Abstract Book

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METHOD OF SELF ORGANIZING MAP (SOM) IN CLUSTERING HUMAN PAPILLOMAVIRUS

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Abstract. Method of Self Organizing Map (SOM) will be given in this article to clustering Human Papillomavirus (HPV). HPV is a virus cause cervical cancer. In this article, we use 18 HPV DNA according to newest complete genome. We have clustered these 18 HPV DNA in to two different cluster which is separated according to their base pairs. This base pairs will determine how easy this virus could mutate.

Key words and Phrases : Self Organizing Map, Human Papillomavirus, Base Pairs

References

THE DEVELOPMENT OF PROBLEM POSING-BASED-INSTRUCTION IN MATH TO DEVELOP STUDENTS' HIGH THINKING LEVEL AND THEIR INDEPENDENT LEARNING

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Abstract. Problem Posing-Based-Instruction (PBI) in Math is placed in the top position in learning Math whereby students are required to master the materials and solve problems in detail. This strategy could also encourage the students to have a high thinking level by which they can gain knowledge by relating the information they have obtained. PBI could also encourage students to study independently. This research will be undertaken collaboratively by both lecturers and students in developing mathematical components that could develop students’ high thinking level and their independent learning. The learning components being addressed is mathematical learning materials that are based on context along with the learning processes. Through this research it is expected that relevant materials and the appropriate learning models could be gained to develop the students’ high thinking level and their independent learning. The subject of the research is the fourth semester students majoring in Math at the Faculty of Education, Islamic University of Riau (UIN Suska Riau). The method to be used is based on the development model offered by Dick & Carey with the consideration that this model is easy to apply and are organized in more detail. Through the research activities appropriate materials and learning models could be obtained on the basis of empirical data through a thorough development process.

Key words and Phrases : Problem posing-based-instruction (pbi), high thinking level, and independent learning
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SOLVING LINEAR PROGRAMMING WITH INTERVAL COEFFICIENTS

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Abstract. The conventional linear programming model requires the parameters to be known as constants. In the real world, however, the parameters are seldom known exactly and have to be estimated. Linear programming with interval coefficients is one of the tools to tackle uncertainty in mathematical programming models. This paper presents a problem solving linear programming with interval coefficients. The problem will be solved by the algorithm general method to solve linear programming with interval coefficients. Thus obtained best optimum solution and worst optimum solution, it can be determined the upper bounds and lower bounds for the optimum value of the main problems.

Key words and Phrases: Linear Programming, Interval Numbers, Linear Programming with Interval Coefficients.
FACTORS THAT INFLUENCE INFIDELITY TENDENCY LEVEL FOR PEOPLE IN JAKARTA

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Abstract. In this modern era, infidelity has been regarded as a common phenomenon among the society, including scholar and worker. Nevertheless, according to the law as well as religion, infidelity is still prohibited. Infidelity causes several negative impacts, such as disease, divorce, rebellious children, and even death. Looking at this fact, infidelity ought to be prevented right at the beginning. This research will investigate the factors which may significantly influence the tendency of infidelity. Several factors to be included in this research is GENDER, OCCUPATION, EDUCATION, POSITION, AGE, FINANCIAL PROBLEM, LIFE SATISFACTION, SELF IMAGE, NEED OF ACCEPTANCE, SPIRITUAL LEVEL, BOREDOM LEVEL, BROKEN-HEART EXPERIENCE, INCOME, FREEDOM IN MAKING FRIEND, LIFESTYLE, LIBIDO LEVEL, OWN AND PARENTS’ MARITAL STATUS. The measurement instrument is self-made and has been proven to be reliable and valid. This research is conducted among 687 workers and scholars in Jakarta. Purposive sampling method is adopted to gather the sample. Data is analyzed by using Two Step Cluster Sampling method and Logistic Regression Model. The result shows that GENDER, FINANCIAL PROBLEM, SPIRITUAL LEVEL, LIBIDO LEVEL, FREEDOM IN MAKING FRIEND, are the significant factors influencing the level of infidelity tendency. The result of this research is hoped to help the religious leaders, counselors, and other related parties to prevent and handle the issue appropriately based on the factors influencing the tendency of infidelity.

Key words and Phrases : Infidelity Tendency, Two Step Clustering, Logistic Regression Model

References


FACTORS AFFECTING THE DIFFERENT PERCEPTIONS AMONG UNIVERSITY OF INDONESIA SCHOLARS TOWARDS LEGALIZATION OF LGBT MARRIAGE

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Abstract. The legalization of LGBT marriage in the United States and the approval from several countries have more or less raised mixed reactions in other countries that have not legalized LGBT marriage, including Indonesia. Now, in Indonesia, some people express their support for the legalization of LGBT marriages, while some others show adverse reaction to the idea. There are many factors affecting the different perceptions. Some of them which will be investigated in this research are GENDER, SOCIAL LIFE, LIFESTYLE, SPIRITUAL LEVEL, ORGANIZATIONAL ACTIVITY, READING ACTIVITY, SYMPATHETIC LEVEL, and SEXUAL ORIENTATION. This research is conducted in order to analyze which factors have significant influence towards the different perception on the legalization of LGBT marriage. Because the future of Indonesia lies in the hand of the young generation, this research is conducted among the University of Indonesia scholars as the sample for the pilot study. The sampling method adopted is Two Stage Cluster Sampling. The primary method of analyzing is Multiple Regression or Logistic Regression Model. Measurement instrument is a self-made and the reliability and validity will be tested. The result of this research is aimed to help Indonesian government to make future regulations and decisions regarding the issue of legalization of LGBT marriage in Indonesia.

Key words and Phrases: LGBT Marriage Legalization, Two Stages Sampling, CHAID, Cluster Sampling, Logistic Regression Model.

References


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AN APPLICATION OF CATASTROPHE THEORY TO ANALYZE THE SUDDEN COGNITIVE DEVELOPMENT FOR KIDS WITH SPECIAL NEEDS

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Abstract. In this paper, an overview of catastrophe theory application is given. So many application in neuroscience and cognitive development are also given. Catastrophe theory specifies a set of criteria for testing the discontinuity phenomenon. Theory of cognitive development as proposed by Piaget is used here, although the development of children with special needs require additional criteria for specialization. Catastrophe model analyzing qualitative change of two control variables to one state variable. Some of the factors that affect the growth and development of a child are the internal factor, i.e. genetic and hormones, and the external factors i.e. nutrition and stimulus (effect of training and support). In this article, effect of training and affection support are chosen as control variables, and sudden cognitive development is chosen as state variable. Correspondence between Gilmore transition criteria, called catastrophe flags, and cognitive development criteria discussed here. As a literature review for a preliminary study, this article does not present the result of the empirical data. Fitting the model do with simulation the fictive data. This article is also equipped with discussion about data retrieval method which is appropriate with the variables.

Key words and Phrases : Catastrophe theory, tiaget, sudden cognitive development, special needs kids, transition criteria.
MODELING HOT WATER BATH TREATMENT OF TROPICAL FRUIT USING LATERAL METHODS OF LINES

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Abstract. One of essential procedure nowadays to analyze a dynamic process in Science and Engineering is Computational modeling. Most of dynamic processes are distributed parameter systems, i.e., systems with state variables depend on the number of independent variables (such as space and time) which are expressed by a set of partial differential equations (PDEs). Lateral method of lines is a method which used for solving PDEs numerically by solving a set of boundary value problems sequentially. The aim is to report the development of PDE toolbox based on Scilab. This paper provides users with a method that is very easy to understand in the applications related to dynamic process. The method uses a Scilab template to develop numerical simulations in the new field. In this paper, a model of tropical fruit heat treatment for decimating insect is presented. The illustration will be given to show how the lateral method of line template works to solve the problem.

Key words and Phrases: Lateral method of lines, Scilab, simulation model.

References

THE DEVELOPMENT OF INSTRUMENT AND INSTRUCTIONAL MATERIALS OF INTEGRAL CONCEPTS BY SCIENTIFIC DEBATE STRATEGIES

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Abstract. The implementation of an integral concept in real life is very broad, but the student’s remains for it in the low category. The strategy of Scientific Debate is allegedly capable to enhance the students’ ability in the concept of the integral. The most important part in the learning process of the Scientific Debate is learning materials and instruments as a means of evaluation. Learning materials and instruments are capable if can measure what should be measured and must have validity, reliability, have criterion power, and the difficulty index. The development of learning materials contains a dish concept, examples of routine and non-routine problem, to exercise routine and of non-routine the question, to reserve application problem. The results of the trial of the instruments was obtained significance value 0.42 that is means the experts have weigh the validity of the content of grains of matter uniformly. The significance value of the question validity is 0.82 it means advance category from the language and images. The significance value of reliability is 0.87 that is included in the advance category. The analysis of the difficulty degree shows the problem number 7 categories difficult, problem number 1, 2, 4, and 6 categories quite, and the problem numbers 3 and 5 categories easily. Analysis of the classification of the criterion power show the problem numbers 1, 2, and 3 is good quite, the problem number 4, 6, and 7 are good, as well as the problem of the number 5 included is excellent.

Key words and Phrases: instruments, validity, reliability.

References

Mathematics, 14, 1-18.


THE CALCULATION OF AGGREGATION ECONOMIC CAPITAL FOR OPERATIONAL RISK USING A CLAYTON COPULA

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Abstract. Bank is required to provide capital adequacy based on its risks. One of the bank’s risks should be calculated for the capital requirement is the operational risk. The operational risk must be managed well because it may have a significant negative effect on their financial reputation. Based on Basel II, the definition of operational risk is the risk of loss resulting from inadequate or failed internal processes, people or systems, or from external events. Meanwhile, the operational risk’s capital requirement is known as the economic capital (EC).

The value of EC is obtained from Value at Risk (VaR) in compound distribution with the level of confidence reaches 99.9%. As known, Basel II Accord has categorized the operational risk into eight business lines and seven loss types. Because of that, bank must calculate EC for overall 56 risks, so it is a need for the aggregation. In the calculation of aggregation EC, the assumptions between risks that is usually used by bank are completely dependent or independent. But, the value of EC from the assumptions are unrealistic, so bank needs to consider the dependence structure that exist between risks for aggregating EC.

In this paper, we use a Clayton copula for this aggregation. A Clayton copula is one type of the Archimedean families that has lower tail dependence. A Clayton copula is used to capture the dependencies of small losses. The purpose of this paper is to conduct a simulation of the calculation of the aggregation EC using a Clayton copula then compares it to the value of EC using a Frank copula. The result of the simulation shows that the value of EC using a Clayton copula is smaller than the value of EC using a Frank Copula.

Key words and Phrases: Operational Risk, Economic Capital, Clayton Copula.
References


ON THE RATE OF CONSTRAINED ARRAYS

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Abstract. Sudokus are nowadays very popular puzzles and they are studied for their mathematical structure. Binary Puzzles are also interesting puzzles with certain rules. A solved Binary Puzzle is an $n \times n$ binary array satisfying: (i) there are no three consecutive ones and also no three consecutive zeros in each row and each column, (ii) the number of ones and zeros must be equal in each row and in each column, and (iii) every two rows and every two columns must be distinct. Binary Puzzles can be seen as constrained arrays and can be used for modulation purposes. It has been studied in [1] that in general, the capacity of two-dimensional constrained arrays is not zero.

In our previous paper [2], we outlined some problems related to Binary Puzzles such as (1) rate of these codes, (2) erasure decoding probability, (3) decoding algorithms and their complexity.

In this paper, we focus on the first problem, that is finding the rate of a code based on the Binary Puzzle. The computation of the number of $n \times n$ Binary Puzzles is a very difficult problem, and so far we were only able to obtain the values for small $n$, by brute force. Since a Binary Puzzle has to satisfy the conditions (1), (2) and (3), we consider these conditions separately and split the computation in three different parts, where each part corresponds to one condition.

That means we consider the following collections of $n \times n$ binary arrays that are constrained:

$A_{n \times n} = \{ X \in \mathbb{F}_2^{n \times n} \mid X \text{ satisfies (i)} \}$

$B_{n \times n} = \{ X \in \mathbb{F}_2^{n \times n} \mid X \text{ satisfies (ii)} \}$

$C_{n \times n} = \{ X \in \mathbb{F}_2^{n \times n} \mid X \text{ satisfies (iii)} \}$

$D_{n \times n} = \{ X \in \mathbb{F}_2^{n \times n} \mid X \text{ satisfies (i), (ii) and (iii)} \}$

where $\mathbb{F}_2^{n \times n}$ is the set of all $n \times n$ binary arrays.

Although the exact size of $A_{n \times n}, B_{n \times n}$ and $D_{n \times n}$ is still an open problem, we provide lower and upper bounds of their sizes, and also of the asymptotic rates. The exact value of $|C_{n \times n}|$ is given by means of a recursive formula.

Key words and Phrases: Binary Puzzle, rate of a code, constrained arrays

References

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BANK D COMPETITORS BASED ON BANKING SATISFACTION AND CUSTOMER ATTACHMENT AND EVALUATION FROM COMPETITORS IN SATISFACTION USING ATM AND BRANCH OFFICES IN DKI JAKARTA

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Abstract. This research using secondary data that is customer data from ten banks, namely: A, B, C, D, E, F, G, H, I, J. The study was conducted to find a competitor of Bank D is based on the customer attachment (CA) and based on the experience of banking satisfaction (satisfaction). Both of these are things that need to be considered by each bank to maintain a good relationship with the customers so that customers continue to use the relevant bank. After that, the Bank D evaluate in terms of CA (against the banks that compete in CA), and satisfaction in using the services of ATMs and branches (for banks that compete in terms of satisfaction). The analysis used for this purpose is a correspondence analysis followed by Kruskal - Wallis. The results obtained showed that the satisfaction of using an ATM and branch offices of Bank B differ significantly from the Bank D and better than the Bank D. Bank D need to improve the service to both of these services because both services that are most frequently used by the customer. Then, the demographic factors that associated significantly between Bank D and Bank B customer’s are age and routine expenses per month from customers. So these two factors need to be considered by the Bank D serve targeted in an effort to evaluate the repair and improvement services to its customers.

Key words and Phrases : Bank, Customer, Customer Attachment, Satisfaction, ATM, Branch Office, Correspondence Analysis, Kruskal-Wallis Test
ESTIMATING THE VALIDITY OF CONSTRUCTS IN PATIENT LOYALTY MODEL

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Abstract. The main objective of this present study is to demonstrate the estimation of validity values of structural and measurement equation in case of the construction the patient loyalty model. The method of estimation was then implemented to an empirical example in which service quality, patient satisfaction and patient loyalty were determined simultaneously. The respondents involved in this study were the patients who ever got healthcare at Puskesmas in Padang, West Sumatera. All 394 respondents who had complete information were involved in this study. This study found that each construct, service quality, patient satisfaction and patient loyalty were valid. It means that all hypothesized indicator variables were significant to measure their corresponding latent variable. In structural relationship that estimated the affect of service quality to patient satisfaction and patient satisfaction to patient loyalty, were also valid. Therefore, this study found that patient loyalty was affected by patient satisfaction positively and directly. Meanwhile service quality affected patient loyalty indirectly with patient satisfaction as mediator variable between both latent variables.

Key words and Phrases: Validity values, patient loyalty, service quality, patient satisfaction.

References

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REPRESENTATION OF SERIES INTO DOUBLE INTEGRAL FORM

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Abstract. Abstract. Representation of series into another form is one of the studies contained in mathematical sciences. One of the most common representation is the representation of series into an integral form, which allows the series (especially the infinite series) can be determined the value or sum. There are many ways to represent the series into integral form, such as by utilizing the Maclaurin series expansion, integral special functions (gamma and beta function), and theorems that have been there before. Anthony Sofo [9] in the study had found the form of a representation of the series $S(a,b,j,k,m,t)$ into double integral form, that will be reviewed in this paper and also its convergence analysis.

Key words and Phrases: Maclaurin Series, Double Integral, Euler Integral, Combinatorial Identities.

References


RELATION PATTERN BETWEEN JOB DISTRESS AND DEMOGRAPHIC FACTORS AMONG WORKERS IN JAKARTA

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Abstract. “Job Stress” is a pressure experienced by worker in doing his job. In psychology, in general, job stress is classified into two. Firstly is job stress which brings negative effect, such as discouragement, illness, etc, and widely referred as job distress. On the other hand, there is job stress which is able to encourage worker to strive, work more creatively, etc, and it is known as job eustress. This research emphasizes more on Job Distress, including Autonomy and Control Distress, Influence over Decision Distress, Peer Support Distress, Leader Support Distress, Work Demand Distress, and Feedback Distress. The same distress experienced by different worker may result differently. This difference is presumed to happen because of the demographic factors of the worker, such as gender, age, occupation, position in job, and work tenure. This research will investigate the demographic factors influencing each job distress and find the related correlation. Research method being used is CRT method. The result is written in this paper. From this research, Job Distress can be prevented and reduced based on a proper method. This research is conducted using purposive sampling among workers in Jakarta.

Key words and Phrases : Job Distress, Demographic Factors, purposive sampling, CRT.

References


DISCRETE TIME MARKOV CHAIN MODEL FOR INFLUENZA SPREAD WITH MEDICAL MASK AND TREATMENT INTERVENTIONS

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Abstract. In this article, we introduce Discrete Time Markov Chain (DTMC) model for influenza spread model. Intervention of Medical mask and treatment to prevent and cure people from Influenza is involved in to the model. Mathematical analysis to find the equilibrium points and their stochastic properties will be discussed in this article. Some Stochastic simulation with several scenario will be given to show some case that might occur in the field.

Key words and Phrases: Discrete Time Markov Chain, Influenza, Medical Mask, Treatment, Equilibrium Points.

References


SPLINE TRUNCATED ESTIMATOR IN MULTIVARIABLE ADDITIVE NONPARAMETRIC REGRESSION

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Abstract. Regression analysis to estimate the regression curve there are three approaches, is parametric regression, the nonparametric and semiparametric regression. Parametric approach assumes the shape of a model to follow a specific pattern while nonparametric approach in the absence of any information about the shape of the regression function. Beside regression approach can be differentiated from the number of variable, both the response variable and predictor variable, is multiple linear regression and multivariable regression. Additive multivariable regression is the sum of several predictor variable. In estimating the nonparametric regression curve, there are several approaches of which spline truncated. The excess truncated spline is to describe the change in the pattern of behavior of the function at sub-intervals.

Nonparametric regression curve estimation spline truncated is:

$$\hat{\mu}(x_{1i}, x_{2i}, \ldots, x_{pi}) = \sum_{j=1}^{p} \sum_{v=1}^{m} \hat{\beta}_{vj} \hat{x}_{ji} + \sum_{j=1}^{p} \sum_{k=1}^{r} \hat{\beta}_{jk(m)}(\hat{x}_{ji} - K_{jk})^{m}$$

Spline truncated estimator regression parameter is given by $\hat{\beta} = (\hat{\beta}_{1}, \ldots, \hat{\beta}_{p})^{\top}$, with $\hat{\beta}_{1} = (\hat{\beta}_{11}, \ldots, \hat{\beta}_{m1}, \hat{\beta}_{1(m+1)}, \ldots, \hat{\beta}_{r(m+1)})^{\top}, \ldots, \hat{\beta}_{p} = (\hat{\beta}_{1p}, \ldots, \hat{\beta}_{mp}, \hat{\beta}_{p(m+1)}, \ldots, \hat{\beta}_{p(r+m)})^{\top}$.

Key words and Phrases : Nonparametric Regression, Multivariable Additive, Spline Truncated
THE STOCHASTIC SI MODEL IN SINGLE AREA: COMPARISON WITH THE DETERMINISTIC SI MODEL

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Abstract. Deterministic and stochastic models often used in mathematical modeling. It is important to know the relationship between these models and the results obtained from the models. Here we discuss the stochastic SI (Susceptible-Infected) model in single area. Solution of the stochastic SI model will be solved numerically using the Euler-Maruyama method. Data SARS from WHO in 2003 in Singapore and Hong Kong will be used to compare solution of the deterministic and stochastic SI models with the original data.

Key words and Phrases: deterministic, stochastic, stochastic differential equation, Euler-Maruyama method.

References

GEOGRAPHICALLY WEIGHTED BIVARIATE NEGATIVE BINOMIAL REGRESSION (GWBNBR)

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Abstract. Poisson regression is customary model for count data response variable. However, the negative binomial regression is more appropriate instead of Poisson regression when the data presence an overdispersion. Both of which are global regression which occasionally produce a misleading result due to spatial heterogeneity. Local regression so-called geographically weighted negative binomial regression (GWNBR) is alternatively used for univariate count data with overdispersion. This paper provides the parameterization and testing hypothesis for parameters of bivariate count data model namely geographically weighted bivariate negative binomial regression (GWBNBR).

Key words and Phrases: Bivariate count data, overdispersion, spatial heterogeneity, local regression model.

References


INFLATION CONVERGENCE ANALYSIS
INTER REGION IN INDONESIA BY USING
SPATIAL DYNAMIC PANEL MODEL AB-
GMM AND SYS-GMM

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Abstract. Inflation controlling which is applied in targeting inflation that ruined
by Bank Indonesia as central banks and government aimed for stability of inflation
rate. Inflation targeting is related to inflation convergence inter-province in
Indonesia which has a relationship with each other. This study intends to discuss the
existence of inflation convergence inter-province in Indonesia and identify spatial
effect in the process. Using data from January 2002 to December 2014, the study
testing absolut beta convergence and conditional beta convergence. The variables
used of this study based approach demand pull inflation, including administered
price (fuel prices) and economic growth. This variables that was suspected have an
effect on to inflation convergence consist of real sector and monetary side. This
study used Spatial Dynamic Panel Model with Arellano-Bond Generalized Method
of Moment (AB-GMM) and Blundell-Bond GMM (SYS-GMM), considering of
spatial effect between the region in Indonesia. Using matrix coefficient Inter-
Regional Input Output (IRIO) Indonesia 2005 as spatial weight matrix.

Key words and Phrases : Convergence, Inflation, Spatial Dynamic Panel Model,
Spatial Effect.

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Models Featuring Endogeneous Interaction and Spatially Correlated Errors, CentER
John Wiley & Sons Ltd. West Sussex.
INVESTIGATING SPOKEN COUNTING EXPRESSIONS IN JAVANESSE AND BAHASA INDONESIA USING ETHNOMATHEMATICS APPROACH

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Abstract. Bahasa Indonesia is national language of Indonesians throughout the country. However, people of Java or Javanesse descendants mostly still speak their mother language. They spread out throughout the country of Indonesia. One of uniqueness of the language is their basic mathematical expression such as counting which they still use in their daily conversation nowadays. This paper will examine the Javanesse counting expression compare to Bahasa Indonesia. Furthermore, it will suggest how the cultural heritage would determine classroom teaching and learning activity. Survey was used to gather the data. Using ethnomathematics framework, the study would enrich cultural knowledge related to mathematics. Qualitative approach will assist the study for conclusion and study.

Key words and Phrases: counting expression, Javanese language, Bahasa Indonesia, Ethnomathematics.

References


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NUMERICAL STABILITY OF THE CLASS PARTIAL DIFFERENTIAL EQUATIONS WITH TIME DELAYS AND IMPULS

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Abstract. In this paper we discuss a stability condition for numerical solutions to a class of boundary value problem (BVP) of partial differential equations of parabolic type with a time delay and impulse. In particular Neumann or Dirichlet BVP is discussed. The BVP model studied is

\[ \partial_t u(x,t) = \theta \partial_x^2 u(x,t) + u(x,t)[1 - u(x,t - \tau)], x \in \Omega, t \geq 0 \]

\[ u(x,t) = 0 \text{ or } \partial_t u(x,t) = 0, x \in \partial \Omega, t \geq 0 \]

\[ u(x,t) = \eta(x,t), x \in \Omega, t \in [-\tau, 0] \]

\[ u(x,t_k) = I_k(u(x,t_{k-1})), \quad t_k > 0, k = 1, 2, \ldots \]

Where \( \Omega = [0,1] \), the delay \( \tau \) and diffusive coefficients \( \theta \) are positive constants.

Our main result is a stability condition for this scheme.

Proposition 2.1 Explicit finite difference scheme of Equation (5) is stable under the condition

\[ \Delta t \leq \frac{2 \Delta x^2}{40 - \Delta x^2 [1 - \max u]} \]

Where \( \max u = \max \{u^j_n: j = 1, 2, \ldots, M + 1, n = N_t + 1, N_t + 2, \ldots, T > 0\} \), \( \Delta x^2 (1 - \max u) < 40 \).

Consistency of the scheme is illustrate in a few examples below. The following example, \( \eta = 0.6 \exp(0.4t) \sin(\pi x) \), \( \theta = 0.01 \) and \( \tau = 1 \) with Dirichlet boundary is presented in Figure (1), the Neumann boundary in Figure (2).
If the stability condition is not satisfied, the numerical simulation may not be stable, for example, we take the last \( \eta \) with Neumann boundary is presented in Figure (3). In this case, \( \delta t = 50 \times 10^{-4} \), \( D = 49.9014 \times 10^{-4} \), \( \theta = 0.06581 \).

Key words and Phrases: Hamilton-Jacobi-Bellman equation, abstract Cauchy problem, m-accretive operator, semigroup.

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Monotone Operators in Banach Space and Nonlinear Partial Differential Equations, American mathematical Society, USA, 1997
A SUPER H-ANTIMAGIC TOTAL COVERING OF A GENERALIZED AMALGAMATION OF GRAPHS

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Abstract. Let $G = (V, E)$ be a nontrivial, finite, simple and undirected connected graph. Let $f : E(G) \rightarrow \{1, 2, \ldots, k\}, k \in N$ be an edge coloring on which the adjacent edges may be colored the same colors. A path in an edge colored graph is said to be a rainbow path if no two edges on the path have the same color. An edge colored graph $G$ is rainbow connected if there exists a rainbow $u - v$ path for every two vertices $u$ and $v$ of $G$. The rainbow connection number of a graph $G$, denoted by $rc(G)$, is the smallest number of $k$ colors required to edge color the graph such that the graph is rainbow connected. In this paper, we will obtain the exact values of rainbow connection number of shackle of special graphs and its operations.

Key words and Phrases: Rainbow coloring, rainbow connection number, shackle of graphs

References
ON RAINBOW CONNECTION NUMBER OF SHACKLE OF GRAPHS

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Abstract. All graphs in this paper are simple, undirected and connected graphs. Let \( G = (V(G), E(G)) \) be a graph of order \( p \) and size \( q \). Graph \( G \) admits a \( H \)-covering, if every edge in \( E(G) \) belongs to at least one subgraph of \( G \) isomorphic to a given graph \( H \). A graph \( G \) is said to be an \((a, d)\)-\( H \)-antimagic total labeling if there exist a bijective function \( f : V(G) \cup E(G) \rightarrow \{1, 2, ..., |V(G)| + |E(G)|\} \) such that for all subgraphs \( H' \) isomorphic to \( H \), the total \( H \)-weights \( w(H) = \sum_{v \in V(H')} f(v) + \sum_{e \in E(H')} f(e) \) form an arithmetic sequence \( \{a, a + d, a + 2d, ..., a + (s - 1)d\} \), where \( a \) and \( d \) are positive integers and \( s \) is the number of all subgraphs \( H' \) isomorphic to \( H \). Such a labelling is called super if \( f : V(G) \rightarrow \{1, 2, ..., |V(G)|\} \). In this paper, we will study a super \( H \)-antimagicness of a connected and disconnected generalized amalgamation of fan graphs on which a path is a terminal.

Key words and Phrases : Super \( H \)-antimagic total covering, generalized amalgamation of graph, connected and disconnected fans

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GEOGRAPHICALLY WEIGHTED REGRESSION MODELING AND MAPPING ON THE HUMAN DEVELOPMENT INDEX EAST KALIMANTAN

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**Abstract.** In this paper, we will discuss a statistical method that aims to overcome the spatial heterogeneity. The difference between the environmental characteristics and geographic location of the observation, so that each observation has different variations. We will discuss about the estimation geographically weighted regression model using the maximum likelihood estimator, as well as investigating the nature of the estimator parameters unbias. Further discussing the kind of test statistics of Geographically Weighted Regression models by likelihood ratio test and empirical studies used the data as the Human Development Index (HDI) in the province of East Kalimantan, which consists of 14 districts. The results showed that the parameter estimator meet unbias nature and results of empirical studies showed better GWR models of the classical regression model in lowering the value of the sum of the square and cross products error (SSPE), and the Akaike Information Criterion (AIC).

**Key words and Phrases :** Geographically Weighted Regression, Human Development Indeks, Likelihood Ratio Test, Maximum Likelihood Estimator, Spatial.

**References**

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Abstract. The herpes virus can be found anywhere and one of the important characteristics is its ability to cause acute and chronic infection at certain times so as a result of the infection allows severe complications occurred. The herpes virus is composed of DNA and containing protein and wrapped by glycoproteins. In this work, the Herpes viruses family can be classified and analyzed by clustering their protein-sequence using Tribe Markov Clustering (Tribe-MCL) algorithm. Tribe-MCL is an efficient clustering method based on the theory of Markov chains, to classify protein families from protein sequences using pre computed sequence similarity information. We implement the Tribe-MCL algorithm using an open source program of R. We select 24 protein sequences of Herpes virus obtained from NCBI database at http://www.ncbi.nlm.nih.gov/. The dataset consists of three types of glycoprotein B, F, and H. Each type has eight herpes virus that infected humans. Based on our simulation using different inflation factor r=1.5, 2, 3 we found various number of the clusters results. The greater the inflation factor the greater the number of their clusters. Each protein will group together in the same type of protein.

Key words and Phrases : Clustering, Herpes Virus, Sequence of Protein, Tribe Markov Clustering, Tribe-MCL

References


A SEMIGROUP APPROACH TO THE HAMILTON-JACOBI-BELLMAN EQUATION FOR FINITELY MANY HAMILTONIANS

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Abstract. Hamilton-Jacobi-Bellman equation is a nonlinear partial differential equation which frequently appears in optimal control. This equation is often formulated as a terminal value problem. For a family of hamiltonian \(\{H_\alpha\}\), the Hamilton-Jacobi-Bellman equation is

\[
\begin{align*}
    u_t + \min_{\alpha} \{H_\alpha(Du)\} &= 0 \text{ in } \mathbb{R}^n \times (0,T) \\
    u &= g \text{ on } \mathbb{R}^n \times \{t = T\}
\end{align*}
\]

There are a comprehensive body of knowledge for the Hamilton-Jacobi-Bellman theory. For example, we can see Bardi and Dolcetta [2], Evans [4], Liberzon [8], Lions [9], and Oksendal [10]. Our concern is the Hamilton-Jacobi-Bellman equation with finitely many Hamiltonians \(\{H_i : i = 1, 2, \ldots, n\}\) for which the corresponding Hamilton-Jacobi equation

\[
    u_t + H_i(Du) = 0 \quad i = 1, 2, \ldots, n
\]

is well posed. Specifically, we assume that the infinitesimal generator \(A_i\) corresponding to the Hamiltonian \(H_i : u_t + H_i(Du) = 0\) is \(m\)-accretive. For \(m\)-accretive property of Hamilton-Jacobi equation see for example Aizawa [1], Burch [3], and Goldstein and Soeharyadi [5]. By this assumption, we show that the generator for the semigroup of Hamilton-Jacobi-Bellman equation is also \(m\)-accretive. Therefore, by Crandall-Liggett theorem, Hamilton-Jacobi-Bellman is wellposed.

Technically, we first convert the terminal value problem of Hamilton-Jacobi-Bellman equation into initial value problem. Introducing new variable \(s = T - t\), we have

\[
\begin{align*}
    u_t + \min_{i \leq n} \{H_\alpha(Du)\} &= 0 \text{ in } \mathbb{R}^n \times (0,T) \\
    u &= g \text{ on } \mathbb{R}^n \times \{s = 0\}
\end{align*}
\]

we then can define abstract Cauchy problem of the Hamilton-Jacobi-Bellman equation

\[
    u_t = A_u, \quad u(0) = g
\]

With \(A_u = \min_{i \leq n} \{A_i\}\). In this case, \(A_i u = H_i(Du,x)\). By the well-posedness of the Hamilton-Jacobi-Bellman equation, the problem is governed by a semigroup of nonlinear operator \(S(t)\), and the solution can be expressed as an evolution of the initial data

\[
    u(t) = S(t)u(0), \quad t > 0 \\
    u(0) = g
\]

Key words and Phrases : Hamilton-Jacobi-Bellman equation, abstract Cauchy
problem, m-accretive operator, semigroup.

References

EXPLORING DEPENDENCY THROUGH VINE COPULA MODEL

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Abstract. Copula is known as a joint distribution function of two or more random variables. It is useful and best solution, in particular, when the marginals are not normal nor identical. In addition, we may also consider Copula as a measure of dependency and thus form a dependence structure. This structure is, however, quite difficult to observe when dealing with more than two dimensional data. To solve this problem, in this paper, we have used a Vine Copula model to explore such dependency. We do this especially through a graph structure whilst its dependence measure is calculated by using partial Kendall’s tau. A numerical analysis is carried out to illustrate on how to form dependence structure and its corresponding graph structure.

Key words and Phrases: graph structure, joint distribution, Kendall’s tau, pair of random variables.

References

PARAMETER ESTIMATION AND STATISTICAL TEST IN MODELLING POISSON INVERSE GAUSSIAN REGRESSION

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Abstract. Count data is data that describes a number of events that occur in a certain period. In statistics, count data is always modelled with a simple Poisson regression. But in many real application, the simple poisson regression fails to describe the data since, usually, the sample variance is larger than the sample means (overdispersion) as required by the simple poisson regression. Negative binomial regression was introduced as one of the mixture poisson regression allowing for overdispersion. Since then, the negative binomial regression has been used in many researches involve count data. Another competing model is poisson inverse gaussian regression. Poisson inverse gaussian regression which also designed for modelling count data with overdispersion case has been widely used in many researches. Some researches show that modelling with poisson inverse gaussian regression is the better model in modelling count data with overdispersion comparing to the negative binomial regression. A poisson inverse gaussian regression model is developed and the maximum likelihood estimation of parameter and statistical hypothesis test are studied.

Key words and Phrases: Poisson Inverse Gaussian, Maximum Likelihood Parameter Estimation, Statistical Hypothesis Testing.

References

PROJECTION ISOMETRIC STOCHASTIC FLOWS FROM $Sp(2)$ TO $S^7$ AND $\Sigma^7$

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Abstract. A research that study about isometric stochastic flows based on viewpoints of action Lie group $S^3$ on $Sp(2)$, and projection $Sp(2)$ to $S^7$ and $\Sigma^7$ has been done. The purpose of this research is to formulate and analyze isometric stochastic flows by those two viewpoints. The formulation was made by constructing isometric stochastic flows on $Sp(2)$. Explicitly, isometric stochastic flows was constructed in an standard Euclidean sphere $S^7$ and Gromoll-Meyer exotic sphere $\Sigma^7_{GM}$ by projection $Sp(2)$. This research has many potential implications for giving geometric formulation and exotic differential structure viewpoint for formulation of isometric stochastic flows on exotic manifold.

Key words and Phrases: isometric stochastic flows, $Sp(2)$, Milnor exotic sphere, and Gromoll-Meyer exotic sphere.

References

THE ENHANCEMENT OF CRITICAL THINKING ABILITY IN MATHEMATICS OF NATURAL SCIENCES STUDENT THROUGH CONTEXTUAL BASED LEARNING MATERIALS

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Abstract. This research aimed to examine the effect of the application of Contextual Based Learning Materials to the enhancement of critical thinking ability in mathematics of Natural Sciences Students. This research was quasi experimental study with the population of all Natural Sciences Students in one university in the city of Bogor. The samples were Natural Sciences Students who took Basic Mathematics Courses. The Subjects were students of pharmacy at a private university as many as 200 people. The design of this study was a pretest-posttest group design. The instruments used in this study were pretest and posttest of critical thinking ability in mathematics. Quantitative data obtained with the instrument in the form of essay test critical thinking ability in mathematics. The data were analyzed using descriptive statistics to determine the average score of the acquisition of the student and determine the value of the average gain normalized to determine enhancement category of critical thinking ability in mathematics. The results show the students'enhancement of critical thinking ability in mathematics quite high and the category of critical thinking ability in mathematics including high category. It can be concluded that the use of contextual based learning material can enhance students' critical thinking ability in mathematics of Natural Sciences Students.

Key words and Phrases : Contextual Based Learning Materials, Critical Thinking Ability in Mathematics, Basic Mathematics Courses, Natural Sciences Student.

References

SPATIAL ANALYSIS AND MODELLING OF VILLAGE LEVEL POVERTY

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Abstract. Poverty issue needs special attention from the government, especially local government. Since decentralization, local governments were given authority to its own policy decisions for the region as well as in terms of poverty alleviation. It is necessary for poverty data to both the smallest area district and even village level. However, the poverty data required the local governments can not be presented until the level of the smallest area. Thus, we need a model that better accuracy for use in the estimation to the smallest area. One solution to improve the accuracy of the model can be by adding a spatial aspect. Furthermore, in this study is done by inserting a spatial aspect in the model. The model is used to determine the factors affecting the village level poverty. Spatial weighting used in this study are the queen contiguity (side-angle contiguity) and a customized contiguity (main business field every village). The aim of this study is to compare the estimation between the Ordinary Least Square (OLS) model with spatial models through R2 and AICc as well as getting the model of village level poverty in Pati Regency, Middle Java, Indonesia. The results showed that the estimation with spatial models (SAR) is better than the OLS model.

Key words and Phrases: ordinary least square, spatial regression, spatial autoregressive models, poverty.

References


ANALYSIS OF THE INFLUENCE OF THE CHARACTERISTICS PATIENT OF THE FOUR INPATIENT DISEASES DIAGNOSIS WITH THE HIGHEST COST IN THE PT ASURANSI ABC AGAINST HOSPITALIZATION COSTS BASED ON CLAIMS DATA

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Abstract. PT Asuransi ABC in collaboration with 68 companies, consists of 34960 participants, of which there are 1731 participants who filed claims. This study uses secondary data period July 1, 2013 - 30 September 2014. This study focused on inpatient claims, where there are 4 burdensome disease diagnosis PT Asuransi ABC at a high cost, those are coronary atrial diseases, chronic renal failure, typhoid fever, dengue haemorrhagic fever. Multiple correspondence analysis method is used to find the characteristics of each patient's disease diagnosis as well as the tendency of the characteristics of the patients in the cost of hospitalization. From this research, there are differences in patient characteristics between the disease and also the trend in the cost of hospitalization. Furthermore, the multiple linear regression analysis of patient characteristics influence on the cost of hospitalization. From the results of this research only typhoid disease hospitalization costs are influenced by patient characteristics.

Key words and Phrases : characteristics of patients, cost of hospitalization, multiple correspondence analysis, multiple linear regression.

References


THE EFFECT OF ECONOMIC GROWTH ON HUMAN DEVELOPMENT DIMENSIONS ANALYSIS WITH STRUCTURAL EQUATION MODELLING (SEM) USING RESPONSE BASED UNIT SEGMENTATION PARTIAL LEAST SQUARE (REBUS-PLS)

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Abstract. The results of HDI and Economic Growth calculation conducted by BPS showed disparities on Human Development and Economic Growth achievement in 33 provinces in Indonesia. This situation makes the local government and the general public often questioned how the relationship between economic growth and dimensions of Human Development. One method that can be used to describe this complex relationship is variant based Structural Equation Model (SEM) or Partial Least Square (PLS). However, in SEM based research, there is a presumption that the samples were taken from a homogeneous population. There are approaches that can be used to detect and overcome the heterogeneity in SEM, one of them is by using Response Based Unit Segmentation Partial Least Square (REBUS-PLS). The processing results by using REBUS-PLS shows provinces grouped into two groups, so that in each group became more homogeneous. The grouping is based on the similar behavior in the model. Furthermore, each formed group has generated a better value of R² and Goodness of Fit (GoF) when compared with that generated by ordinary PLS. This shows that the models in each formed group is better than before the group was formed.

Key words and Phrases: Structural Equation Modelling (SEM), Partial Least Square (PLS), Response Based Unit Segmentation Partial Least Square (REBUS-PLS), Economic Growth, Human Development

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SmartPLS dan Visual PLS, Salemba Infotek

Abstract. Let $A$ and $B$ $C^*$-algebras. Right (left) Hilbert-$C^*$ module $X_A(\rho X)$ is module that completed with right (left) inner product $<\cdot, \cdot>_A (\rho <\cdot, \cdot>)$ and satisfied completeness on right (left) norm module $||\cdot||_A (\rho ||\cdot||)$ whereas Hilbert-$C^*$ bimodule $bX_A$ is bimodule that completed with right and left inner product and satisfied completeness on right and left norm module. Objectives of this final paper are to describe what is Hilbert-$C^*$ module and Hilbert-$C^*$ bimodule and how to construct it, studied its properties along with its application by examples. Research was done by literatures study, that is studied its main themes that highly related with Hilbert-$C^*$ module and Hilbert-$C^*$ bimodule. As the result, Hilbert-$C^*$ bimodule can be constructed through module with two $C^*$-algebras as scalar completed with inner product and satisfies completeness on norm module. Then, we will show its application by examples.

Key words and Phrases: $C^*$-algebra, Hilbert space, inner product space, Hilbert-$C^*$ module, Hilbert-$C^*$ bimodule.

References

THE EFFICIENCY OF PRIVATE AND PUBLIC HOSPITALS IN WEST JAVA: AN APPROACH TO PRINCIPAL COMPONENT ANALYSIS WITH DATA ENVELOPMENT ANALYSIS

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Abstract. This paper aims to evaluate the efficiency of public and private hospitals in West Java by applying the nonparametric method of Principal Component Analysis with Data Envelopment Analysis (PCA-DEA). For this purpose, the statistical data for 6 months of 2015 are updated from the Ministry of Health Direktorat Jendral Bina Upaya Kesehatan. We have selected the five inputs: Paid Workers basic medical grounds, medical specialist, non-medics, other paramedics, and Paid Beds and two outputs: Periodical inpatients and paid outpatient.

Key words and Phrases: efficiency, principal component analysis, data envelopment analysis, hospitals.

References

AN INCLUSION PROPERTY OF ORLICZ-MORREY AND WEAK ORLICZ-MORREY SPACES

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Abstract. Orlicz-Morrey spaces are generalizations of Orlicz and Morrey spaces. There are two versions of Orlicz-Morrey spaces. One is defined by Nakai [4] and another by Sugano, Sawano, and Tanaka [1]. Here we are interested in studying the inclusion property of these spaces which were introduced by Nakai, where Orlicz-Morrey spaces is the set
\[ L_{\Phi,\Psi}^p (\mathbb{R}^n) = \{ f \in L^p_{\text{loc}} (\mathbb{R}^n) : \|f\|_{L_{\Phi,\Psi}} < \infty \} \]
For which \[ \|f\|_{L_{\Phi,\Psi}} = \sup_B \|f\|_{L_{\Phi,\Psi},B} \] and
\[ \|f\|_{L_{\Phi,\Psi},B} = \inf \{ \lambda > 0 : \Phi(\frac{|B|}{\lambda}) \int_B |f(x)| dx \leq 1 \} \]
Gunawan, et.al.[2] have proved an inclusion property of Generalized Morrey spaces, i.e let \( \Phi, \Psi : (0, \infty) \rightarrow (0, \infty) \) almost decreasing functions such that \( r \Phi(r) \) almost increasing. Then, \( L_{p,\Phi} (\mathbb{R}^n) \subset L_{p,\Psi} (\mathbb{R}^n) \) is true if and only if \( \Phi(t) \leq \Psi(t) \) for all \( t > 0 \) and \( p \geq 1 \). On another hand, by using \( \Phi^{-1}(s) = \inf \{ r > 0 : \Phi(r) \geq s \} \) Masta, et. al. [3] have proved an inclusion property of Orlicz spaces \( L_{\Phi} (\mathbb{R}^n) \). Let \( \Phi, \Psi \) be two Young functions. Then, \( L_{\Phi} (\mathbb{R}^n) \subset L_{\Psi} (\mathbb{R}^n) \) is true if and only if \( \Phi(t) \leq \Psi(t) \) for all \( t > 0 \). Now, we will discuss the structure of Orlicz-Morrey spaces \( L_{\Phi,\Psi} (\mathbb{R}^n) \). By using \( \Phi^{-1}(s) \) we will obtain some necessary and sufficient conditions for the inclusion property of Orlicz-Morrey spaces and extend the results to weak Orlicz-Morrey spaces.

Key words and Phrases : Inclusion, Orlicz-Morrey Spaces, weak Orlicz-Morrey Spaces.

References

THE ACCURACY OF LINEARIZATION METHOD OF DIFFERENTIAL EQUATION IN FLYING WING EQUATION OF MOTION

JEMIE MULIADI

Abstract. Aircraft movements were subjected to the Newtonian equations of mechanics and to the Euler’s moment equations, which is highly nonlinear and also consuming high computational load. For some practical reason, the methods of linearization were developed to reduce the complexity of the computation needed to produce dynamic solution of the aircraft model. So far, the method works well in conventional aircraft which consist of wings, fuselage (body), vertical tail and horizontal tail. Recently, the Agency of The Assessment and The Application of Technology (BPPT, Indonesia) has developed the unconventional “Flying Wing” configuration UAV. The configuration was unconventional due to the omission of both tails in order to reduce the drag force. Therefore, an assessment needs to be performed to investigate the suitability of linearization method for Flying Wing UAV compared to its exact solution. The result of the simulation shows that the omission of tail doesn’t affect much to the accuracy of the linearized model compared to its exact solution. Which conclude that, although Flying Wing were unconventional configuration, but it was suitable to be modelled using linearized equation of motion.

Key words and Phrases: Linearized Equation of Motion, Flying Wing, BPPT UAV.

References

THE RELATIONSHIP BETWEEN MATHEMATICS AND THE WORDS OF WISDOM

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Abstract. Mathematics is an abstract science in terms of the object of study. Although it is an abstract sciences, mathematics is required by the other sciences to solve problems in it. Consequently, mathematics is also known as the Queen of knowledge. Not only that, mathematics can also show and prove the words of wisdom in the form of qualitative statements through the mathematical process in the form of quantitative statement. Therefore, this study will examine several cases in mathematical process that prove and support the words of wisdom in the form of qualitative statements. The method used in this research is the literature study as researcher chooses and examines some of the existing literature and also synthesis some mathematical processes that are developed based on experiences in mathematics itself. The results show that mathematics has a relationship with the words of wisdom that can be viewed through a mathematical calculation process in which proves and shows that the qualitative statements of the words of wisdom are true.

Keywords and Phrases: Relationship, Mathematics, Quantitative, The words of wisdom, Qualitative

References

BOUND SETS IN STANDARD \(n\)-NORMED SPACES

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Abstract. The theory of 2-normed spaces was first introduced by Gähler [3] in 1963 and extended to the theory of \(nn\)-normed spaces, for \(n > 2\) [4,5]. Recently, Kir and Kiziltunc [2] defined the notion of bounded sets in an \(n\)-normed space. Their result was rectified by Sukaesih et al. [1] as follows. Let \(K\) be a nonempty subset of \(X (\| \cdot \|, \cdots, \| \cdot \|)\). Then \(K\) is called bounded with respect to \(A = \{a_1, \cdots, a_n\}\) if there is \(M > 0\) such that
\[
\|x, a_{i_2}, \cdots, a_{i_n}\| \leq M
\]
for every \(x \in K\) and \(\{i_2, \cdots, i_n\} \subseteq \{1, \cdots, n\}\). In this paper we show that for standard \(n\)-normed spaces, a set \(K \subseteq X\) is bounded with respect to \(A\) if and only if \(K\) is bounded with respect to another \(nn\) linear independent vector \(B = \{b_1, \cdots, b_n\}\). Consequently, \(K\) is bounded if it is so with respect to any \(n\) linear independent set.

Key words and Phrases: \(n\)-norm, \(nn\)-normed spaces, bounded set.

References

INCREASING THE STUDENTS’ MATHEMATICAL COMMUNICATION SKILL BY APPLYING REACT (RELATING, EXPERIENCING, APPLYING, COOPERATING, AND TRANSFERRING) LEARNING STRATEGY IN GRADE 7 AT 99 JAKARTA JUNIOR HIGH SCHOOL

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Abstract. According to the observation and the pre-test result in Grade 7 of 99 Jakarta Junior High School, it’s seen that the students’ mathematical communication skill is relatively in the low level. REACT learning strategy can be one of the alternatives of mathematics learning in the classroom to increase that skill. REACT learning strategy consists of five steps, those are: relating, experiencing, applying, cooperating, and transferring, which can increase the mathematical communication skill in each steps, respectively. The objective of this research is to increase the students’ mathematical communication skill in grade 7 at 99 Jakarta Junior High School. This is a classroom action research that conducted in three cycles. Every cycle has four steps, those are planning, practicing, observation, and reflection. There is post-test in every ending of cycles for measuring their mathematical communication skill. This research was conducted from September until October 2014. The result shows that the mathematics learning process through REACT learning strategy increase the students’ mathematical communication skill. This is shown by the gaining of the average test score.

Key words and Phrases: Mathematical Communication, REACT Learning Strategy, Classroom Action Research.

References

PREDICTING GENOTYPES INHERITANCE TRAITS THROUGH EIGENVALUES, EIGENVECTORS AND DIAGONALIZATION MATRICES

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Abstract. This study was aimed to examined the autosomal inheritance trait and autosomal recessive disease inheritance through controlled monohybrid cross. Autosomal inheritance traits controlled by genes (paired alleles) located on autosomes that are possessed in organisms. For each trait, an organism inherits two alleles, one from each parent. These alleles may be the same or different. If one parent has two different alleles, then the offspring will receive one of these two alleles with the same opportunities and form their own genes. To predict the proportion of offspring in the successive generation having these genes can be used eigenvalues and eigenvectors, and diagonalization matrix. The parent genes passed on to offspring will form a matrix model. The matrix model used to investigate the inheritance of genotypes in a population from generation to generation.

Key words and Phrases: autosomal inheritance, eigenvalues, eigenvectors, diagonalization matrices

References

GROUND MOTION PREDICTION EQUATION USING TWEEDIE GENERALIZED LINEAR MODEL

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Abstract. Large magnitude of an earthquake causing a great financial losses. Therefore, seismic hazard need to be determined using statistical catastrophe model. Peak Ground Acceleration (PGA) as a parameter of ground motion is presented as a function of distance from epicenter and local site condition. The equation were derived by empirical regression using generalized linear model. The data in this research taken from United States Geological Survey’s databases for Padang’s earthquake on September 30, 2009. The PGA distribution following Tweedie model \( \hat{\theta} = 1.48, \hat{\mu} = 10.57, \hat{\phi} = 0.718 \). Parameters estimated by maximizes the log likelihood function using Genetic Algorithm. At 5% and 10% significance level, it is found that closer distance from epicenter with stiff soil has a biggest risk to damage when earthquake happen.

Key words and Phrases: catastrophe model, peak ground acceleration, ground motion, tweedie distribution, genetic algorithm.

References

TEACHING MULTIPLICATION AND DIVISION OF FRACTION

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Abstract. Fraction is one of core materials that quite difficult to understand since it needs abstraction process and linked with daily life. Many authors have suggested that multiplication and division of fraction are more difficult to understand than addition and subtraction. There are many ways how to teach multiplication and division of fraction, and the success or failure of the student to understand multiplication and division of fraction will depend on the teaching strategies used. This study was aimed to examine the appropriate strategies used to teach multiplication and division of fraction. The strategies outlined below were reviewed from many results of study. Besides the strategies, finding of this study revealed that there were many student’ problem that commonly found in learning multiplication and division of fraction.

Key words and Phrases : multiplication of fraction, division of fraction, teaching strategies, student’ problem.

References

THE UTILIZATION OF CANONICAL CORRELATION ANALYSIS (CCA) TO ESTIMATE RAINFALL DISTRIBUTION OVER WEST JAVA USING CLIMATE PREDICTABILITY TOOL (CPT)

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Abstract. This study is mainly concerned the utilization of Canonical Correlation Analysis (CCA) method using Climate Predictability Tool (CPT) software to forecast rainfall distribution over West Java every 3months on 2015 (after July) based on Climate Hazards group Infrared Precipitation with Stations (CHIRPS) data. Predictors used in CPT were the monthly data index of Nino3.4 + Dipole Mode (DMI), with initial condition July. The initial condition choose by the last data update. While, the predictant were rainfall data CHIRPS region of West Java. The results of rainfall forecast by CPT was the distribution of rainfall over West Java on ASO and SON season 2015 were low (0-800 mm/3months), while rainfall distribution on OND-NDJ 2015 and DJF 2015/2016 were high (1000-1800 mm/3months), shows that the rainy season will come from October-November 2015. The CCA score over those season (3months) prediction mostly over 0.5. The accuracy of the model CPT also indicated by the Relative Operating Caracteristic (ROC) curve of the results of Pearson correlation 5 representative point of observation (Bogor, Karawang, Bandung, Indramayu, and Ciamis), were mostly located in the top line of non-skill, so that a reliable model of the CPT with CCA method to use.

Key words and Phrases: CCA, CHIRPS, CPT, Rainfall distribution, ROC.

References


0-1 INTEGER LINEAR PROGRAMMING MODEL FOR LOCATION SELECTION OF FIRE STATION: A CASE STUDY IN INDONESIA

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Abstract. In this paper, a 0-1 Integer Linear Programming Model is constructed to determine the minimum number and location of the fire station. The maximum time data required by firefighter traveled from a district to the other districts is used to build the mathematical model of the set covering problem. Then it is solved by using optimization software Matlab 2013a. The results denoted that the minimum number of the fire station were 2 whereas its locations were in Lubuk Begalung and Kuranji subdistricts, Padang, Indonesia.

Key words and Phrases: Set Covering Problem, minimum number and location of fire station, the maximum time data.
AN ASYMMETRIC PUTNAM-FUGLEDE THEOREM FOR \((p, k)\)-QUASIPOSONORMAL OPERATORS

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Abstract. An asymmetric Putnam-Fuglede Theorem for \((p, k)\)-quasiposinormal operators is proved. As a consequence of this result, we obtain that the generalized derivation induced by these classes of operators is orthogonal to its kernel.

Key words and Phrases: Hilbert Schmidt class, Putnam-Fuglede Theorem, hyponormal operator, normal operator.

References

INVESTIGATING STUDENTS’ SPATIAL VISUALIZATION IN THE PROPERTIES OF SOLID FIGURE BY USING DAILY LIFE CONTEXT

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Abstract. The aim of this research is to investigate students’ spatial visualization in the properties of solid figure by using daily life context. Pendidikan Matematika Realistik Indonesia (PMRI) was chosen as an approach in the learning process. This research used the descriptive qualitative method. Data were collected by using students’ worksheet, video recording and interviewed some students to get deeper information of their spatial visualization. Based on the result by investigating from findings and the data obtained in this research, it can be concluded that students could think about solid figure properties if they see these objects oftenly in daily life activities such as objects that have cube, cuboid or prism form. However, they found difficulties to make sketch related to objects that combine more than one kind of solid figures then it could be solved by classroom discussion.

Key words and Phrases: spatial visualization, daily life context, PMRI.
AN AGENT BASED MODEL FOR TRANSMISSION OF TERRORISM

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Abstract. Terrorism is a menace to humanity and society. It is also a complex social problem that can be a serious threat to sovereignty of each country, including Indonesia. Thus, a plan to stop the spread of terrorism with a variety approaches such as historical, social, political, psychology, and other disciplines is needed that people's human rights can be protected and upheld.

One of the methods for studying social complexity in this case is using the approach of Agent Based Modeling (ABM). ABM is a computational method that enables a researcher to create, analyze, and experiment with models composed of agents that interact within an environment. Agents have attributes to characterize them, and the rules that will affect the relationship between agents and an environment. Repetitive interactions between agents are a feature of ABM, which relies on the power of computers to explore dynamics out of the reach of pure mathematical models. The rules were obtained from the literature.

In this research, the model construction is divided into five classes namely general class (G), class of seed (S), class of active terrorist (FA), class of terrorist in prison (FP), and Densus 88 class (D). The attributes used are age, frequency of interactions with FA, prison verdict and prison term of FP.

The results of model construction are the rules how an agent can move from one class to another class based on age, distance between agents, frequency of interactions between agents, and opportunities of agent for moving class. The opportunity is represented by the generated random numbers. The simulation using NetLogo 5.2 and Mathematica 10.0 shows the performance and skill of Densus 88 is important in suppressing the growth of terrorist population in Indonesia.

Key words and Phrases : Agent Based Model, Terrorism in Indonesia, Netlogo, Mathematica.

References

A MODEL OF TRANSMISSION AND TREATMENT OF MARIJUANA ABUSE IN INDONESIA

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Abstract. In this presentation, a mathematical model of the use of marijuana in population is discussed. Two types of equilibrium are obtained from the model. The stability of the equilibrium depends on a threshold parameter called basic reproductive number. Some numerical simulations are given in this presentation.

\textit{Key words and Phrases}: mathematical model, marijuana abuse, equilibrium, stability.

References

SELF-EXCITING POINT PROCESS FOR ESTIMATING EARTHQUAKE INTENSITY

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Abstract. A spatio-temporal point process is characterized uniquely by its conditional intensity function. A sequence of earthquakes can be regarded as point patterns that have a temporal clustering feature, so we use self-exciting point process for modeling the conditional intensity function. An estimator of the background intensity can be estimated using thinning procedure and the model parameters are estimated simultaneously using an iterative approach.

Key words and Phrases: spatio-temporal point process, conditional intensity function, self-exciting point process, thinning procedure.

References

ASSESSMENT OF THE CHARACTERISTICS OF METEOROLOGICAL DROUGHT USING STANDARDIZED PRECIPITATION INDEX (SPI) IN WEST JAVA

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Abstract. Meteorological drought is decrease in precipitation in comparison with the mean value and would affect the quantities of water resources. Assessment of meteorological drought is one of the most important steps in risk management of drought. The main premise of the current effort is that the use of a drought index, such as SPI, may lead to a more appropriate understanding of meteorological drought characteristics in West Java, Indonesia. The basis of drought indices is often based on measuring the deviation of precipitation values from long-term mean, during a specific period of time. The aim of this research is the assessment of the characteristics such as intensity, frequency and duration of meteorological drought using SPI with 3 months time scales in West Java. The indices have been computed using Climate Hazards Group InfraRed Precipitation with Station (CHIRPS) data during 1981-2014. The results indicate that Characteristics of meteorological drought for each region in west Java can be seen clearly. This information can be useful to anticipate the risk of meteorological drought in West Java.

Key words and Phrases: Characteristics, Meteorological drought, West Java, SPI.

References


AN APPROXIMATION COMPARATIVE STUDY OF EIGHTH FUNCTIONS SMOOTH SUPPORT VECTOR MACHINES

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Abstract. Support vector machine (SVM) as one of the machine learning methods is important in statistical learning theory. Smooth Support Vector Machine (SSVM) is one of new formulation of SVM. In SSVM, smoothing method is used to make unconstrained optimal model. Smoothing function used to replace plus function in SVM. Eight smoothing functions in this paper are presented, i.e. quadratic polynomial, fourth order polynomial, piecewise polynomial, spline function, sixth order polynomial, advanced of fourth order polynomial function, quadratic Bezier function, third order Bezier function, and fourth order Bezier function. Those functions have been presented before to find solution in SVM. In this paper, eight smoothing functions were compared. Value of infinity norm is used to approximate between smoothing function and plus function. The smoothing function has minimum error of infinity norm, is called the best approximation function. Theoretical analysis and numerical results illustrate that piecewise polynomial function with approximation is better than quadratic polynomial function, fourth polynomial function, and third order spline function. While the advanced of fourth order polynomial function and sixth order polynomial function have error approximation value almost the same as plus function. The comparison of piecewise polynomial function with the advanced of fourth order polynomial function and the sixth order polynomial function can't be determined which has the best approximation value. This is happened because the error approximation value of each function is effected by various parameters. Based on the whole infinity norm value measurement, quadratic Bezier and quadratic polynomial show the same error values. While forth order Bezier function shows the smallest error approximation value among the other functions which have been tested.

Key words and Phrases: Smooth function, support vector machines, plus function, infinity norm.

References


ESTIMATION OF LOSS FUNCTION FOR EVALUATING EARTHQUAKE INSURANCE RISK BY USING GENERALIZED LINEAR MODEL

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Abstract. Physical losses caused by earthquakes are death or casualties and damage to buildings and areas. Therefore, efforts to reduce the risk of earthquake are very necessary. In Indonesia, damage and loss of buildings caused by earthquake are poor in the availability of data bases. Loss data for building is not detail, while damage data is only available for powerful earthquakes. The previous research showed that damage data for building in Java Island is only available for two events, i.e. the Yogyakarta earthquake on May, 2006 and the Tasikmalaya earthquake on September, 2009. The limitation of damage data can be overcome by using a proxy variable.

The aim of this paper is to estimate the function of loss due to earthquake by using generalized linear model. The generalized linear model is a flexible generalization of ordinary linear regression by allowing the linear model to be related to the response variable through link function. We assume that the function of loss caused by earthquake is a proxy variable and affected by magnitude, depth, population density, and gross regional domestic product. The application of this model is presented to evaluate the earthquake insurance risk in Java Island.

Key words and Phrases: loss function, earthquake insurance, generalized linear model, link function.

References

CUSTOMIZED CONTIGUITY IN SPATIAL REGRESSION FOR MODELLING WOMEN OF CHILDBEARING AGE WHO HAVE HIGH FERTILITY

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Abstract. Fertility rate is one of demographic factors that most influence on population growth rate. One of analysis methods about fertility that considers the spatial relationship between the regions and the surrounding territories is spatial regression. Spatial regression analysis uses a spatial weighting matrix to show the relationship between regions. There are some type of contiguity that is used to create a spatial weighting matrix, including rook contiguity, bishop contiguity and queen contiguity. These three kinds of contiguity only considering the proximity of the area and its surrounding territories, in the other hand, fertility rate is a product of various factors, one of which is socio cultural factor. Spatial weighting matrix that can be used to incorporate socio cultural factor is costumized contiguity. The aim of this study is for modelling women of childbearing age who have high fertility in Mamuju and Mamuju Tengah Regency. The model is made with a spatial approach through spatial autoregressive (SAR) method, and uses spatial weighting matrix with customized contiguity. The spatial weighting matrix is made based on the main ethnic in every village. The response variable is ratio of women of childbearing age who have high fertility. The result using SAR method indicates that there is spatial dependency lag in the response variable. Value of R\textsuperscript{2} and AIC from the model indicates that the model with considering spatial element is better than model with no spatial element.

Key words and Phrases: customized contiguity, fertility, SAR, spatial regression.

References

Abstract. The relationship of respond variable with some predictor variables is not always using only single approach such as spline, kernel or Fourier series. In the regression model allows the response variable to follow different nonparametric regression curve between the predictor variables and other predictor variables. Data given in pairs \((x_{i1}, \ldots, x_{ip}, t_i, y_i)\) the relationship between the predictor variables \(x_{i1}, x_{pi}, t_i\), and the response variable \(p_yi\) follow additive nonparametric regression model:

\[
y_i = \mu(x_{i1}, \ldots, x_{pi}, t_i) + \epsilon_i = \sum f(t_{pi}) + g(t_i) + \epsilon_i.
\]

Predictor component, \(x_{i1}, x_{pi}\), approached using Spline Functions linear predictor component while \(t_i\) approached by the kernel function.

This research was conducted with the purpose of seeking estimator truncated form of linear spline and kernel to estimate the nonparametric regression curve. Estimator models obtained using Ordinary Least Square method (OLS). The Estimator regression curves obtained are:

\[
\hat{f}_{\alpha,\lambda}(x, t) = A(\lambda, \alpha)y, \hat{g}_{\alpha,\lambda}(t) = D(\alpha)y \quad \text{and} \quad \mu_{\alpha,\lambda}(x, t) = (A(\lambda, \alpha) + D(\alpha))y.
\]

Kernel Estimator mixture and multivariable regression Spline rely heavily on points knots and bandwidth. Kernel mixed Estimator and multivariable regression Spline is the finest in determining point’s knots and optimal bandwidth.

Key words and Phrases: Nonparametric regression, Spline, Mixed Estimator, Kernel
MIXED REGRESSION MODEL: TRUNCATED SPLINE AND KERNEL FUNCTION

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Abstract. Given paired data \((u_i, v_{1i}, v_{2i}, ..., v_{mi}, y_i)\) which have relations that assumed following additive nonparametric regression model \(y_i = f(u_i) + \varepsilon_i\) where \(f(u_i, v_{ij}) = g(u_i) + \sum_{j=1}^{m} h_j(v_{ij}), \ v_{ij} = (v_{1ij}, v_{2ij}, ..., v_{mij})^T, i = 1, 2, ..., n.\) Random error \(\varepsilon_i\) follows normal distribution with zero mean and variance \(\sigma^2.\) The aim of this study is to obtain estimator for \(g(u_i)\) and \(\sum_{j=1}^{m} h_j(v_{ij}).\) Regression curve \(g(u_i)\) is approached using kernel function \(p\) degrees and knot points \(\xi = (\xi_1 + \xi_2 + \cdots + \xi_q)^T.\) While regression curve component \(h_j(v_{ij})\) is approached using kernel function with bandwidth \(\phi_j(v_{ij})\) and the estimator of \(\sum_{j=1}^{m} h_j(v_{ij}).\)

References

THE U-PROJECTIVE RESOLUTION OF A MODULE

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Abstract. In [1], Davvaz and Shabani-Solt developed the generalization of homological algebra, involving the concept and definition of U-complex, morphism between two U-complexes, U-homotopy, and U-homology module. In fact, generalizing some complex, exact sequence is included, can be hard if the preservation of the properties of the complex is needed. This paper gives the example of the way constructing the generalization of projective resolution of a module. The next target of observation should be the development of generalized extension modules obtained from U-projective resolution. Concepts related to this discussion can be found in the book [2].

Key words and Phrases : exact sequence, projective module, projective resolution.

References

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ASSESSING MATH ANXIETY IN FULL FUNDED SCHOLARSHIP MATHEMATICS UNDERGRADUATE STUDENT

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Abstract. Undergraduate student who gets scholarship has obligation to gain a good score in grade point average (GPA). For the first time they face mathematics level in University, some of materials are part of Senior High School lesson and they can handle it but some of them are totally difference. They have problem in that and how to maintenance the motivation in math course with pressure in institution target. Understanding math anxiety is the key factor for facing the difficulties in studying Mathematics course. The lecturer should recognize the causes and effects of math anxiety as well as a way to help student overcome it. This research aims to assess math anxiety full funded scholarship mathematics undergraduate students which are focus on internal factor like learning process, lecturer, classmate and external factor like parents and friends who are studying at other university. Subject was given questionnaire to obtain the data math anxiety internal and external factor. Data that is gotten in questionnaire is followed up by interview. The data was analysed by descriptive qualitative with standard of math anxiety. The result indicated that external factor in more influent in math anxiety rather than internal factor. Some internal factor can reduce external factor influence by developing good lecturing and advising.

Key words and Phrases: math anxiety, full funded scholarship, undergraduate student.

References


SMALL AREA ESTIMATION WITH GENERAL REGRESSION NEURAL NETWORK (CASE STUDY: THE NUMBER OF DROPOUT CHILDREN IN POVERTY)

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Abstract. Artificial Neural Network (ANN) or better known as Neural Network (NN) is one example of nonlinear models that have flexible functional form. Since presented by McCulloch and Pitts in 1943 as a formal mathematical model describing the working of a human brain, a lot of research about NN has been done. This study discusses the application of General Regression Neural Network (GRNN) in Small Area Estimation (SAE) to estimate the number of children in poverty that dropout from school. The problem of SAE is how to produce reliable estimates of characteristics of interest such as counts for areas or domains for which only small samples or no samples are available. GRNN is used because GRNN falls into the category of probabilistic neural network that especially advantageous due to its ability to converge to the underlying function of the data with only few training samples available. This study shows that GRNN performs fit model for the case.

Key words and Phrases : General Regression Neural Network, Small Area Estimation, Dropout Children, Poverty.

References

THE IMPLEMENTATION OF CREATIVE MATHEMATICAL GAMES TO IMPROVE THE NUMBER SENSE OF KINDERGARTEN AND ELEMENTARY SCHOOL CHILDREN

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Abstract. The research departed from an issue found regarding the number sense of kindergarten children of UPI Lab School and Cidadap 1 Elementary School. As a solution to this problem, the research proposes the use of creative mathematical games in the teaching and learning. Departing from the issue and the offered solution, the following problems are formulated: 1) Children’s ability of number sense before the implementation of creative mathematical games; 2) The forms of creative mathematical games in improving children’s number sense; 3) The implementation of creative mathematical games in improving children’s number sense; 4) The factors possibly affecting the implementation of creative mathematical games; and 5) Children’s ability of number sense after the implementation of creative mathematical games. The research adopted action research method, drawing upon Kemmis & Taggart’s design. There were 25 participants of this research, consisting of teachers and children of group A of the Kindergarten of UPI Laboratory School and 15 participants from Cidadap 1 Elementary School. Meanwhile, data were collected through observation, interview, and documentation. The data were then analyzed qualitatively using thematic analysis technique. The findings show that children respond positively to the creative mathematical games. They demonstrate fairly high enthusiasm and are able to understand number as well as its meaning in various ways. Children’s number sense has also improved in terms of one-on-one correspondence and mentioning and comparing many objects. The factors possibly affecting the implementation of these creative mathematical games are the media and the stages of teaching and learning that should be in accordance with the level of kindergarten and elementary children’s number sense.

Key words and Phrases: number sense, creative mathematical games.

References


ON 2-TUPLE PARTITION WITH SOME DISTINCT PART MARKED

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Abstract. This paper is inspired by two colour partitions. First, we introduce 2-tuple partitions and we give the relationship between 2-tuple partitions and two colour partitions. Then, we give some result in 2-tuple partitions with some distinct part marked.

Key words and Phrases: Integer partitions, two colour partitions, partition functions.

References

MODELING OF ENERGY EFFICIENT TRAFFIC LIGHT SYSTEM

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Abstract. Consider a system of vehicular traffic that is modelled as a single lane traffic based on the optimal velocity model. Let that the traffic system controlled by traffic lights. Implementing the most efficient traffic lights would be certainly necessary to fulfill emission reduction commitments. Therefore, the benefit of designing a good traffic control system goes beyond reducing travel times. The effect of different traffic light control strategies on the traffic flow are discussed using three different strategies, i.e. the synchronized, green wave, and self-organizing strategies. Numerical simulation is carried out to get a better understanding of the microscopic behavior of the system. Some hypothetical comparisons on energy efficiencies under each strategy are also presented.

Key words and Phrases: vehicular traffic, traffic light strategies, optimal velocity model, energy efficiency.

References

AN APPLICATION OF BAYESIAN ADAPTIVE LASSO QUANTILE REGRESSION TO ESTIMATE THE EFFECT OF YEARS OF SCHOOLING AND EXPERIENCE ON EARNING

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Abstract. Education plays important role to transfers skill and knowledge to increase productivity and earning. Using mincer earning function, we investigated the effect of years of schooling and experience on earning over quantile. By specifying the effect of covariate at different quantile levels we allow the covariate to affect response variable not only at the center of distribution, but also at its spread. We employed two methods to estimate parameters in mincer equation: (i) bayesian quantile regression (BQR), (ii) bayesian quantile regression with adaptive least absolute shrinkage and selection operator (Lasso) penalty (BALQR). The latter method extends the bayesian Lasso penalty term by employing different penalty function with an adaptive tuning parameter accomodated in inverse gamma prior distribution. Data used in this paper is samples from workers in agricultural sector in South Sulawesi. Empirical results showed that BALQR outperformed over BQR because it resulted in smaller mean squared error (MSE). In addition, the estimators do not monotonically increase over quantile.

Key words and Phrases: Bayesian quantile regression, adaptive lasso penalty, mincer equation.

References

Abstract. Understanding the psychological students can help teachers to facilitate their students according to the needs and absorb of information related to learning. One of the striking looks of the diversity of students in the classroom is the student's learning style. The learning style of each student is different. According DePorter and Hernacki there are three kinds of learning style: visual, auditory, and kinesthetic. Mathematics teachers in general deliver their lesson by auditory style with talk or lecture. Sometimes they deliver by visual style, demonstrated the teaching aid or displayed visually in class. To deliver the lesson by kinesthetic style is rare in mathematics class, where the information can be absorb by doing, experiencing, touching, moving or being active in some way. Then students with kinesthetic learning tendencies do not understand the mathematics which described well only with one explanation. For this problem, we tried to give special treatment to students with kinesthetic learning tendencies in mathematics class on the subject of positive and negative integers addition MATEMATIKA GASING. The research method is Classroom Action Research. Data were analyzed using qualitative descriptive statistics.

Key words and Phrases: Tendency Learning, MATEMATIKA GASING, Action Research, Qualitative Descriptive.

References


AN IMPROVED HYBRID METHOD BASED ON ANT COLONY OPTIMIZATION, PARTICLE SWARM OPTIMIZATION AND 3-OPT ALGORITHM FOR TRAVELING SALESMAN PROBLEM

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Abstract. The traveling salesman problem (TSP) is the problem of finding a shortest closed tour which visits all the cities exactly once in a given set of cities. The proposed method for solving TSP in this paper is the improved version from previous hybrid method based on Particle Swarm Optimization (PSO), Ant Colony Optimization (ACO) and 3-Opt algorithms for Traveling Salesman Problem. One iteration of the proposed method contains one iteration of PSO, one iteration of ACO and 3-Opt algorithm. So, instead of using the 3-Opt algorithm after reaching the termination criteria, the method uses the 3-Opt algorithm for the best solution in every iteration. PSO is used to find the best parameters $\alpha$ and $\beta$ which are used for determining city selection in ACO algorithm. Afterward the shortest tour length will be produced by ACO algorithm. Finally the 3-Opt algorithm will be applied to the shortest tour length to get the best tour in each iteration. The final solution of the proposed method is the shortest tour among the best tours from all iterations. The performance of proposed method is examined by ten different benchmark problems taken from TSPLIB and the results are compared to the performance of the previous hybrid method of ACO, PSO and 3-Opt. It shows that the proposed method is better than the previous hybrid method in most cases in terms of the tour-length.

Key words and Phrases : Traveling Salesman Problem, Ant Colony Optimization, Particle Swarm Optimization, 3-Opt algorithm.

References


SOLVING MULTIPLE TRAVELING SALESMAN PROBLEM (M-TSP) USING K-MEANS CLUSTERING-GENETIC ANT COLONY SYSTEM (GACS) ALGORITHM

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Abstract. Multiple Traveling Salesman Problem (M-TSP) is a routing problem which visit n cities by m salesmen (m < n) and a condition that each city can only be visited exactly once by a salesman and the route must end at the origin city. n cities are divided into m clusters and each cluster is visited by a salesman. The division of the cluster uses k-means clustering algorithm, and each cluster will look for the route using Genetic Ant Colony System (GACS) algorithm, which is a combination of genetic algorithm and Ant Colony System.

Key words and Phrases: Multiple Traveling Salesman Problem, K-means Clustering, Genetic Ant Colony System.

References

DETERMINATION OF FISHERMEN POVERTY ALLEVIATION PROGRAM USING ANALYTIC HIERARCHY PROCESS IN PARIGI MOUTONG PROVINCE CENTRAL SULAWESI

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Abstract. Parigi Moutong is one of four districts which the percentage of poor people is high, i.e. more than 20%. Poverty alleviation programs, which have been undertaken, are still not optimal in accelerating poverty reduction, because the decreasing average is relatively small, below 0.5%. Therefore, it is necessary to do combination of top-down and bottom-up in determining the poverty program in Parigi Moutong. In process of determining program the community are involved, but when deciding program the community should be assisted by expert who are familiar with the problems that exist at the site. Models such as these, are expected to increase success in poverty reduction. One method that can be used to assist in the decision making process is using AHP (Analytic Hierarchy Process). This research is using stakeholders as the expert respondent. The results show that tourism development in Parigi Moutong be the main aspect priority in preparing the program of economic improvement Parigi Moutong fishermen community with priority value is 0.53. In tourism developing that should be taken precedence is the availability of bins for environmental conservation (0.553), local cultural traditions as tourists attracting (0.485) and community involvement in economic activities (0.461). The second priority is fish cultivation with priority value is 0.188, which must be developed is the availability of the pond as the development of the fishing capture result (0.492). Management aspects of post-fishing be the third priority (0.178) with packaging/management of the fishing capture result, had to be developed. The aspect as supporting facilities of the fishing capture result on the sea (0.102) becomes the last priority which needs to be developed in this aspect is the empowerment of fishing vessels with priority value is 0.392.

Key words and Phrases : Analytic Hierarchy Process, Fishermen Community, Parigi Moutong, Poverty.
References


PREDICTING STOCK MARKET VOLUME USING MACHINE LEARNING TECHNIQUES

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Abstract. The stock market volume movement is crucial information to give an overview of the performance of the stock market in Indonesia. Machine learning techniques have been successfully to predict the stock price movement but have not been applied to predict the stock volume movement. In this paper, seven techniques of machine learning are applied to predict volume movement of Jakarta composite index. The techniques are logistic regression, linear discriminant analysis, quadratic discriminant analysis, k-nearest neighbors, Naive Bayes, neural networks, and decision tree. Experimental results show that Naive Bayes is better than other techniques.

Key words and Phrases: prediction, stock market volume, machine learning.

References


HIERARCHICAL BAYES MODELING IN SMALL AREA FOR ESTIMATING UNEMPLOYMENT PROPORTION UNDER COMPLEX SURVEY

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Abstract. In general, surveys to estimate unemployment proportion are designed for large area. An area is regarded as a large if the sample size is large enough to be directly estimates or design-methods with adequate precision. However, direct design-methods are unreliable to be applied in small area as they are based on small sample size. To carry out estimate for small area with adequate precision, we can use the indirect-estimation such as hierarchical bayes models. In this paper, we compare the effectiveness and implementation of four hierarchical bayes small area models for estimating the proportion of unemployment based on data generated from complex survey with finite population. Two of the models adopt the commonly Fay-Heriot models assuming known variance, while two the other models assumed that the sampling variance was unknown. From the study we found that the model assuming unknown variance outperforms the other and can be considered as small area level estimation to account proportion of unemployment.

Key words and Phrases: small area estimation, hierarchical bayes, complexsurvey, unemployment.

References


Abstract. We develop model repacking model approximation for the bed allocations problems. We propose to model each arrival of patient class-category $i$ is an independent $M/G/N_i$ model. We consider two cases. First, consider the case where a patient of class $j$ ask the hospital for an upgrade to class $k$ (but never return to his/her own class). In this case, we consider the upgraded patient as the higher class arrival (upgraded class). $k$. Second, consider the case where a patient of class $j$ is full, i.e., all $N_j$ beds are occupied, then the patient will be put in different class as long as there is an empty bed. According to the regulation, the overflow class of patient will be replaced back immediately to his/her own class as soon as the capacity available. This is so called repacking model. We apply repacking model into our bed allocation model. As a numerical example, we will apply our model for the case of Academic Hospital of Universitas Gadjah Mada, Yogyakarta, Indonesia.

Key words and Phrases : Bed Allocation Optimization, Overflow Loss System, Repacking Model, BPJS, Rumah Sakit UGM.
SIMULATION ON THE VARIATION OF CAPITAL AND PERIOD OF INVESTMENT IN THE MODEL OF PROFIT AND LOSS SHARING WITH TABARRU’ FUND

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Abstract. Syariah finance system is kind of system that manage financial rules based on Islam. The concept of this system is justice for all people who participate in it. In this research, a syariah investment model is constructed using musyarakah profit and loss sharing concept. Musyarakah is kind of profit and loss sharing which people use their asset or fund for one business together and have a deal to share profit and loss equally. The model is determined as below,

\[ S(t) = I(t) + B(t) + C(t) \]

where \( S(t) \) is the total installment, \( B(t) \) is total profit sharing portion and \( C(t) \) is payment of deferred debt on day \( t \). The tabarru’ fund is added in the simulation of model with net premium that similar to the concept of insurance system. Tabarru’ fund is collection of trader funds in order to payback if the condition of loss occurs. Eventually, it will make the installment is always paid so there is no remain debt in the end of period. This investment model is implemented using generating data of net income trader in Pasar Balubur Bandung. The data is identified its distribution using easyfit and Matlab software. For variation of investment capital, we use average of net income to make new investment capital for each trader and for the periods, we use \( T = 30 \), \( T = 52 \) and \( T = 90 \) based on the numbers of data. Simulation using variation of investment capital give conclusion that capital of investment changes does not affect on profit for both investor and trader but increasing periods of investment make higher trader profit but make lower investor profit. The result of this simulation claim that syariah investment mode using tabarru’ fund is the most effective model than others.

Key words and Phrases: Syariah Investment Model, Tabarru' Fund, Profit and Loss Sharing.

References


APPLICATION OF SIMULATED ANNEALING TO DETERMINE TABARRU-FUND OF PROFIT AND LOSS SHARING MODEL IN SYARIAH INVESTMENT

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Abstract. In [1], Davvaz and Shabani-Solt developed the generalization of homological algebra, involving the concept and definition of U-complex, morphism between two U-complexes, U-homotopy, and U-homology module. In fact, generalizing some complex, exact sequence is included, can be hard if the preservation of the properties of the complex is needed. This paper gives the example of the way constructing the generalization of projective resolution of a module. The next target of observation should be the development of generalized extension modules obtained from U-projective resolution. Concepts related to this discussion can be found in the book [2].

Key words and Phrases : exact sequence, projective module, projective resolution.

References


STRUCTURE OF FOOD INSECURITY IN PAPUA

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Abstract. Food insecurity occurred in almost all regions in Indonesia. In recent years, one region in Indonesia which becomes priority to cope of food insecurity is Papua. The problem of food insecurity is a multidimensional issue that requires a complex analysis and should receive serious attention. One of statistical methods that used to analyze multiple dimensions with many variables is Structural Equation Modelling (SEM). This method has the ability to solve complex problems by combining path analysis and confirmatory factor analysis. If the data has a limited number of samples and are not normally distributed, partial least square (PLS) is used. Analysis of food insecurity in Papua with PLS method shows that latent variables of food access, food availability and food utilization have significant affects to food insecurity in Papua.

Key words and Phrases: Structure Equation Modeling, Partial Least Square, Food insecurity.

References

FORECASTING ON INDONESIAN FROZEN SHRIMP USING ARIMA AND FEED FORWARD NEURAL NETWORK

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Abstract. One of indicators to monitor the increasing of international trade is with watching on export growth. The increasing of the export performance has direct impact on the increasing on economic growth. It means export has huge benefit for the economy on a country. The availability of export value data is very important to decision maker and foreign trade policy conducted by the government. Based on commodity classification, one of the sector which has given contribution to Indonesian export value is fishery, where frozen shrimp is the main export commodity in this sector. The availability of the current export data become challenge to apply an effective forecasting technology. At first, forecasting method is dominated by linear method. But, linear method unable to capture non linear relation that are often found in real condition. The objective of this study is to obtain forecasting data on fishery export value with linear method that is Feed Forward Neural Network (FFNN). FFNN is the most commonly used Neural Network (NN) architecture in many fields of application. To get appropriate model (optimum architecture) is necessary to determine the right combination among number of input variables and number of units on hidden layer. In this study, ARIMA method is being used to obtain the most suitable NN architecture in order to have NN model with the best forecasting performance.

Key words and Phrases: Export, ARIMA, Neural Network, Feed Forward Neural Network.

References

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THE IMPACT OF MATEMATIKA GASING TOWARD LEARNING OUTCOME BASED ON LEARNING STYLE

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Abstract. This research is motivated by the lack of students' proficiency in basic mathematics calculations such as addition, subtraction, multiplication, and division. We teach addition in 35 fifth graders of Public Elementary School Perumahan Bumi Kelapa Dua Tangerang using an innovative learning way called Matematika GASING, which was developed by Prof. Yohanes Surya at the Surya Institute. Matematika is the Indonesian word for mathematics and GASING stands for Gampang (easy), Asyik (fun), and Menyenangkan (enjoyable). In this research we focus on the aims, they are to know: (1) the impact of Matematika GASING learning through students' learning outcome, (2) the impact of learning style types toward students' learning outcome, and (3) the interaction of Matematika GASING learning and learning style toward students' learning outcome. Data collected by test and questionnaire to get learning outcome in Mathematics and learning style types, respectively. Data analysis uses one way Anova by significance 5%. We hope that this research can show that: (1) there is an impact of Matematika GASING learning through students' learning outcome, (2) there is an impact of learning style types toward students' learning outcome, and (3) there is an interaction of Matematika GASING learning and learning style toward students' learning outcome.

Key words and Phrases: basic mathematics, addition, Matematika GASING, learning style, learning outcome.

References

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FORECASTING RISK MEASURE FOR OPTIMAL RETENTION IN INSURANCE COMPANY

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Abstract. There are two important issues of claim severity in insurance company: distribution and retention. We do the first by analyzing the data from certain insurance company during a contract period. It is found that an appropriate distribution for such data is Inverse Gaussian. The second issue relates to the fact that insurance company may not be able to cover all claims, in particular, large claims. For this case, the company must transfer such large risk to reinsurance company. In other words, there should be a limit of so what called “retention” in which both companies share the risk. In this paper, we have used some risk measures such as Value-at-Risk (VaR) and Conditional VaR as proposed retention forecast. Our numerical analysis shows that these measures are optimal and reasonably accurate. Furthermore, we may use this retention to calculate pure premium.

Key words and Phrases: Claim severity, Inverse Gaussian distribution, Value-at-Risk.

References

SOME ALGEBRAIC PROPERTIES OF A POPULATION GROWTH MATRIX

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Abstract. Suppose D is defined as a matrix obtained from multiplication of the permutation matrix with block diagonal matrix whose diagonal blocks is matrices with non negative entries. The matrix D describes population growth in a patch. In this paper we will show that D can also be seen as a Kronecker Product between a non-negative matrix with Ejj which is a matrix of all zeros entries except in the (j,j) entry. This paper also discusses some properties of permutation matrix that correspond with D. This result has important application to population dynamic study with m life stages living in n spatial locations.

Key words and Phrases: Permutation Matrix, block diagonal matrix, Kronecker product, Population growth.

References

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CONSTRUCTING THE GENERAL SUDOKU USING COSETS THEORY

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Abstract. Sudoku is a game which objective is to fill a $9 \times 9$ grid with digits so that each column, each row, and each of the nine $3 \times 3$ sub-grids that compose the grid (also called "boxes", "blocks", "regions", or "sub-squares") contains all of the digits from 1 to 9. Let $K$ a quadratic number and $n$ is the root of $K$. In this paper, we will consider the $k \times k$ Sudoku which contains $kn \times n$ sub-grids. The group we will use is $\mathbb{Z}_k := 1, 2, 3, \ldots, k$ under the addition modulo $k$. The subgroup we use is the cyclic subgroup $W$ which generated by $n$, $W = n, 2n, 3n, \ldots, n^2$. If $W$ is ad subgroup of $(\mathbb{Z}_k, +)$ and $a$ is an element of $\mathbb{Z}_k$, then $W + a := w + a w \in W$) is defined as the right cosets of $W$ in $\mathbb{Z}_k$. This paper will discuss about constructing the general $k \times k$ Sudoku using right cosets.

Key words and Phrases: Sudoku, Right Cosets, $\mathbb{Z}_k$.

References

VECTOR FIELD ON $S^7$ AND $\Sigma^7$

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Abstract. Let $S^7$ as a manifold. A vector field $\mathcal{X}$ on a $S^7$ is a cross section of its tangent bundle $TS^7$. The tangent bundle $TS^7$ is one of vector bundles on $S^7$. By the Serre-Swan Theorem, there is equivalence between vector bundle and finitely generated projective module. It is known that the set of cross sections of a bundle form a module over the ring of continuous $F$-valued functions on $S^7$. From here obtained that the set of vector field on $S^7$, is the elements of a module. In this paper, we propose on a manifold which it’s not diffeomorphism with $S^7$,e.i., $\Sigma^7$.

Key words and Phrases: Vector field, $S^7$, vector bundle, module, $\Sigma^7$.

References

Abstract. This research is motivated by the problem of students who come from rural areas are still difficult to understand properly for addition calculation. This problem can lead them to a bad result when they enter college, and when they course such as mathematics, physics, chemistry and computer. For that condition the matriculation activities is neccesary, because the matriculation activities can help students to improve their basic skills. In matriculation activities, students are introduced Matematika GASING (Easy Fun and Enjoyable). There is a critical point when students learn Matematika GASING. The critical point is a situation where students are expected to understand the basic concepts of mathematics. In Matematika GASING concrete concepts is introduced first before abstract concepts. GASING addition can facilitate the learning process of students who have not been smooth counting. Student can do quickly calculation, if the student is able to master GASING addition or pass through GASING critical point addition. The aim of this research is to present the relation of the critical point GASING addition with student learning outcomes. The subject of this research is matriculation class at STKIP Surya. The research method used in this research is qualitative research. The sample is 28 marticulation students at STKIP Surya. This research expects to show Matematika GASING can help ability of students increased.

Key words and Phrases: Matematika GASING, critical point, addition

References


Abstract. Surya College of Education (STKIP Surya) is a college where the students representatives from various local governments. The majority of students come from mountainous areas of Papua. For every first-year student at Surya STKIP, they are not directly follow the lectures as in the other campus, but students have to follow the matriculation activities. Based on observations during matriculation activities for this year, many student still use your fingers or tally mark to answer the addition question. With these condition, we intend to investigate by giving treatment to use Matematika GASING (Easy, fun and enjoyable) for learning mathematics. This study aims to discuss how to add three digit number by using Matematika GASING. The sample is 28 students in matriculation class at STKIP Surya. The research method used in this study is qualitative research. This study expects to show Matematika GASING can improve matriculation students ability in learning mathematics for three digit addition.

Key words and Phrases: Matematika GASING, three digit addition, Qualitative Research.

References

GSTARX MODELLING FOR FORECASTING CONSUMER PRICE INDEX IN KALIMANTAN

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Abstract. Consumer Price Index (CPI) is an index to measure the average change in the prices level of a basket of consumer goods and services consumed by the households in a certain period. CPIs in nearby cities may correlate each other. Therefore, there are location effect along with time effect for CPIs series. Generalized space time autoregressive (GSTAR) can be employed for forecasting CPIs that involves time and location. Hence, the autoregressive (AR) parameters on GSTAR may differ at each location. This work identified the order of AR parameters corresponding to time, location and exogenous variables, i.e. inflow and outflow currency, so called GSTARX model. This research compared the forecasting accuracy of GSTARX model with various weights for location. We applied the method for forecasting CPI in four cities in Kalimantan: Pontianak, Banjarmasin, Samarinda and Balikpapan. The empirical results exhibited that GSTARX with normalized cross-correlation weigh yielded better forecasting accuracy in term of root mean squared of error (RMSE) for Pontianak and Banjarmasin.

Key words and Phrases: Consumer price index, GSTARX, exogenous variable.

References

Associates, Illionis.


IMPLEMENTATION OF MATEMATIKA GASING IN ADDITION OF MANY NUMBERS FOR MATRICULATION STUDENTS AT STKIP SURYA, TANGERANG

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Abstract. Every new academic year, STKIP Surya is always come students to study from Papua. Their background knowledge are different. Before the undergraduate program of study begins, they have to go through matriculation activity. In matriculation activity, they study of mathematics by Matematika GASING. On learning mathematics, many students did not understand the lesson from lecturers. Many students also could not answer the questions correctly, for example about the addition of many numbers such as 2 + 7 + 9 + 5 + 6 + 8 = ⋯, 5 + 9 + 6 + 1 + 8 + 7 + 4 + 3 + 5 = ⋯. Students still use their finger or making graffiti in the form of tally marks to count. From this problem, we use Matematika GASING (Gampang, ASyIk, menyenaNGkan) in addition of many numbers for student learning mathematics. Mathematics learning process with Matematika GASING started from something that is concrete, directed to the abstract symbols and the evaluation in a mental arithmetic. In this research, we take 28 matriculation students as samples. This type of research is qualitative research. Techniques of analysis in this research is conducted by analysis per question between pretest and posttest in the same category. From the results of this analysis, we expect with implementation of Matematika GASING can help improving calculation skills in addition of many numbers for Papua students.

Key words and Phrases: Matematika GASING, Addition of many numbers, qualitative research.

References


CORRELATION BETWEEN MATHEMATICAL CONNECTION AND PROBLEM SOLVING SKILLS IN MATHEMATICS THROUGH SCIENTIFIC APPROACH ON 4TH GRADE ELEMENTARY SCHOOL STUDENTS IN EAST JAKARTA

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Abstract. The research goal to determine the effect scientific approach to mathematical problem solving skills and mathematical connections and relationships between mathematical connections and problem solving skills in elementary school fourth grade students in East Jakarta. Research using experimental methods and design research is the posttest only control design. Samples were taken using cluster sampling method and the data processed by t-test and linear regression. Research founding shows: 1) The scientific method significantly affect the ability of solving problems with \( t_{\text{counting}} = 3.256 \) greater than \( t_{\text{table}} = 1.67 \) at \( \alpha = 0.05 \); 2) The scientific method significantly affect the ability of mathematical connection with \( t_{\text{counting}} = 4.0632 \) greater than \( t_{\text{table}} = 1.67 \) at \( \alpha = 0.05 \); 3) There is a correlation between mathematical connection with mathematical problem solving skill with \( t_{\text{counting}} = 3.58 \) is greater than \( t_{\text{table}} = 1.67 \) at \( \alpha = 0.05 \) and a coefficient determination test is obtained by 31.45%.

Key words and Phrases: Mathematical Connection, Problem solving Skills, scientific approach
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THE CL-INTEGRAL

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Abstract. In this paper it will be constructed the CL-integral. The CL-integral is more general than the Lebesgue integral but it is less general than the Henstock-Kurzweil integral. Some properties of the CL-integral will be explored, including some characteristics of its CL-primitive. Finally, some convergence theorems for this integral will be constructed. Present an abstract here. Avoid complicated formulae in the abstract.

Key words and Phrases: The Henstock-Kurzweil integral, the CL-integral, the Lebesgue integral, CL-primitive, and convergence theorem.

References

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C2-4C-02-090

THE INFLUENCE OF INTEREST AND STUDY MOTIVATION TOWARD STUDENT LEARNING OUTCOME ABOUT MULTIPLICATION OF TWO-DIGIT NUMBERS USING MATEMATIKA GASING

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Abstract. This research was conducted based on the findings that students have difficulties in learning multiplication of two numbers, especially multiplication of two digits with two digits and multiplication of two digits with three digits. This research is a pre-experimental design. The design that is used in this study is The One Group Pretes-Posttest Design. The purpose of this study is to find out: (1) the influence of students interest to their mathematics learning outcome, (2) the influence of students motivation to their mathematics learning outcome, (3) the influence of students interest and motivation altogether to mathematics learning outcome. The population in this study is 4th grade students in Cihuni II elementary school in Kelapa Dua Tangerang districts. The sampling technique had been used is cluster random sampling and data collected by test and questionnaire. The data findings were analyzed by using anova with significance level 5%. The expected results this research are: (1) There is positive influence of student interest mathematics learning outcome, (2) There is the influence of student study motivation toward mathematic outcome learning, (3) There is the positive influence of students interest and motivation altogether to mathematics learning outcome.

Key words and Phrases: study interest, study motivation, learning outcome, and Matematika GASING.

References

SLOW AND FAST DYNAMICS MODEL OF A MALARIA DISEASE WITH SICKLE-CELL GENETIC DISEASE

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Abstract. As a chronical disease, malaria which is caused by parasite called Plasmodium Falciparum is one of the common disease in tropical areas. One of the important characteristics of the plasmodium is related to the immunity of the erythrocyte which contains HbS (Hemoglobin Sickle-cell). In this paper we consider a slow and fast dynamics of the malaria induction of the individuals who has anemia sickle-cell genes. We will use the next generation matrix to describe the basic reproduction number of the system and study the dynamics numerically. From the simulation, we show slow and fast dynamics behavior via the phase portrait.

Key words and Phrases: Hemoglobin Sickle-cell, slow-fast dynamics, malaria.

References

WEIGHTED WEIBULL DISTRIBUTION AND ITS APPLICATION TO WIND SPEED DATA

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Abstract. Energy consumption will increase simultaneously with increasing human activity. The most common source of energy used is still derived from fossil fuels, and based on the National Aeronautics and Space Agency (LAPAN, Indonesia) is estimated in the 22nd century there will be scarcity of fossil fuels. Environmental impact becomes a reason to seek alternative energy sources such as wind energy. The Ministry of Energy and Mineral Resources and the Agency for the Assessment and Application of Technology (BPPT, Indonesia) tries to take advantage of wind for electrical power and refers to the national energy policy, hydroelectric power plant is expected in 2025 will reach 250 megawatts (MW). In order to optimize machine used to generate energy, the characteristics of wind speed should be specified accurately, and the probability distribution is one way to describe the characteristics. Many years ago, the scientist used weibull distribution to modelling wind speed but fluctuating wind conditions led researchers to think of alternatives or modifications of weibull distribution. In 2013, Ramadan has modified weibull distribution by adding a shape parameter to generate weighted weibull distribution. This paper will introduce the characteristics of weighted weibull distribution, the statistics properties and inferences. To complete this paper, wind speed data from Bali (Indonesia) will be analyzed to explain how weighted weibull distribution is better than weibull distribution to describe about characteristics of the wind speed in Bali.

Key words and Phrases: wind speed modelling, weighted weibull distribution, weibull distribution, shape parameter, modified weibull.

References

GROUP CONSTRUCTION ON RUBIK’S CUBE

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Abstract. Rubik’s Cube is a three-dimensional puzzle game which is well known. This thesis considers the Rubik’s Cube from mathematical perspectives and focuses on group theory, particularly on the group which is in the form of semi direct product. Some terminologies are defined in Rubik’s Cube so we can construct a group which represents all possible patterns on the Rubik’s Cube. That group is formed through observations on the Rubik’s Cube and its rotations. Furthermore, it discusses about a subgroup named slice group, which is constructed from rotations of the middle layers of the Rubik’s Cube, then determines the group which is isomorphic to it.

Key words and Phrases: Rubik’s Cube, group, semi direct product, order.

References


DEVELOPMENT STUDY ON SPATIO TEMPORAL DATA MINING MODELING

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Abstract. In this paper we study about the development of spatio temporal data mining modeling, which is combination of spatial and time series models using Knowledge Discovery in Databases method (KDD). We apply the spatio temporal models such as Generalized Space Time Autoregressive-Kriging (GSTAR-Kriging) and Clustering GSTAR-Kriging to real phenomena of oil production data at volcanic layer Jatibarang.

Key words and Phrases: Clustering GSTAR-Kriging, OLS, KDD.

References


VARIABLE NEIGHBORHOOD SEARCH METHODS FOR SOLVING POST ENROLLMENT UNIVERSITY TIMETABLING PROBLEMS

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Abstract. Courses timetabling problems are combinatorial problems which can be considered as graph colourings or graph labelling problems. Finding solution for a courses timetabling problem is defined as the assignment of a set of events (courses or exams) to resources (timeslots and rooms) subject to a set of constraints. The focus of this paper is on the optimization problem, where the objective is to find feasible solution i.e. solution without hard constraint violation, with minimum soft constraint violations. The main objective is to investigate the deployment of three neighbourhood structures in some simulated annealing (SA)-based strategies to tackle the problems. The solver contains two phases, first a feasible solution is sought using some graph-based constructive heuristics, followed by the implementation of SA heuristics using one or some combinations of those neighbourhood structures to minimize the soft constraints. The heuristics are tested in the public instances found in the literatures (the Second International Timetabling Competition - http://www.cs.qub.ac.uk/itc2007/) and some actual instances from Surya College of Education (SCE) Tangerang. The results on the public instances are compared with several other authors. In most cases the performance of the heuristics are comparable to the current best results and they even can improve the state-of-the art results in many instances. In addition, the quality of the timetables produced by implementing this strategy to the SCE instances are all good. The solver has been using as a standard course timetabling solver for the institution.

Key words and Phrases: Combinatorial Optimization, Scheduling/Timetabling, heuristics/metaheuristics, variable neighborhood search, simulated annealing.

References


ON CONNECTION BETWEEN PROJECTIVITY AND PURITY OF MODULES

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Abstract. Let M, N, F be modules over an associate ring with identity R. A short exact sequence of R-modules

\[ 0 \to N \to M \to F \to 0 \]

is called pure if it remains exact after being tensored with any right R-module. If N is a submodule of an R-module M and the canonical short exact sequence

\[ 0 \to N \to M \to M/N \to 0 \]

is pure, then we call that N is pure submodule of M. Then we will conclude that every summand is a pure submodule. Using the projectiveness properties it is shown the partial converse of the last statement, namely, if P is a projective R-module and N a finitely generated pure submodule then N is a direct summand of P. With the result, it will shown the criteria of purity of a submodule. The problem on connection between projectiveness, purity, and the existence of direct summand of modules is motivated by a problem arise in linear system with delay which can be formulated as linear systems over ring of polynomial over field of real numbers. It is expected that the result can be used to help in formulating the form of solution space of the linear system with delay.

Key words and Phrases: Pure Module, Projective Module, Direct Summand.
A1-1A-03-098

SOME REMARKS ON THE CHROMATIC NUMBER OF FUZZY GRAPH OPERATIONS

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Abstract. In this paper, we investigate the chromatic number of fuzzy graph operations, i.e. the union, join, cartesian product, and composition of two fuzzy graphs. Our results indicate that the results from crisp graph operations are not always analogous to fuzzy graphs.

Key words and Phrases: Chromatic number, union, join, cartesian product, composition, fuzzy graph.

References

ON TOTAL IRREGULARITY STRENGTH OF SUBDIVISION OF DOUBLE-STAR

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Abstract. A total k-labeling is a map that carries all of vertices and edges of a graph $G$ into a set of positive integer labels $\{1, 2, \ldots, k\}$. A totally irregular total $k$-labeling of a graph $G$ is a total $k$-labeling such that the weights calculated at all edges and all vertices are distinct. The weight of an edge $uv$ on $G$ is defined as the sum of the label of $u$, the label of $v$ and the label of $uv$, while the weight of vertex $u$ is the sum of the label of vertex $u$ and the label of all edges incident to $u$. The total irregularity strength of $G$, denoted by $ts(G)$, is the minimum value of the largest label $k$ over all such totally irregular total $k$-labelings. In this paper, we investigate the total irregularity strength of a 2-subdivision of double-star $S^2_{n,n}$ $n \geq 3$.

Key words and Phrases: totally irregular total k-labeling, total irregularity strength, weight, subdivision of double-star.

References

Abstract. One attempt of Ministry of Education and Culture for the development of education in Indonesia, is the holding of national examinations (UN) centrally, through Badan Standarisasi Pendidikan Nasional, so that the implementation of the UN described the successful implementation of education at the district, city, province, or national. In this study, we evaluate, analyze, and explore the database of the results of implementation UN of Junior High School at 2014, with SMP/MTs as the smallest unit of analysis at the district level. We used the methodology of Knowledge Discovery in Databases (KDD) using statistical description and spatial mapping of UN. The classification results of the data mining process for UN at year 2014 using 6,878 SMP/MTs at West Java showed that the classification of good-moderate and less is 15.22% - 81.01% - 3.76%. While the results of the spatial mapping for SMP/MTs at West Java can be described at good-moderate and less level is 26.35% - 36.36% and 36.99%. The evaluation results of visualization in graphical form using arcgis can give an information of position of quality education at city, province or national. So, it can be used by management for making decision of increasing education services based on database of UN at West Java.
Key words and Phrases: KDD, spatial mapping, UN

References

MODELING OF MODIFIED VALUE-AT-RISK FOR SKEWED STUDENT-t DISTRIBUTION

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Abstract. In this paper we discuss about the modeling of Modified Value-at-Risk (MVeR) for asset returns are skewed Student-t distribution. MVaR for skewed Student distribution is a special form of MVaR models of non-normal distribution. Modeling is done by breaking the probability density function skewed Student-t distribution using Mclaurin series, with the differential operator. Based on the series Mclaurin the differential operator, then was formed Gram-Charlier series of a function that is expressed to the probability density skewed Student-t distribution. In order to give the adjustment factor to the percentile performed using Corniesh-Fisher expansion. Based on the Cornish-Fisher expansion, the non-standard can be expressed by a polynomial series expansion Hermete standard process. Using this way, finally obtained the MVaR model for skewed Student-t distribution. This model can be used to determine the amount of market risk, especially for asset returns are skewed Student-t distribution.

Key words and Phrases: Skewed Student-t, MVaR, Mclaurin, Gram-Charlie, Cornish-Fisher, Hermete.

References

ANALYSIS OF MATHEMATICS TEACHER PROBLEM IN LEARNING IMPLEMENTATION SENIOR HIGH SCHOOL

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Abstract. Many researchers study about student’s problem in learning mathematics. In a real condition at school, students lack of thinking mathematically. It indicates that there is an unstructured learning process, so that many people blame the educators that is teacher. Teacher is important elements of student’s success in learning. This research is a qualitatitive research that arms to study teacher’s problem in implementing mathematics learning at school in detail. Instrument in this research was researcher it self as a main instrument guided by valid and reliable guided interview.

Subject in this research was mathematics teacher in Palopo City. Research process followed the steps: (a) stated the indicators of student problem based of the theory and the relevant research; (b) stated supported instrument that is guided interview; (c) conducted taking of research subject; (d) collection of data to reveal teacher problem in implementing learning at school; (e) conducted triangulasi to find a valid data; (f) conducted analysis of teacher problem data in implementing mathematics learning at school; (g) conducted discussion of analysis result; (h) conducted conclusion of analysis result. Result of this research show that (a) teacher had difficulty in managing a heterogen class; (b) lack of facilities and instructures; (c) lack of students attention toward completeness of text books; (d) each problem in senior high school caused of student had lack of basic knowledge; (e) there were several student that had low ability in learning mathematics. Based of result research above, then teachers problem in implementing mathematics learning at school could be used as a reference in developing character, cultivated reasoning ability, teacher creativity as well as strengthen student’s understanding in basic concept of mathematics for students at school and could be used as modified futher basic research.

Key words and Phrases: qualitative research, mathematics teacher problem, mathematical problem.

References

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ANALYSIS OF USING GAUSSIAN MIXTURE MODEL TO ESTIMATED LOSS SEVERITY DISTRIBUTION OF LOSS DISTRIBUTION APPROACH FOR OPERATIONAL RISK

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Abstract. Banks must be able to manage all of banking risk, one of them is operational risk. Banks manage operational risk by calculates estimated operational risk which is known as the economic capital(EC). Loss Distribution Approach (LDA) is a popular method to estimate economic capital(EC). This paper propose Gaussian Mixture Model(GMM) for severity distribution estimation of loss distribution approach(LDA). The result on this research is the value at EC of LDA method using GMM is smaller 2% - 2.8% than the value at EC of LDA using existing distribution model.

Key words and Phrases: Operational Risk, Loss Distribution Approach, Gaussian Mixture Model.

References


RAINBOW CONNECTION NUMBER AND STRONG RAINBOW CONNECTION NUMBER OF THE GRAPH 
\( (d_2(P_n) + K_1) \)

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Abstract. Let \( G \) be a nontrivial connected graph with an edge-coloring \( c:E(G) \rightarrow \{1, 2, \ldots, k\}, k \in \mathbb{N} \). A path is called rainbow if no two edges in the path have the same color. The graph \( G \) is rainbow connected if any two vertices of \( G \) are connected by a rainbow path in \( G \). The rainbow connection number of \( G \), denoted \( rc(G) \), is the smallest number of colors needed to make \( G \) rainbow connected. The strong rainbow connection number of \( G \), denoted by \( src(G) \), is the smallest number of colors needed so that for any two vertices \( x, y \in V(G) \) there is a rainbow \( x - y \) path which is also geodesic. In an earlier finding, the first author has found the \( rc \) and \( src \) of \( d_2(P_n) \), the shadow graph of a path-graph. In this paper we compute the \( rc \) and \( src \) of the sum of this graph with a \( K_1 \). For \( n \leq 6 \), \( rc(d_2(P_n) + K_1) = src(d_2(P_n) + K_1) = 2 \). For \( n \geq 7 \), \( rc(d_2(P_n) + K_1) = 3 \) and \( src(d_2(P_n) + K_1) = \lceil \frac{n}{2} \rceil \), with \( diam(d_2(P_n) + K_1) = 2 \).

Key words and Phrases: rainbow connection, shadow graph, path, sum.

References


A REVIEW ON PRACTICAL GUIDE FOR COMPUTATIONAL GEOMETRY USING LINEAR OPTIMIZATION

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Abstract. A practical guide to present the computational geometry via linear programming is discussed in this paper. We review some theories on geometric objects, geometric relations, combinatorial complexity and computational geometry. Further, we discuss about how important the convex hulls and its algorithm to compute the convex hulls. The computation of convex hulls is one of the most fundamental, and one of the first studied problems, in computational geometry. The convex hull CH(S) of a set of points S is defined as the minimum set forming a convex shape containing all points in S. A set is convex if any line segment (p,q) between any pair of points p, q ∈ S is completely contained in S. Using the terminology of Linear Optimization (see Mortensen [1]), thus for computational geometry problem on calculating the convex hull is then finding the furthest allowed point in a given direction. We present some simple examples (see [2]).

Key words and Phrases: convex hulls, linear optimization, computational geometry.

References

AFFINELY ADJUSTABLE ROBUST COUNTERPART FOR UNCERTAIN SPATIAL OPTIMIZATION MODEL OF WATER SUPPLY ALLOCATION PROBLEM

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Abstract. Consider the spatial optimization model for water supply allocation (SOMWSA) proposed by [2]. The problem is modeled as a linear optimization problem in order to optimally water across multiple across multiple district with objective to minimize the total population affected by deficits in the regions. In this paper, we discuss a modified model of the SOMWSA of [2] by considering the possibility of uncertain data in demand. In this paper, to model the robust version of SOMWSA, we present the robust counterpart model as promote by Ben-Tal and Nemirovski in [1] with ellipsoidal uncertainty approach (also see [3]). Furthermore by considering the SOMWSA as a multistage decision problem, the decision variables now become the wait and see decision variables, thus we have to use the affinely adjustable robust counterpart, since the water flow for a region i depends on the water flow of region i-1.

Key words and Phrases: affinely adjustable robust counterpart, spatial optimization, water supply allocation problem, robust optimization, ellipsoidal uncertainty set.
References


ENCRYPTION ALGORITHM USING NEW MODIFIED LOGISTIC MAP FOR DIGITAL IMAGE

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Abstract. At this time when information technology is developing rapidly, the public's attention to the data and personal information is very low. This is clearly seen in the behavior of people who so easily deploy/split the data and personal information in social media. Moreover, a person's awareness and attention to digital data that can be accessed by off-line is lower. In fact, even in off-line network, the digital data is very easy to move from person to another person, which may cause the manipulation or alteration of data. Therefore, it is essential to provide protection to the data, especially if the data is highly confidential. The focus of this paper is to protect digital data, specifically digital image. Protection is provided in the form of encrypted digital image. The encryption process using the new map, $x_{n+1} = \frac{r_1 x_n}{1 + \lambda (1 - x_n)^2} \pmod{1}$, which is a modification of the logistic map. We will call the new map with logistic MS map. In the result, we found the encrypted digital image using the new map, and how its performance in terms of: average time of encryption/decryption process; histogram analysis; and the sensitivity of the initial value. Not only the encryption process, the research is also equipped with a decryption process as the inverse of the encryption process that will produce the original image as output. The results showed that the average time of the encryption process is relatively same as the decryption process. Histogram of the encrypted image is flat (uniform distribution) and the sensitivity of the initial value reached $10^{17}$. So that, the encryption algorithm which developed by MS logistic map is more resistant to brute-force attack.

Key words and Phrases: Logistic MS map, Logistic map, encryption and decryption algorithm, digital image.

References


THE IMPLEMENTATION OF COMBINATORIAL GRAY CODE ALGORITHM OF GENERATING TREE OF PERMUTATION n WITH m CYCLES

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Abstract. Combinatorial Gray code is a method to generate combinatorial objects so that any two successive objects differ in small prescribed way. Author has developed combinatorial Gray code of generating tree of permutation n with m cycles. This paper discusses the algorithm that is in O(1) time per object, which is a condition of the effectiveness of the algorithm for generating combinatorial objects. The paper also discusses its algorithm implementation in Java programming language.

Key words and Phrases: Combinatorial Gray code, generating tree of permutation n with m cycles, algorithm, Java programming language.

References

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THE FORMATION OF THE GRAY CODE WITH
HAMMING DISTANCE 1 FOR TRIBONACCI STRINGS

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Abstract. Tribonacci strings are a family of fibonacci strings, with characteristic has no substring 111. The following are examples of Tribonacci strings: 110101, 11011011011, 00010110110010011, and this is not a Tribonacci strings: 111011, 10111100, 110111001. Gray code with Hamming distance 1 of Fibonacci Strings have been developed by some researchers. Until now, research related to Tribonacci strings still very little, and this research develops Gray code with Hamming distance 1 for Tribonacci strings. The establishment of a Gray codes in this research through several phases, namely: enumeration, generation, and listings. The research on enumeration and generation of Tribonacci strings has produced a reccurence relation to the formation of a Tribonacci string and has been proven to be true. The main results of this research are Gray codes for Tribonacci strings is beneficial for the field among other things: the creation of interconnection networks, parallel algorithms, encryption, variations in coding theory.

Key words and Phrases: Hamming Distance, Listing, Recurrence Relation, Tribonacci Number, Tribonacci String
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ANALYSIS OF VARIABLES AFFECTING UNEMPLOYMENT RATE AND DETECTING FOR CLUSTER IN WEST JAVA, CENTRAL JAVA, AND EAST JAVA IN 2012

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Abstract. The objective of this study is modeling the Unemployment Rate (UR) in West Java, Central Java, and East Java, with rate of disease, infant mortality rate, educational level, population size, proportion of married people, and GDRP as the explanatory variables. Spatial factors are also considered in the modeling since the closer the distance, the higher the correlation. This study uses the secondary data from BPS (Badan Pusat Statistik). The data will be analyzed using Moran I test, to obtain the information about spatial dependence, and using Spatial Autoregressive modeling to obtain the information, which variables are significant affecting UR and how great the influence of the spatial factors. The result is, variables proportion of married people, rate of disease, and population size are related significantly to UR. In all three regions, the Hotspot of unemployed will also be detected districts/cities using Spatial Scan Statistics Method. The results are 22 districts/cities as a regional group with the highest unemployed (Most likely cluster) in the study area; 2 districts/cities as a regional group with the highest unemployed in West Java; 1 district/city as a regional groups with the highest unemployed in Central Java; 15 districts/cities as a regional group with the highest unemployed in East Java.

Key words and Phrases: Unemployment, Open Unemployment Rate, Moran I Test, Spatial Autoregressive, Spatial Scan Statistics

References

Pusat Statistik Provinsi Jawa Timur.


DEVELOPMENT OF LEARNING DEVICE LOCAL CONTEXT THE PALOPO CITY WITH MODIFY COOPERATIVE LEARNING MODEL TYPE OF THINK PAIR SHARE AND PROBLEM BASED LEARNING MODEL

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Abstract. Innovation learning in subjects in Mathematics Education specially at the University of Cokroaminoto Palopo is still centered on the lecturers and less utilize local context or local superiority and local problems as source of learning specially in Polopo city. Its the underlying researches to developing of learning device local context the Palopo city with modify the cooperative learning model type of Think Pair Share and Problem based learning model that quality (Valid, Practical and Effective). Based on consideration of efficienicy, specially in term of the time available, so the development of these is carried out with simultaneous. In other words, when developing model, developed learning device that accordance with the model and development of instrument that regarding with model and learning device. Long term purpose to be achived with developing model learning are (1) development devide that characterized local context the Palopo city that can be used and referance by each lecturers at the University in Palopo city, (2) the book learners that developed characterized also local context the Palopo city that can be used by each lecturers at the University in Palopo city, (3) Through modification local context learning model the Palopo city is expected to be input to the Departement of Education to be discovery learning model that can be used by any educators both in Palopo and other areas. So with referance to the target outcomes in this research, so can contibute to science education, specially in the Education World with the inovation of new model learning through modification the cooperative Thing Pair Share learning model with problem based learning model. The research methode used include : (1) The phase of pliminary investigation, (2) design, (3) realization, and (4) tasting evaluation and revision to combined class 1 in Data Analysis subject. The result of the research showed that the device that developed with linking the local context and local issues in Palopo city can stimulate and develop the capabilities of students to mathematics problems that happen in Palopo city specially in education problem. The result of this research may also contribute to development of learning, specially for educators both lecturers and teachers in Palopo.

Key words and Phrases: development device, modification, Cooperative type Think Pair Share Learning Model, problem based learning model

References


DYNAMICS OF A RE-PARAMETRIZATION OF TWO-DIMENSIONAL MAPS

\[(x_{n+1}, y_{n+1}) = g(\mu, \lambda) (x_n, y_n) = \left(\frac{x_n(\lambda - \mu x_n)}{y_n(x_n - \mu)}, x_n\right)\]

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Abstract. The discussion of two-dimensional mapping in this paper is based on a member of a family of system derived from a generalized \(\Delta\Delta\)-sine Gordon equation introduced by J.M. Tuwankotta in 2005. By replacing the role of integral and parameter in a system of difference equations, we will generate a new mapping and compare the properties of the new mapping with the original one, i.e. measure preserving property, their symmetries and reversing symmetry. Furthermore, the dynamics of the new mapping is analyzed.

Key words and Phrases: Re-parametrization, two-dimensional mapping, generalized \(\Delta\Delta\)-sine Gordon, measure preserving, symmetric, reversing symmetric.

References

dimensional integrable mappings that posses invariants of high degreee, RIMS Kokyuroku Bessatsu13 , pp. 75-84.
FUZZY BILINEAR BILEVEL OPTIMIZATION

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Abstract. Fuzzy bilinear bilevel optimization problems is bilinear bilevel optimization problems involving the objective function coefficients having fuzzy value. The resulting problem consist of upper-level problem, which is a crisp bilinear optimization problem, implicitly determining the optimization of lower-level problem having fuzzy value. In finding the optimal solution of this problem, it can use an effective algorithm is based on the membership function approach under the assumption that the second-level decision makers can select a single optimal solution. With this solution the upper level fuzzy optimization problem is solved with the use of a stability region. This algorithm provides us with a global optimal solution of the fuzzy bilinear bilevel optimization problem.

Key words and Phrases: Fuzzy bilevel optimization, Bilevel programming, Bilinear programming, Optimal solution.

References


MULTISCALE SEASONAL AUTOREGRESSIVE FEED FORWARD NEURAL NETWORK MODELING FOR NONSTATIONARY-SEASONAL TIME SERIES DATA

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Abstract. This paper presents a procedure to build an architecture from Multiscale Seasonal Autoregressive Feed-Forward Neural Network (MSAR-FFNN) model for time series data forecasting. The used data are nonstationary-seasonal time series data. In this paper, 150 values are generated from a SARIMA(0,1,1)×(0,1,1)4 model. The data are decomposed based on Maximal Overlap Discrete Wavelet Transform (MODWT) to obtain wavelet and scaling coefficients. The decomposition is used as a method for data preprocessing. Inputs of MSAR-FFNN model are seasonal and near-seasonal lags from the wavelet and scaling coefficients, in addition to the same inputs as the Multiscale Autoregressive (MAR) model inputs. In the Multi-Layer Perceptron (MLP), the resilient backpropagation algorithm is used to estimate weights of MSAR-FFNN model. To obtain optimal MSAR-FFNN model, the units in the input layer are selected based on the combination between Wald and F tests. The number of units in the hidden layer is determined by the Bayesian Information Criterion (BIC).

Key words and Phrases: nonstationary, seasonal, near-seasonal, MODWT, wavelet, neural network, feed forward, resilient backpropagation.
EXPLORATION OF QUEUE AT PT. BANK NEGARA INDONESIA PADANGSIDIMPUAN BRANCH

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Abstract. This research aimed to explore the optimum point of customer queue in PT. Bank Negara Indonesia, Padangsidimpuan branch. Besides, this research also revealed the number of the queue in term of days and hours, and its relationship to the teller service. The queue happened due to the random visits of the customer could not be handled appropriately by the bank. The exploration was conducted by employing quantitative approach. The data was acquired through observation and field notes. The data was analyzed in two steps, 1) assumption test which consists of randomity, Poisson congruence, exponential congruence and utility factor test, and 2) queue theory analysis by using Kendall-Lee notation (M/M/5): (FIFO: ∞/∞). The research had found that for optimum service on Tuesday, Wednesday and Thursday in the first week and the fourth week needed five tellers, and then on Monday and Friday needed six tellers. This condition happened due to the variety of customers’ visit number in those days. It means that dates gave no influence to customers’ visits. In term of hours, it was found that from 11-12 AM, more customers visite the bank, so that it was suggested to the bank to add a few more tellers in that hours. This result was taken by decision making in queue system which considers service cost and good service criteria.

Key words and Phrases: queue, queue theory, optimum point, customer, teller.
EXPERT SYSTEM FOR THE PREVENTION OF EPIDEMIC DENGUE HAEMORRHAGIC FEVER

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Abstract. This research aims to develop an expert system for the prevention of epidemic dengue hemorrhagic fever that will provide recommendations for governments and communities to conduct preventive measures are optimal. Recommendations are given in the form of expert opinion to prevent an epidemic of dengue in an area with the input characteristics of the area and public health as well as area and time predicted an epidemic of dengue using ANFIS. The process of inference in expert system uses a rule base and knowledge representation with Forward chaining method. Expert system of prevention of epidemic dengue hemorrhagic fever is built using MATLAB R2012a.

Key words and Phrases: Epidemic DBD, ANFIS, Sistem pakar.

References


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RISK AND VOLATILITY: TIME SERIES MODEL FOR INVESTMENT

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Abstract. Investments in stock market such as stocks, bonds, currencies and derivatives have some risks. The accurate forecasting of volatility is a key issue for successful risk management and analysis. The most popular model representing volatility is the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model. In this study, GARCH(1,1) and GARCH(1,1)-M is the best suited model to forecast volatility of IDX composite. The forecast of volatility is used to compute Value at Risk (VaR) as consideration to help investors for their investment.

Key words and Phrases: time series, generalized autoregressive conditional heteroscedasticity, value at risk, volatility.

References

SPATIAL MODEL FOR A STREAM NETWORKS

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Abstract. Application of existing geostatistical theory of stream networks provides a number of interesting and challenging problems. Most of statistical tools in the traditional geostatistics has been based on a Euclidean distance such as autocovariant functions, but for stream data is not permissible since it deals with a stream distance. To overcome this autocovariant developed a model based on the distance the flow with Using convolution kernel approach (moving average construction) (Ver Hoef, Peterson, Theobald, 2006; Cressie et al., 2006). Spatial model for a stream networks is widely used to monitor environmental on a river networks. This model can analyze a relationship spatial dependence with a quality of the river water, and also predict the quality of the river water at unobserved locations on the river using kriging method. This objective of this paper is to analyze a variety of spatial dependences which are based upon several river physical characteristics related to the prediction results. This results can also be presented in a geographical map.

Key words and Phrases: stream networks, spatial dependence, autocovariant function, kernel convolution, kriging.

References

ALGEBRA OF COLORS

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Abstract. We consider the set of colors. The colors are produced by a unit volume of paint. We construct a color by mixing in a certain proportion of five basic colors of paint: red, yellow, blue, black and white. We introduce an algebra operation of the set of colors, which is the mixing any colors. Finally, we construct an isomorphism between the set of colors with $\mathbb{R}^5$, where $\mathbb{R}$ is the set of real numbers.
SPATIAL AUTOREGRESSIVE POISSON MODEL FOR DETECTING INFLUENTIAL FACTORS ON THE NUMBER OF DENGUE HAEMORRHAGIC FEVER PATIENTS IN THE PROVINCE OF DKI JAKARTA

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Abstract. Dengue Haemorrhagic Fever (DHF) Patients is a rare occurrence but DHF disease is a serious problem that requires special handling in each district. In this research used spatial autoregressive Poisson models to detect factors that influence toward the number of DHF patients. Based on the results of this study was obtained factors that influence the number of DHF patients are spatial and non-spatial. Spatial factor that predispose to a particular location is the location of the neighbors. While non-spatial factors that influence the number of DHF patients are the number of population density, the number of health centers, and the volume of waste. In this research, parameter was estimated by maximum likelihood estimation. Furthermore, in spatial autoregressive Poisson model was obtained error standard was less than without spatial in Poisson regression model.

Key words and Phrases: Spatial Autoregressive Poisson, Dengue Haemorrhagic Fever (DHF), maximum likelihood, Poisson regression.

References


SIZE RAMSEY NUMBER FOR $P_3$ VERSUS $T_7$

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Abstract. Let $F, G,$ and $H$ are simple graphs. We say $F \rightarrow (G,H)$ if for every 2-coloring of the edges of $F$ there exist a monochromatic $G$ or $H$ in $F$. The Ramsey number $r(G,H)$ is defined as min $\{|V(F)|: F \rightarrow (G,H)\}$ and the restricted size Ramsey number $r^*(G,H)$ is defined as min $\{|E(F)|: F \rightarrow (G,H), |V(F)| = r(G,H)\}$. In this paper we give the size Ramsey number for path $P_3$ versus $T_n$, $n = 7$.

Key words and Phrases: Size Ramsey number, path, tree

References

ON $(a, d)$-DISTANCE ANTIMAGIC LABELING

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Abstract. For an arbitrary set of distances $D \subseteq \{0, 1, \ldots, \text{diam}(G)\}$, a $D$-weight of a vertex $x$ in a graph $G$ under a vertex labeling $f: V \to \{1, 2, \ldots, v\}$ is defined as $w_D(x) = \sum_{y \in N_D(x)} f(y)$, where $N_D(x) = \{y \in V | d(x, y) \in D\}$. A graph $G$ is said to be $D$-distance magic if all vertices has the same $D$-weight, it is said to be $D$-distance antimagic if all the $D$-weights are different, and it is called $(a,d)$-$D$-distance antimagic if the weights constitute an arithmetic progression with difference $d$ and starting value $a$. In this paper we study $(a,2)$-distance antimagic graphs.

Key words and Phrases: labeling, distance antimagic labeling, $(a,d)$-distance antimagic

References

SCHEDULING OF TANKER BY CALCULATION OF CONVEX HULL

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Abstract. Shipment schedule play a fundamental role in every petroleum supply chain, because this factor has a considerable influence in financing. So necessary a shipment schedule which result in the minimum transportation cost. In this paper, we study a tactical optimization model for crude oil distribution by 2 type of tankers. The problem consists of scheduling the shipments through routes linking platforms (crude oil production sites) and terminals (crude oil processing sites). The objective is to ship the products from the platforms to supply the terminals with minimum transportation cost for a finite planning horizon. For each site, the inventory levels must lie between a lower and an upper bound to avoid the lack or excess of product. Also, for each site, the demand or the production is given for the whole planning horizon. Scheduling process will be carried out by using the branch and bound method to solve the knapsack problem, where the number of tankers that must and can submitted is the result of calculation of the convex hull of a knapsack with two variables. It is intended to restrict the number of tankers used. The conclusion from this problem is a time schedule of tanker for a finite planning horizon, where we know the source and destination of a tanker.

Key words and Phrases: branch and bound, convex hull, knapsack, petroleum, schedule.

References

CANCER CLASSIFICATION USING CUCKOO OPTIMIZATION ALGORITHM WITH FEATURE SELECTION

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Abstract. For many years, cancer classification has improved to detect cancer at early stage of treatment. Cancer classification is used for the treatment of cancer has entered the challenge to target specific therapy for each type of cancer pathogens in an effort to maximize efficiency and minimize toxicity. This research present cancer classification with feature selection using microarray data. The clustering method based by recently invented Cuckoo Optimization Algorithm (COA) and traditional method K-Means, Support Vector Machine, and Fuzzy C-Means for comparison. Cuckoo Optimization Algorithm is inspired by the life of bird called Cuckoo. Feature selection is used to reduce the dataset so that the dataset are used more informative. Feature selection is crucial for cancer classification, because for each cancer has small numbers of gene are informative. In this paper, filter method is used. In the filter method, a feature relevance score is calculated, and low-scoring features are removed. The class I (healthy) and class II (cancerous) are already known. The feature are ranked according to the symmetric divergence between positive and negative classes distribution. The experiment investigation that optimization based clustering with feature selection increase the accuracy, sensitivity, and specificity classification. The results are expected to show the difference between all the dataset used and the dataset using feature selection.

Key words and Phrases: Cancer classification, feature selection, clustering, traditional method, Cuckoo Optimization Algorithm, microarray data, feature score
EXCHANGE RATE US DOLLAR (USD) TO INDONESIAN RUPIAH (IDR): A MARKOV-SWITCHING GARCH MODEL APPROACH

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Abstract. Financial time series usually exhibit complex and dynamic pattern. It is usually fluctuated very high, either increase or decrease depend on the situation, such as inflation, interest rate, political stability, etc. Especially, in this paper will be focused on exchange rate US dollar (USD) to Indonesian Rupiah (IDR). It is observed that Indonesian rupiah exchange rate against US dollar in recent year show a decline in very high value. If that time series is illustrated, then it will produce a dynamic and absolutely not linear pattern, which is not good enough if it is modeled by one model for entire period of time series. Therefore, it will be introduced Markov-Switching GARCH model. This model may contain some structural characteristic of the model at different time period and it is expected can capture a dynamic pattern that is more complex and not linear. This model is also have turn over mechanism (switch) that is influenced by the state that were not observed following the Markov chain process. Additionally, it will be added Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model that can capture the phenomenon of clustering the volatility that often arise in the economic and financial time series. The discussion will be focused on fitting the Markov-Switching GARCH model to exchange rate US Dollar (USD) to Indonesian Rupiah (IDR) series.

Key words and Phrases: Exchange rate, GARCH, Markov chain, Markov-Switching GARCH, Volatility

References

DEVELOPING MATH LEARNING INSTRUMENTS BASED ON PROBLEM BASED INSTRUCTION WITH SCIENTIFIC APPROACH TO FACILITATE THE STUDENT MATH SKILLS

RISNAWATI

Abstract. This research aimed to develop learning instruments based on problem based instruction with scientific approach that included syllabi, lesson plans, and test instruments on aspects of mathematical ability to produce a valid, practical, and effective learning tool. For effective implementation of this device, it was tested on fourth semester students. The type of this research was research development that used 4-D model with the stages of Define, Design, and Develop, and Dissemination. The model of this development was modified because it was not performed or extinguished. The population of this study was fourth semester students which consist of seven classes. By using random sampling technique, two classes were selected; experiment and control class. Data collection technique used validation sheet for the learning devices, questionnaire, and test for student creative thinking. Data were analyzed with descriptive and quantitative analysis. Results of this research were: 1) the math learning instruments in learning activities which used problem based instructions with scientific approach. 2) The results of the review of materials experts assert that the learning devices which used problem based instruction with scientific approach developed was categorized as valid, and practical or good. 3) media experts give good feedback. 4) The results of student responses with overall percentage of students for small group at 87.6% categorized as good. 5) The development of the devices by using problem based instruction with scientific approach was effective to facilitate student math skills at UIN Suska Riau. This is shown by the score of $t_{calculate} = 3.362$ less than the score of $t_{table} (\alpha = 0.05) = 2.02$.

Key words and Phrases: development, problem based instruction, scientific approach, and math skills.
TRACING METACOGNITION OF STUDENTS FOR STUDYING THE NUMBER OF THEORY BY APPROACH OF LEARNING BEHAVIOR

LA MISU

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Abstract. The purpose of this research is to develop learning theory with behavioral modification cooperative learning Numbered Heads Together in solving mathematical problems students on the course Theory of Numbers. The steps were developed from the theory of behavior modification cooperative learning with Numbered Heads Together regard to solving mathematical problems in Number Theory course consists of five phases, namely: (1) Selection of cooperative as a learning approach, (2) Compiler material number theory on a given topic in the form of paper, (3) Presentation of papers in rotation by a member of the group in front of the class, (4) Comments member of another group against the grain material from the group that has been designated, (5) The summary or affirmation matter and positive reinforcement and negative reinforcement.

Based on trial results empirically in the implementation of learning through the theory of behavior modification cooperative learning Numbered Heads Together as follows: (1) the participation of students from both groups of presenters and groups of participants is very high so as to motivate students to learn to find and resolve their own issues on specific topics in number theory, and (2) Achievement of student learning outcomes that first meeting: 37.5% and the average of 50.5, the second meeting: 52.4% and an average of 52.9, and the third meeting: 72.5% and average 62.3.

Key words and Phrases: Problem Solving Mathematics, Theory of Learning Behaviour

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Siswa Kelas VIII SMP Negeri 5 Kendari. FKIP Unhalu Kendari. Tidak Dipublikasikan.


THE BOUNDEDNESS OF BESSEL-RIESZ OPERATORS ON MORREY SPACES

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ABSTRACT

In this paper, we shall discuss about Bessel-Riesz operators. Kurata et.al have investigated its boundedness on generalized Morrey spaces with weight. We reprove the boundedness of the operators on Lebesgue spaces and Morrey spaces using different approach. Moreover, we also find the norm of operators are bounded by the norm of kernels.

Keywords: Bessel-Riesz operators, Hardy-Littlewood maximal operator, Morrey spaces.
DYNAMIC MODEL FOR EVALUATION METHOD OF DOMESTIC WASTE WATER QUALITY CONTROL IN STABILISASI PONDS

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ABSTRACT

Dynamic models as evaluation method domestic waste water quality control in stabilization ponds IPAL Sewon, Bantul, Yogyakarta is an evaluation method to processing unit operates through the biological WWTP. There are 4 (four) system the simultaneous nonlinear equations solved diferesimal that solved numerically Runge Kutta method with Order 4. The dynamic model is part of operating system calculated simultaneous equations between bacteria, algae, Dissolved Oxygen (DO) and Biochemical Oxygen Demand (BOD). With water quality using control graph the indicated with the observation data the x-axis and y axis is the data count for the area is predicted line angle 45° and tolerance ± 20%. The results of obtained raw effluent quality meets the domestic class II that show the BOD <50 mg / l, DO > 3 mg / l, bacteria < Total 1,104 / 100ml. Therefore, Model may be used as a tool of evaluation of the performance of the WWTP and accordance with field conditions.

Keywords: dynamic models, wastewater stabilization pond, quality control
GENERATING NEW GRAPHS USING BOOLEAN OPERATIONS (∨ AND ∧) ON ADJACENCY AND ANTIADJACENCY MATRICES OF GRAPHS

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ABSTRACT

Let \( G \) be a graph with \( V(G) = \{v_1, ..., v_n\} \) and \( E(G) = \{e_1, ..., e_m\} \). We only consider graphs with no multiple edges on this paper. The adjacency matrix of \( G \), denoted by \( A(G) \), is the \( n \times n \) matrix \( A = [a_{ij}] \), where \( a_{ij} = 1 \) if \( e = v_i \rightarrow v_j \in E(G) \) or \( a_{ij} = 0 \) otherwise. The antiadjacency matrix of \( G \), denoted by \( B(G) \), is the \( n \times n \) matrix \( B = [b_{ij}] \), where \( b_{ij} = 0 \) if \( e = v_j \rightarrow v_i \in E(G) \) or \( b_{ij} = 1 \) otherwise. Harary and Wilcox has considered Boolean operations on two graphs \( G_1 \) and \( G_2 \), resulting a new graph \( G \) whose \( V(G) \) equals to \( V(G_1) \times V(G_2) \). On this paper, Boolean operations will be defined for two adjacency and two antiadjacency matrices of graphs \( G_1 \) and \( G_2 \) with \( V(G_1) = V(G_2) \) rather than looking at the two graphs themselves. Boolean operations which are reviewed on this paper are \( \lor \) and \( \land \). The objectives of this paper are to introduce the operations on two adjacency or two antiadjacency matrices of graph \( G \), to discover some characteristics of the operations on the matrices, to construct a new graph which is generated using the operators on two adjacency or antiadjacency matrices, and to reveal the similarity between operators on adjacency matrix and operators on antiadjacency matrix based on the represented graph. This paper also emphasizes on investigating the relationship between the operators and on comparing largest eigenvalue between graph which constructed by Boolean operators on both adjacency and antiadjacency matrices.

Keywords: graph, antiadjacency matrix, adjacency matrix, Boolean operation, operation \( \lor \), operation \( \land \), largest eigenvalue
COMPARING THE LARGEST EIGENVALUE OF ADJACENCY AND ANTIADJACENCY MATRICES OF GRAPHS WHICH CONSTRUCTED USING BOOLEAN OPERATION (⊕ AND ⊕̅)

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ABSTRACT

Let $G$ be a graph with $V(G) = \{v_1, \ldots, v_n\}$ and $E(G) = \{e_1, \ldots, e_m\}$. Only graphs with no multiple edges will be consider on this paper. The adjacency matrix of $G$, denoted by $A(G)$, is the $n \times n$ matrix $A = [a_{ij}]$, where $a_{ij} = 1$ if $e = v_i v_j \in E(G)$ or $a_{ij} = 0$ otherwise. The antiadjacency matrix of $G$, denoted by $B(G)$, is the $n \times n$ matrix $B = [b_{ij}]$ where $b_{ij} = 0$ if $e = v_i v_j \in E(G)$ or $b_{ij} = 1$ otherwise. Boolean operations on two graphs have been examined by Harary and Wilcox. Hence, this paper will consider Boolean operations on two adjacency or two antiadjacency matrices of $G_1$ and $G_2$ with $V(G_1) = V(G_2)$. Boolean operations which are discussed on this paper are OR ($\lor$), AND ($\land$), XOR($\oplus$), and NXOR($\oplus\neg$), but the paper will focus on operation $\oplus$ and $\oplus\neg$. The purposes of this paper are to introduce the operations on two adjacency or two antiadjacency matrices of two graphs $G_1$ and $G_2$ with $V(G_1) = V(G_2)$ to reveal the effect on the represented graph using operations $\oplus$ and $\oplus\neg$ on both adjacency and antiadjacency matrices, and to compare the largest eigenvalues between the matrices generated by the Boolean operations.

Keywords: graph, antiadjacency matrix, adjacency matrix, Boolean operation, operation $\oplus$, operation $\oplus\neg$, operation $\lor$, operation $\land$, largest eigenvalue
IMPLEMENTATION SUPERVISORY CONTROL ON PETRI NET FOR REGULATOR SYSTEM OF TRAFFIC IN AIRPORT JUANDA SURABAYA

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ABSTRACT

Discrete event system is a system with the state space of the system describe by a discrete set \{0,1,2,3⋯\} and transition state observed at the discrete points in time. Discrete event system and related issue control of great concern to the research community in recent years. Many successful application as advanced theoretical tool, such as automata and petri net is done in modeling system. In addition, limited control in discrete event system has become an active area of research since conducted by Ramadge and Wonham, known as supervisory control system. The purpose of supervisory is restrict so that events can’t occur and keep to event. In this case, the controller only act if there are thing wrong or threaten on the system. Example in effect on traffic control system in the air, especially to plane (air traffic control) with the aim of preventing collision between plane (making separation). This research investigated to automata and petri net can be used to solve the problem supervisory control, in this case the traffic control system at the airport (airport traffic).

Keywords: petri net and supervisory control
IMPLEMENTATION OF HIERARCHICAL CLUSTERING USING K-MER SPARSE MATRIX TO ANALYZE MERS-COV GENETIC RELATIONSHIP

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Hierarchical clustering is an effective method for phylogenetic analysis based on the distance matrix between DNA sequence. One of interesting methods for computing the distance matrix is k-mer method. K-mer is considering more efficient compare to some others. The computing steps to find the distance matrix using k-mer method starts from creating k-mer sparse matrix. Then, creating k-mer singular value vector. The last step is counting distance between each vectors. In this work, we will analyze the families of MERS-CoV viruses by implementing Hierarchical clustering to their DNA sequences using k-mers sparse matrix. MERS-CoV (Middle East Respiratory Syndrome Coronavirus) is reported for the first time in Saudi Arabian, 2012. Since 2014, the syndrome had been spread to others country outside Saudi Arabian. We implemented the Hierarchical clustering using k-mer sparse matrix algorithm using open source programming tool and packets R. The data set is obtained from NCBI database. Based on our simulation using k=8, we found clustering of each country and knew the ancestor of each sequence of DNA MERS-CoV. The ancestor from one country is able to be different each other.

Keywords: Hierarchical Clustering, k-Mer Sparse Matrix, MERS-CoV, phylogenetic, singular value vector
The advantage of helical gear that can operate silently, on parallel and non-parallel shafts at high capacity is great such that helical gears are used in almost all car transmission systems. As such, the study on two major failures of helical gears which are due to bending stress and pitting is critical. In this study, numerical modeling of a gear that is used in the transmission system of a 5-speed Malaysian brand car was conducted using finite element method. Bending stress and pitting analysis were then conducted on this helical gear that was modeled in 3D involute form. The obtained results of maximum bending and contact stresses were compared to analytical results obtained through the application of the AGMA formulations. It was found that the results of the FEM modeling and the AGMA formulations were in good agreement. Parametric studies were conducted on the effects of face width and helical angle of the gears on the bending and pitting stresses. It was observed that the increase of face width of the gear will decrease the maximum bending stress while the increase of the helical angle will increase the pitting stress in a non-linear fashion in both cases.

Keywords: Numerical modeling, finite element method, contact stress, AGMA formulation
In this paper we discuss the mathematical modelling and numerical simulations of solitary wave for Variational 1D Boussinesq Model (VBM). We know that a solitary wave is a nonlinear wave that travels undisturbed in shape and velocity as a result of a balance between dispersion and nonlinearity. According to the theory of Korteweg-de Vries (KdV), the solitary waves that satisfies is hyperbolic secant squared form with the velocity depend on the amplitude and the depth. However the weakly nonlinear approximation is made in VBM. Therefore, we investigate mathematically for solitary wave that satisfies VBM.

Keywords: solitary wave, VBM
ALGEBRAIC ATTACK ON MINI-AES ALGORITHM

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Algebraic attack is a potentially powerful attack on symmetric key block cipher. It has been applied on two algorithm of AES simplification, that are Simplified AES and Baby Rijndael. In this research, the application of algebraic attack on Mini-AES algorithm is done to get a polynomial equations system of Mini-AES algorithm and its solutions using XL Algorithm.

From this research, the 256 unique original polynomial equations are obtained based on s-box function, key schedule, and the encryption process of Mini-AES algorithm. Furthermore, the 65,024 extended polynomial equations are obtained using XL Algorithm. To determine the resistance level of Mini-AES algorithm against algebraic attack, the empirical studies need to be done to get the solutions of extended polynomial equations using support computational algorithms.

*Keywords: Algebraic Attack, Mini-AES, Polynomial Equations System, XL Algorithm*
SQUARE ATTACK ON MINI-AES AND SIMPLIFIED AES USING ALL VARIANT OF ACTIVE NIBBLE POSITION

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Mini-AES and Simplified AES are a miniature of AES. Square Attack is a chosen plaintext attack that choose a Λ-set which a set of special plaintext. Square Attack had implemented on Mini-AES with one active nibble. In this research, Square Attack will be implemented using all variant of active nibble position. Then finding key candidate based on Λ-set characteristic using three pairs of plaintext and ciphertext. From this research, proofed that Square Attack can implemented in Mini-AES and Simplified AES to find right candidates key on second, third, and forth round appropriate with active nibble position. Mini-AES as strong as Simplified AES based on tenacity of algorithm, because both of algorithm have same structure and generally need two Λ-set for the least to find all of right key candidate with 2^10 for data complexity. Finding key K_0 (seed) directly use key schedule algorithm based on subkey K_3 which find from Square Attack with one active nibble or two active nibble for (1,4) and (2,3) position chronologically active nibble value is more effective than Square Attack on forth, third, and second round to find K_3, K_2, K_1 partially.

*Keywords: Square Attack, Mini-AES, Simplified AES
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