Four-year PhD position, position 1: TU Eindhoven (Netherlands) with AcomeA Milan (Italy)

Two 4-year Marie Curie PhD positions are available at TU Eindhoven, starting date March 1, 2019. Research topics may include numerical linear algebra, big data, probability and statistics, modeling, model reduction, large-scale optimization.

This is a description of Position 1 at TU Eindhoven, joint with AcomeA Milan, https://www.acomea.it/. This position is “ESR5” (Early-stage researcher), part of the EU Marie Curie EID project BIGMATH, http://itn-bigmath.unimi.it, including 7 PhD positions in total, at universities in Milan, Novi Sad, Lisbon, and Eindhoven.

You will be a member of the Centre for Analysis, Scientific Computing and Applications (CASA), within the Department of Mathematics and Computer Science at TU Eindhoven. Your daily advisors will be:

Moreover, at TU Eindhoven, you may also work with

Additionally, you will spend 4 months at the University of Milan and work with
- Alessandra Micheletti (Associate Prof of Probability and Mathematical Statistics) http://www.mat.unimi.it/users/michel/.

Keywords: Data science, modeling of human behavior, fintech: combining finance and technology, numerical linear algebra, data reduction, variable reduction, model reduction, optimization, statistics, machine learning.

Main tasks:
- Carrying out innovative math research, developing new methods and algorithms, writing papers, presenting them at conferences, writing a PhD thesis.
- Some programming to implement and test the methods, e.g. in Julia, Matlab, Python, or R.
- Teaching 300 hours spread over the 4 years (total work time ca 6800 hours, so the teaching is < 5% of the time).

Offered:
- A very attractive Marie Curie PhD position at TU Eindhoven, joint with AcomeA Milan and in collaboration with the University of Milan.
- Several advanced courses and international conferences.
- Gross salary 2325 (in first year) to 2972 euros (in fourth year) monthly; 40 hours/week.
- Start March 1, 2019 (or a bit earlier if mutually agreed).

Asked (selection criteria):
- MSc in applied or pure mathematics, good grades and strong math skills, with a clear interest in the mentioned topics
- High motivation, perseverance
- Good analytical and English communication skills
- Willing to move a few times between Eindhoven and Milan (as indicated below)
- Speaking Italian is a plus
- Because of EU regulations, this position is not open to people who spent more than 12 months in The Netherlands in the last 3 years prior to the start of the position.
Locations: Eindhoven (Netherlands, 26 months) and Milan (Italy, 22 months), as follows:
March 2019: TU Eindhoven (with 1 week course in Milan); April—August 2019: AcomeA Milan;

To apply: For informal inquiries please contact Dr. Michiel Hochstenbach, TU Eindhoven by email.
To apply, please go to
Please include all of this: motivation letter, CV (math interests, languages, some personal info, hobbies),
list of BSc and MSc courses with grades, MSc thesis (or draft), list of ca 3 people for recommendation.
See also http://www.win.tue.nl/~hochsten/bigmath.html.
Scanning of the applications will start immediately; closing date December 5, 2018.

You are also very welcome to obtain informal information about the project and AcomeA via Giuseppe
Codazzi, giuseppe.codazzi@acomea.it.

For further information about employment conditions you may contact Jonelleke Kamperman, HR
advisor TU Eindhoven, pzwin@tue.nl.

Project description
Please find below a brief description from the BIGMATH proposal. Here “RO” stands for research
objective. This position is ESR5 (ESR = Early-stage researcher).

Project 5 (ESR5): Scoring individual financial investment potential (TU/e & AcomeA)
Modern Financial Technology (fintech) companies offer, besides traditional systems of investment, also
online applications and services where single investors may deposit any amount of money, which can be
rapidly claimed at any time. Such online systems are often used by small investors like students, young
people, etc. as “piggy banks” or by individuals with a larger capital, in parallel to other investments, to
diversify their portfolio. The aim of this project is to identify customers who have a financial
potential larger than their actual investments, to apply targeted marketing strategies. The financial
behavior of individuals is related to their attitude to risk and to save money, and to their way of living,
etc. In this project, we will retrieve this information via socio-demographic data, geolocalized data,
analysis of social networks, by defining relevant variables (RO3) and suitable measures and distances
that may quantify the possible features of interest. Then ESR5 will develop a feature extraction
procedure (RO4) to reduce the problem dimension and identify the more relevant variables to describe
the financial behavior of the individuals. The identification of such variables is crucial and challenging,
due to the heterogeneity of information to be considered. Based on the selected variables, the
customers having an unexploited financial potential will then be identified via quantile regression
techniques.
The relevant research objectives:

**RO3:** Develop model reduction or feature selection techniques for the construction of fit-for-purpose models, which may reduce the complexity of a system, increasing the interpretability of cause-effect relationships.

**RO4:** Develop interpretable statistical models for classification in imbalanced classes and for the prediction of rare events (i.e. classification into 2 imbalanced classes). The aim is to overcome the application of “black box” machine learning techniques, using models that can interpret the interrelationships and the causal effects among different features.

**Some information on AcomeA**

In 1994, a group of managers and entrepreneurs acquires a small asset management company, Anima. In the next fifteen years, Anima grows as the first Italian Asset Manager independent from a distribution network, with more than 350,000 customers, 7 billion of assets under management and 120 distribution agreements. The assets under management top at 11 billion after the acquisition of DWS Italy. In 2010 the same group of independent managers acquires another small A.M. Company: AcomeA is founded on their principles and values, having the customers’ wealth as the core driver. Independence, full transparency, direct information, education and alignment of interests are the main features.