

# MARKOV POPULATION DECISION CHAINS WITH CONSTANT RISK POSTURE

Pelin G. Canbolat, Koç University, Industrial Engineering, Turkey

The purpose of this work is to formulate and efficiently solve stochastic problems involving populations via Markov population decision chains with constant risk posture. A Markov population decision chain concerns the control of a population of individuals in different states by assigning an action to each individual in the system in each period. The progeny of an individual is a vector specifying the number of its immediate descendants in each state. In every transition, each individual earns a random reward and generates a random progeny. The decision maker maximizes expected (finite- or infinite-horizon) system utility under the following assumptions: (i) The utility function exhibits constant risk posture, (ii) progeny vectors of distinct individuals are independent, and (iii) progeny vectors of individuals in a state who take the same action are identically distributed. The main result is that it is possible to solve the problem with the original (finite) set of state-action pairs without augmenting it to include information about the population in each state or any other aspect of the system history. Possible applications include management of animal populations, crops or forests, control of the spread of an infectious disease, and government decisions such as taxation, demographic planning, education, health services and criminal justice systems.