

Research Proposal for Admission to PhD Programme of Jamia Millia Islamia

Name of the Topic: Designing new algorithms for optimizing different financial solutions by minimizing conditional value of risk using soft computing techniques

This proposal is going to emphasize designing new algorithms for optimizing financial solutions, so that the conditional risk will be reduced. These algorithms will be developed using soft computing methods viz. Artificial Neural Network, Genetic algorithm and Fuzzy sets. The algorithms will be developed to take into consideration the conditional value of risk. The conditional value of risk is also known as mean excess loss. Let a probability level (β) is given. The value at risk (α) is the lowest amount such that with probability (β), losses will not exceed (α). Now conditional value at risk is the conditional expectation of losses above that amount (α).

- [1]. Currently, the mathematical modeling is done based on conditional value at risk. The model is being applied to various applications. This model does not include uncertainty involved in computing conditional value at risk. The conditional value at risk is represented with known accuracy. However, real – situations have uncertainty and this proposal will explore soft computing techniques to represent the conditional value at risk.
- [2]. This proposal will devise new algorithms using soft computing methods to find out solutions when uncertainty is involved in conditional value at risk. The research done so far uses mathematical modeling to find the expected value of conditional value at risk.
- [3]. This proposal will make use of Artificial Neural Network and Genetic Algorithm to compute the value of conditional value at risk.

The new algorithms will be designed to minimize financial cost and also to minimize this conditional value at risk. Fuzzy sets will be defined to represent this conditional value at risk. The Artificial Neural Network will then be employed to calculate the value of conditional risk taking inputs from these fuzzy sets. The algorithms will use mathematical equations to minimize financial cost and also to minimize the calculated value of the index for conditional value of risk. The final optimized cost will include minimal financial. Cost as well as minimal value of conditional value of risk.

The solution of this problem will also be tested using genetic algorithm to minimize financial cost and minimizing the conditional value at risk. The outputs of both the algorithms will be compared and numerical results will be presented.

This work will give a description of various steps used in the new algorithm. It will have a complete formulation of fuzzy sets used in the algorithm. The structure and algorithm of Artificial Neural Network (ANN) will be presented. The Numerical results of ANN will be given. A complete description of genetic algorithm as applied to this problem will be developed and numerical results will be presented.

These algorithms will be tested on a financial optimization applications and share market trading. The results obtained for financial cost as well as conditional value at risk will be compared for both the above mentioned algorithms.

This proposal is expected to bring the following improvements:

- I. This proposal will utilize the soft computing techniques to represent the conditional value at risk, because of these techniques viz (ANN) and (GA) this value will be computed taking into consideration uncertainty involved.
- II. The new algorithms will be tested on various financial applications and the outputs of the algorithm based on (ANN) will be compared with the output of the algorithm based on (GA).
- III. Thus, a novel scheme for finding optimal solutions using conditional value at risk and using soft computing methods for uncertainty data computation will be devised.