

SUMMARY AND CONCLUSION

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Multicriteria Decision Making (MCDM) problem is a process that allows one to take decisions in the presence of multiple, potentially conflicting criteria. In typical real life problems, people often find it hard to make decisions in a complex, subjective situation with more than a few realistic options. Thus, MCDM, the well-known branch of decision making, was developed to support the decision makers in their unique and personal decision process.

Analytic Hierarchy Process (AHP) is one of the most famous methods for making multi-criteria decisions. AHP was developed to optimize decision making when one is faced with a mix of qualitative, quantitative, and sometimes conflicting factors that are taken into consideration. AHP has been very effective in making complicated, often irreversible decisions.

AHP builds a hierarchy (ranking) of decision items using comparisons between each pair of items expressed as a matrix. Paired comparisons produce weighting scores that measure how much importance the items and criteria have with each other. Due to the complexity and uncertainty involved in real world decision problems, a decision maker may sometimes feel more confident to provide fuzzy judgments than crisp judgments. To overcome this difficulty, fuzzy judgments have been suggested and fuzzy AHP has been applied in a wide variety of applications. The Fuzzy AHP approach is a systematic method for the alternative choice and justification problems that combines the concept of fuzzy set theory and the hierarchical structure analysis.

There are different Fuzzy Analytic Hierarchy Process methods available in the literature.

In this thesis, Fuzzy Analytic Hierarchy Process Method, Extent Analysis Method on Fuzzy Analytic Hierarchy Process, Entropy Based Fuzzy Analytic Hierarchy Process Method, Modified Fuzzy Analytic Hierarchy Process Method, Hybrid Fuzzy Analytic

Hierarchy Process Method, Intuitionistic Fuzzy Analytic Hierarchy Process Method are studied with some of its applications to real world problems.

The first chapter deals with preliminary definitions and notations.

In the second chapter the following Fuzzy Analytic Hierarchy Process methods are studied

- i. Fuzzy AHP Method using Triangular Fuzzy Numbers (Van Laarhoven and Pedrycz's Approach)
- ii. Fuzzy AHP Method using Triangular Fuzzy Numbers (Debmallya Chatterjee and Bani Mukherjee's Approach)
- iii. Fuzzy AHP Method using Trapezoidal Fuzzy Numbers (Buckley's Approach)
- iv. Fuzzy AHP Method using Combination of Triangular Fuzzy Numbers and Trapezoidal Fuzzy Numbers (Nang-Fei Pan's Approach)

In Chapter III a Modified Fuzzy Analytic Hierarchy Process based MCDM methodology is studied. This method enables multiple decision makers on evaluation and uses triangular fuzzy scale that includes both positive and negative fuzzy numbers.

Hybrid Fuzzy Analytic Hierarchy Process Method is studied in Chapter IV, which combines AHP and fuzzy set theory to solve decision making problems in an uncertain and multiple-criteria environment.

In Chapter V Intuitionistic Fuzzy Analytic Hierarchy Process is studied. In this chapter, preferences are represented by intuitionistic fuzzy values. This method is proposed with the objective of improving the classical AHP and Fuzzy AHP to handle more complex problems, where the decision makers has some uncertainty in assigning preference values to the objects considered.

In Chapter VI Extent Analysis Method on Fuzzy Analytic Hierarchy Process is studied by employing the triangular fuzzy numbers and the Extent Analysis Method.

Entropy Based Fuzzy Analytic Hierarchy Process Method is based on grade value of membership function, which includes fuzzy AHP method and Shannon's entropy concepts to calculate aggregate weights. This method is studied in Chapter VII.

Application of all these Fuzzy Analytic Hierarchy Process methods in real-life problems facilitates in deriving scientific and logical solutions.

In chapter VIII the author of this thesis made an attempt to develop a mathematical model for decision making regarding the selection of right school for the children using Extent Analysis Method on Fuzzy Analytic Hierarchy Process.

In chapter IX the author of this thesis intended to develop a mathematical model for the same problem (the selection of right school for the children) using the same data by applying Modified Fuzzy Analytic Hierarchy Process.

Many decision making problems which are complicated and fuzzy in nature exist in modern society. How to solve them is becoming increasingly important for human society. In solving multiple criteria's decision making in a fuzzy environment, Fuzzy Analytic Hierarchy Process plays an important role. Application of Fuzzy Analytic Hierarchy Process Methods in real life problems not only helps the administrators to find a right solution but also the beneficiaries to gain maximum advantage/ satisfaction.