

Question 1: [Marks 15]
Solution
1) Goals of this Research paper: [Marks 5]

The goal of this research paper is to design an Expert System by using fuzzy logic to handle qualitative and uncertain facts and to evaluate the performance of teachers in higher education departments. This paper is an attempt to cope with the problems in the scenario of teacher's performance evaluation. It provides complete model of fuzzy expert system to evaluate teachers' performance on the basis of various key performance attributes. This Expert system has joined knowledge and experience of different human experts to help the top level executives for decision making in educational institutions.

2) How the goals identified has been achieved in this research paper: [Marks 4]

A tool is employed for knowledge acquisition to address the Teacher's Performance Assessment, through which a set of 99 attributes have been extracted which are pivotal in teacher's performance by any means in delivering the higher education. Further these extracted attributes were grouped into 15 groups and each group has further sub-groups whose evaluation contributes to main attribute. And on the basis of this we finally rank a teacher whether he is excellent or an average teacher.

The intent is to assign a weight to every group of attributes which shall be helpful in the evaluation of qualitative/uncertain variables, which is impossible to assess in any other way. The linguistic variables are measured into numeric values for the purpose of decision making process. So this model takes into consideration the input linguistic variables for the purpose.

The performance of teachers is ranked either Very High, High, Medium, Low, Very Low and there is a numeric weight against each evaluation of performance which ultimately contribute to evaluate a particular group of attribute.

They have used a fuzzy set whose value ranges from 1 to 0 encompassing the acquired performance by any particular teacher. The certain rules are defined in Knowledge Base and on the bases of these rules various facts are added which ultimately are gathered to measure the performance of any particular teacher. For conducting decision score a formula is used which is given below:-

$$C_i = \sum_{n=1}^m P_n W_n$$

Where

C_i = i^{th} main attribute

m = number of sub-factors in the i^{th} attribute

P_n = Fuzzy value of n^{th} input parameter

W_n = Expert weight of the relative input parameter

When the input data is computed by the Fuzzy Expert System then a Decision Making Scale Table is used to rank the performance of any particular teacher as Outstanding, Excellent, Very Good, Good Satisfied and Poor.

3) Experimental results of this research paper: [Marks 3]

An experiment is conducted in this research paper for evaluation of performance of three teachers with respect to Teaching Learning Process Attribute. Its sub-group of attributes is evaluated for all three teachers and they have acquired the following ranking after computation of these attributes.

Case	System Calculation	Description
A	0.573	Outstanding
B	0.0465	Excellent
C	0.0451	Excellent

This experiment shows that the Fuzzy Expert System for Teachers Performance Evaluation results in quite accurate manner and it serves the purpose. Hence the ambiguous, uncertain and qualitative knowledge of this particular problem domain have been successfully manipulated by implementing the Expert Technology with the Fuzzy Logic.

4) Future work that has been identified in this research paper: [Marks 3]

The experiments shown that it's a quite useful model to be incorporated in solving any problem domain. It sufficiently feeds the decision making process. Hence this model may also be employed to address any domain which is required to be modeled. In future this system can be employed to assess the performance of not only the teachers but also other administrative, non-teaching staff of the institute. Also other government institutions can employ it to evaluate the Annual Confidential Reports of all kinds of employees.

Question 2: [Marks 5]

- 1) The age factor, facilities and school environment must be considered as attributes for teacher's evaluation in this system. With the passage of time the system must be changed to fulfill the requirements of new challenges. And the system should not be implemented directly. It should be implemented on experimental basis first and if all teachers agree that the attributes that are being tested by this system are fit for evaluation then it should be implemented permanently.
- 2) In my view, the expert system can be improved by improving the accuracy of the assessment provided by the system. To measure the accuracy, there must be an expert to monitor the evaluations of the expert system for some time. An independent evaluation should be made for a teacher by an expert and then compared with the evaluation made by the expert system for the same individual. This should be done for some time to see if the expert system is providing the correct results or not. If not, then the knowledgebase should be improved further. More domain experts should be consulted and more key attributes should be added to the knowledge base.
- 3) The system output should be available to teachers so that teachers can use its results to improve their performance. The system should be capable to include more and more attributes that will be indicated with the passage of time.

