Model for testing of a student's natural interest by using graph theory and fuzzy logic

Introduction:

When a student passes SSC, for further studies he/she has to select branch. As far as education system in Maharashtra goes, the student has to select one of arts, commerce, science(general), science(technical) or some other courses. We observe that many times students choose their faculty without knowing their self interest. The choice of faculty is mostly influenced by their parents, friends and surrounding situations. When student goes for a faculty in which he/she has no natural inclination, then it all ends with frustration. This is a big social problem in Maharashtra. It should be better if every student chooses a branch in which he/she has natural interest. We have developed a model to find out student's natural interest with the help of graph theory and fuzzy logic. Also we find qualities which are required for good student and their reasoning ability as they are necessary for student of any faculty.

Mathematical terms:

Graph: Graph is an ordered pair(V,E)where V denotes set of vertices and E denotes the set of edges.

Complete graph: graph is said to be complete graph if there is an edge between any two vertices of a graph.

Degree of a vertex: the degree of vertex v in graph G is number of edges incident on vertex v.

Directed graph: graph is said to be directed graph or digraph iff every edge in a graph has direction.

- **In degree:** is number of edges coming towards the vertex.
- **Out degree:** is number of edges going g away from the vertex.

Tournament: Tournament is a complete directed graph.

King in a tournament: In a graph, a king is a vertex from which every vertex is reachable by path of length at most two.

Fuzzy logic:

- Mathematically fuzzy set $\mu:X\rightarrow[0\ 1]$
- Branch developed by Lutfi zadeh.
- Multivalued logic.
- Every element of universal set is element of fuzzy set but with some gradation.

Methodology:

We have developed questionnaire consisting of 200 statements and student has to respond these statements by assigning grades from A to E.

Where A≡Totally agree with numerical weight 1.

B≡Somewhat agree with numerical weight 0.75.

C≡can't say anything with numerical weight 0.50.

D≡disagree with numerical weight 0.25.

E≡totally disagree with numerical weight 0.

Then depending on the response given by student we predict about their natural inclination. This questionnaire is certified by MD psychiatrist as most scientific and specific. While analyzing responses given by students we first draw the tournament then next step is finding out king in tournament. The vertex corresponding to king suggests the natural inclination of student.

To begin with we had developed a questionnaire which contained questions having two options to each question and student was supposed to choose and one option. But it is not always possible to give answer either yes or no. Hence we find need of fuzzy logic.

The graph model has 92% success rate. We have tested the success rate by keeping track of all those students who have undergone the aptitude test.

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