Chapter IX

CHAPTER IX

APPLICATION OF INTERVAL – VALUED FUZZY SOFT SETS IN THE ANALYSIS OF THE FACTORS INFLUENCING HIGH SCORES IN HIGHER SECONDARY EXAMINATIONS

High scores in the Higher Secondary Examinations have become the high order priority in the academic life of a student in the present scenario. The parents have more concern and they leave no stone unturned to get their wards a pass with comparatively higher score which enables them to join a course, particularly a professional course, in a reputed institution. Many students perform upto the expectations, though not all.

The author of this thesis intended to analyze the factors contributing high scores in the higher secondary examination and also to identify the prime factor by collecting the data from students, academicians and parents using Interval-Valued Fuzzy Soft Sets.

To analyze the factors influencing the higher academic performance of higher secondary students, opinion of three groups of respondents were collected. The first group G_1 consists of fifty high performers who are pursuing professional courses in leading professional colleges. The second group G_2 consists of fifty academicians handling higher secondary subjects. The third group G_3 consists of parents of high performers.

The author conducted a pilot study and identified the following factors influencing high scores in Higher Secondary Examinations.

F_1 – Exposure to the scoring techniques

F_2 – Better motivation

F_3 – Planned preparation

F_4 – Proper guidance and counseling

F_5 – Special coaching imparted by tuition centers

F_6 – Good economic condition and good environment at home

Each respondent was asked to give a score value ranging between 1 and 10 for each factor. Using the data, Mean (M) and Standard Deviation (S.D) were calculated for each group G_1, G_2, G_3. An Interval Fuzzy Number Matrix was framed by taking the six factors F_1, F_2, F_3, F_4, F_5, F_6 as rows and the three groups G_1, G_2, G_3 as columns. Each entry in the matrix is an Interval Fuzzy Number which was framed by taking $\frac{M - S.D}{10}$ and $\frac{M + S.D}{10}$ as the left and right end points of the interval respectively.

$$A = \begin{array}{c} \\ F_1 \\ F_2 \\ F_3 \\ F_4 \\ F_5 \\ F_6 \end{array} \begin{array}{c} \begin{array}{ccc} G_1 & G_2 & G_3 \end{array} \\ \begin{pmatrix} [0.7, 1.0] & [0.9, 1.0] & [0.5, 0.7] \\ [0.6, 0.7] & [0.8, 0.9] & [0.8, 0.9] \\ [0.7, 0.8] & [0.9, 1.0] & [0.6, 0.7] \\ [0.7, 0.8] & [0.8, 0.9] & [0.7, 0.8] \\ [0.7, 0.9] & [0.6, 0.8] & [0.7, 0.8] \\ [0.7, 0.8] & [0.7, 0.8] & [0.8, 0.9] \end{pmatrix} \end{array}$$

The following is the algorithm for finding the solution to the problem using Interval-Valued Fuzzy Soft Sets:

Step 1:

Construct the Interval-Valued Fuzzy Soft Set (H, E), where H is a mapping given by $H : E \to F(U)$. Let U = { F_1, F_2, F_3, F_4, F_5, F_6 } and E = { G_1, G_2, G_3 }.

$H(G_1) = \{ < F_1, [0.7, 1.0] >, < F_2, [0.6, 0.7] >, < F_3, [0.7, 0.8] >,$
$< F_4, [0.7, 0.8] >, < F_5, [0.7, 0.9] >, < F_6, [0.7, 0.8] > \}$

$H(G_2) = \{ < F_1 , [0.9, 1.0] > , < F_2 , [0.8, 0.9] > , < F_3 , [0.9, 1.0] > ,$
$< F_4 , [0.8, 0.9] > , < F_5 , [0.6, 0.8] > , < F_6 , [0.7, 0.8] > \}$

$H(G_3) = \{ < F_1 , [0.5, 0.7] > , < F_2 , [0.8, 0.9] > , < F_3 , [0.6, 0.7] > ,$
$< F_4 , [0.7, 0.8] > , < F_5 , [0.7, 0.8] > , < F_6 , [0.8, 0.9] > \}$

Step 2:

$\forall F_i \in U$, compute the choice value c_i for each features F_i such that

$$c_i = [c_i^- , c_i^+] = \left[\sum_{G_i \in E} \mu_{H(G_i)}^-(F_i) , \sum_{G_i \in E} \mu_{H(G_i)}^+(F_i) \right], \text{ where } i = 1 \text{ to } 6.$$

$c_1 = [2.2, 2.7]$, $c_2 = [2.3, 2.6]$, $c_3 = [2.2, 2.5]$, $c_4 = [2.2, 2.5]$, $c_5 = [2.0, 2.5]$, $c_6 = [2.2, 2.5]$

Step 3:

$\forall F_i \in U$, compute the score r_i of F_i such that

$$r_i = \sum_{F_j \in U} ((c_i^- - c_j^-) + (c_i^+ - c_j^+)), \text{ where } i , j = 1 \text{ to } 6.$$

Thus, we have $r_1 = 1.1$, $r_2 = 1$, $r_3 = -0.2$, $r_4 = -0.2$, $r_5 = -1.4$, $r_6 = -0.2$

Step 4:

The decision is any one of the elements in $S = \max_{h_i \in U}\{r_i\}$. In our problem, the factor **"Exposure to scoring techniques (F_1)"** is the best choice because $\max_{h_i \in U}\{r_i\} = \{ F_1 \}$. This result is reasonable because we can see that $c_1 \geq c_i$, where i = 2,3,4,5,6. i.e. F_1 has the highest choice value.