CHAPTER 5

CHAPTER - 5

FUZZY MODELS – A COMPARATIVE STUDY OF THE HIDDEN PATTERNS

In this chapter, we compare the hidden patterns of the fuzzy models. The FCMs and FRMs models which has analysed the URCS problems in chapter one, have been combined into a SFCRMs model to make a comparative study of the hidden patterns of FCMs and FRMs. Here basically, we make the hidden patterns into super hidden pattern, so that comparison is direct. This chapter has two sections.

First we use the FRMs and FCMs in models related with the URCS problem in chapter one to construct the new Super Fuzzy combined Cognitive Relational Maps (SFCRMs) model dynamical system. This forms section one of this chapter.

In section two we use these two models together with the students teacher model submatrix of the DSFRMs model constructed in chapter three of this thesis. Thus, we compare the three matrices using once again the SFCRMs model described in chapter two of this thesis.

We compare the FLCMs model and FLRMs model with the FCMs and FRMs models and interpret the conclusion. Finally, we give the conclusions based on our study.

5.1 COMPARISON OF THE INTEGRATED HIDDEN PATTERNS OF THE FCMs AND FRMs MODELS USING THE SFCRMs

We, using the connection matrices of the FCMs and FRMs used in chapter one of this thesis, get the super connection matrix for the SFCRMs constructed, defined and described in chapter two of this thesis.

Let M_I denote the super connection matrix. (The suffix I of the super matrix denotes the integrated hidden patterns);

$$M_I = \begin{array}{c} \\ S_1 \\ S_2 \\ S_3 \\ S_4 \\ S_5 \\ S_6 \\ S_7 \\ S_8 \\ S_9 \\ S_{10} \\ S_{11} \\ \vdots \\ S_{14} \\ S_1 \\ \vdots \\ S_{10} \end{array} \begin{array}{c} \begin{array}{cccc} S_1 & \cdots & S_{14} & T_1 \end{array} \quad \cdots \quad T_8 \\ \left[\begin{array}{c|c} M & (0) \\ \hline (0) & M_1 \end{array}\right] \end{array}$$

where M =

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}	S_{14}
S_1	0	–1	1	–1	1	–1	1	0	0	–1	0	0	–1	–1
S_2	–1	0	0	0	–1	0	0	0	0	0	0	0	0	0
S_3	1	0	0	0	0	0	0	0	0	0	0	–1	–1	0
S_4	–1	0	0	0	–1	1	–1	0	0	0	0	1	0	1
S_5	0	–1	0	–1	0	–1	0	0	0	0	1	–1	–1	–1
S_6	–1	1	0	1	–1	0	–1	0	0	0	0	0	1	1
S_7	1	0	0	–1	1	–1	0	0	0	0	1	–1	–1	–1
S_8	0	0	0	0	0	0	0	0	0	0	0	–1	0	0
S_9	0	0	0	0	1	0	0	0	0	0	1	0	0	0
S_{10}	–1	1	0	0	0	0	0	0	0	0	0	0	1	1
S_{11}	0	0	0	0	1	0	1	0	1	0	0	0	0	0
S_{12}	0	0	–1	1	0	0	0	–1	0	0	0	0	0	0
S_{13}	–1	0	0	1	–1	1	–1	0	0	0	0	0	0	1
S_{14}	0	0	0	1	–1	1	–1	0	0	0	0	0	1	0

$$\text{and } M_1 = \begin{array}{c} \\ S_1 \\ S_2 \\ S_3 \\ S_4 \\ S_5 \\ S_6 \\ S_7 \\ S_8 \\ S_9 \\ S_{10} \end{array} \begin{array}{c} \begin{array}{cccccccc} T_1 & T_2 & T_3 & T_4 & T_5 & T_6 & T_7 & T_8 \end{array} \\ \left[\begin{array}{cccccccc} 1 & 0 & -1 & 1 & 1 & 1 & 0 & -1 \\ 0 & 0 & 1 & 0 & -1 & 0 & 1 & 1 \\ 0 & 0 & 1 & -1 & -1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 1 & 0 & 0 & -1 \\ 0 & 0 & 1 & -1 & 0 & -1 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 & -1 & 1 & 1 \\ 1 & 0 & 0 & 0 & 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & 1 & 1 & 0 & 0 & -1 \\ 1 & 0 & 0 & 1 & 1 & 1 & 0 & -1 \\ 0 & 1 & 0 & 1 & 1 & 0 & -1 & 0 \end{array}\right] \end{array}.$$

Take any state super row vector say X = (1 0 0 0 0 0 0 0 0 0 0 0 0 0 | 0 0 1 0 0 0 0 0 0 0) where S_1 in M is in the ON state and all other nodes are in the OFF state. That is in the FCMs the student suffers from poverty is in the on state and in the FRMs the node “students fear” hence they just sit quiet without learning the subject or understanding the subject in class is in the ON state.

To find the effect of the super row vector on the dynamical system M_I.

$$X M_I \hookrightarrow (1\ 0\ 1\ 0\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 0 \mid 0\ 0\ 1\ 0\ 0\ 0\ 1\ 1)$$
$$= Y \text{ (say).}$$

It is pertinent to mention here in this chapter M_I^t is only the special transpose mentioned in chapter two of this thesis; that is the submatrix M in M_I is not transposed only M_1 is transposed.

$$Y\ M_I^t \hookrightarrow (1\ 0\ 1\ 0\ 1\ 0\ 1\ 0\ 0\ 0\ 1\ 0\ 0\ 0 \mid 0\ 1\ 1\ 0\ 1\ 1\ 0\ 0\ 0\ 0)$$
$$= X_1 \text{ (say)}$$

$$X_1 M_I \hookrightarrow (1\ 0\ 1\ 0\ 1\ 0\ 1\ 0\ 1\ 0\ 1\ 0\ 0\ 0 \mid 0\ 0\ 1\ 0\ 0\ 0\ 1\ 1)$$
$$= Y_1 \text{ (say)}$$

$$Y_1\ M_I^t \hookrightarrow (1\ 0\ 1\ 0\ 1\ 0\ 1\ 0\ 1\ 0\ 1\ 0\ 0\ 0 \mid 0\ 0\ 1\ 0\ 0\ 0\ 1\ 1)$$
$$= X_2 .$$

We see $X_2 = X_1$ is a fixed point. Thus the super hidden pattern of the super dynamical system M_I is a fixed pair of super row vectors given by {(1 0 1 0 1 0 1 0 1 0 1 0 0 0 | 0 0 1 0 0 0 1 1), (1 0 1 0 1 0 1 0 1 0 1 0 0 0 | 0 1 1 0 1 1 0 0 0 0)}.

We see if in the state super vector the two nodes the student suffers from poverty and students fear hence they just sit quiet without learning the subject or understanding the subject in the class room alone is in the ON state then we see the super hidden pattern gives the following:

If the student suffers from poverty and is also quiet and disinterested in class then the student has family problems, suffers from inferiority complex, speaking and writing in English is a problem, he is ill-treated by class mates, city students do not mix with him, he is bored and restless in class; student is dejected as the teacher has no good knowledge of the subject and the best of the students talent or capacity do not come out because of the teacher; this is the integrated hidden pattern using the super fuzzy cognitive relational maps model. From the teachers side for the same two ON state of students attributes from the FCMs and FRMs described by the matrices M and M_1 respectively. We see the teacher is an ill behaved one, they hurt the feelings of URCS without being sensitive to them and they come to class and do not impart any good education to them.

This is the way we get the integrated (combined) hidden pattern of the two models using the SFCRMs model.

We have worked with several such ON state super row vectors.

Now we just see if the two nodes proper guidance and student get enough motivation from the teacher on the subject and on the life skills for their future are in the ON state from the students attributes of the FCMs and

FRMs respectively: that is if X = (0 0 0 1 0 0 0 0 0 0 0 0 0 | 0 0 0 0 0 0 0 0 1 0) be the given super row vector to find the effect of X on the dynamical system M_I.

$XM_I \hookrightarrow (0\ 0\ 0\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 1 \mid 1\ 0\ 0\ 1\ 1\ 1\ 0\ 0) = Y = (A_1\ A_2)$.

We find

$Y\ M_I^t \hookrightarrow (A_1M \mid A_2 M_1^t)$

$\hookrightarrow (0\ 1\ 0\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 1\ 1\ 1 \mid 1\ 0\ 0\ 1\ 0\ 0\ 1\ 1\ 1\ 1)$

$= X_1$ (say)

$X_1M_I \hookrightarrow (0\ 1\ 0\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 1\ 1\ 1 \mid 1\ 1\ 0\ 1\ 1\ 1\ 0\ 0)$

$= Y_1$ (say) $= (B_1\ B_2)$

$Y_1 M_I^t \hookrightarrow (B_1M \mid B_2 M_1^t)$

$\hookrightarrow (0\ 1\ 0\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 1\ 1\ 1 \mid 1\ 0\ 0\ 1\ 0\ 0\ 1\ 1\ 1\ 1)$

$= X_3$ (say).

We see $X_3 = X_1$. Thus the super hidden pattern is a super fixed pair of points given by

$\{(0\ 1\ 0\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 1\ 1\ 1 \mid 1\ 0\ 0\ 1\ 0\ 0\ 1\ 1\ 1\ 1),$

$(0\ 1\ 0\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 1\ 1\ 1 \mid 1\ 1\ 0\ 1\ 1\ 1\ 0\ 0)\}$.

We now see if the two attributes associated with the students viz. proper guidance and students get enough motivation both on lesson (subject) and life skills for their future we see both are positive attributes we see the resultant is that students are confident of their general appearance, they have good self confidence level, they are regular to class, they get good employment opportunities and have good communication skills further they are comfortable in class, they are regular never wish to miss a class, they show good grasp of the subject, they are punctual and freely communicate with teachers and do not fear to clear doubts.

Thus when students enjoy positive attributes certainly all other positive attributes of students come to ON state not only that most of the attributes regarding the teachers which come to ON state are also positive.

Thus we see from the comparison of the hidden patterns, very many attributes are involved and further when these attributes are taken positive; invariably the resultant that is attributes which come to ON state are also positive and if these attributes are taken as negative the resultant super vector that come to ON state are also negative.

We have worked with several such cases and the observation from this super fuzzy combined cognitive relational maps model is included at the end of this chapter.

5.2 COMPARISON OF THE HIDDEN PATTERN OF THE URCS PROBLEMS USING THE SUPER FUZZY COMBINED COGNITIVE RELATIONAL MAPS (SFCRMs) MODEL

Now we will be constructing the SFCRMs using the matrices M, M_1 defined and used in chapter one and that of the submatrix N_1 of S_D; part of the DSFRM matrix; relation between students and teachers say (N_1) in chapter three to form the super diagonal matrix P_I.

$$P_I = \left[\begin{array}{c|c|c} M & (0) & (0) \\ \hline (0) & M_1 & (0) \\ \hline (0) & (0) & N_1 \end{array}\right]$$

where M and M_1 are given in from section 5.1 and from S_D we take only N_1 where

$$S_D = \begin{array}{c} \\ S_1 \\ S_2 \\ S_3 \\ S_4 \\ S_5 \\ S_6 \\ S_7 \\ S_8 \end{array} \begin{array}{c} \begin{array}{cccccccccccc} T_1 & T_2 & T_3 & T_4 & T_5 & T_6 & T_7 & T_8 & T_9 & T_{10} & T_{11} & T_{12} \end{array} \\ \left[\begin{array}{cccccccccccc} 1 & 1 & 0 & 1 & 1 & 1 & 1 & -1 & -1 & 0 & 0 & -1 \\ 0 & 1 & 0 & 1 & 0 & 1 & 1 & 0 & 0 & -1 & -1 & -1 \\ 0 & -1 & 0 & -1 & 0 & -1 & 0 & 1 & 1 & 0 & 0 & 1 \\ 1 & 0 & 1 & 1 & 1 & 0 & 1 & 0 & -1 & -1 & 0 & -1 \\ -1 & -1 & 0 & -1 & 0 & 0 & -1 & 1 & 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 1 & 1 & 1 & 1 & 0 & -1 & -1 & 0 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & -1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & -1 & -1 \end{array}\right] \end{array}$$

$$\left[\begin{array}{ccccccc|cccccccc} M_1 & M_2 & M_3 & M_4 & M_5 & M_6 & M_7 & P_1 & P_2 & P_3 & P_4 & P_5 & P_6 & P_7 & P_8 \\ 1 & -1 & -1 & 1 & 1 & 1 & -1 & 1 & 0 & -1 & 0 & -1 & 0 & 0 & -1 \\ 0 & -1 & 0 & 1 & 1 & 1 & 0 & 1 & -1 & 0 & -1 & 0 & 0 & -1 & 0 \\ 0 & -1 & -1 & -1 & -1 & -1 & 0 & 0 & -1 & -1 & -1 & -1 & -1 & -1 & 0 \\ 1 & 0 & 0 & 0 & 1 & 1 & 0 & 1 & -1 & 0 & -1 & 0 & -1 & 0 & -1 \\ -1 & 1 & 1 & -1 & 0 & -1 & -1 & 0 & 0 & -1 & 0 & -1 & 0 & -1 & 0 \\ 1 & 0 & 0 & 1 & 1 & 1 & 0 & 1 & 0 & 0 & -1 & 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & -1 & 0 & -1 & 0 \\ 1 & 0 & 0 & 1 & 1 & 1 & 0 & 1 & 0 & 0 & 0 & -1 & 0 & -1 & 0 \end{array}\right]$$

$$\begin{array}{c} \begin{array}{ccccccc} G_1 & G_2 & G_3 & G_4 & G_5 & G_6 & G_7 \end{array} \\ \left[\begin{array}{ccccccc} 0 & 1 & 1 & 0 & 0 & 0 & 1 \\ 0 & 1 & -1 & 0 & 0 & 0 & 0 \\ 1 & 0 & -1 & 0 & -1 & 0 & -1 \\ 0 & 1 & 1 & 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & -1 \\ 0 & 1 & 1 & 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 & 0 & 1 & 1 \end{array}\right] \end{array} = [N_1\ N_2\ N_3\ N_4]$$

$$\text{and } N_1 = \begin{array}{c} \\ S_1 \\ \vdots \\ S_8 \end{array} \begin{array}{c} \begin{array}{ccc} T_1 & \ldots & T_{12} \end{array} \\ \left[\begin{array}{ccc} & & \\ & & \\ & & \\ & & \end{array}\right] \end{array}.$$

Now we give the integrated super hidden pattern.

The functioning of these new super fuzzy models are described and defined in chapter two of this thesis. Now we show how the super hidden pattern looks like.

Let X = (0 0 0 0 0 0 0 0 1 0 0 0 0 0 | 0 0 0 0 0 1 0 0 0 0 | 0 0 0 0 1 0 0 0) be the given super row state vector; the only nodes in the ON state are classmates ill treat the URCS as they are poorly dressed and lack appearance and communication skills, the best in the students do not come out because the teacher is partial and undisciplined in class and students suffer inferiority complex are in the ON state. To find the effect of this super row state vector on the dynamical system P_I.

$XP_I \hookrightarrow (0\,0\,0\,0\,1\,0\,0\,0\,1\,0\,1\,0\,0\,0 | 0\,0\,1\,0\,0\,0\,1\,1 | 0\,0\,0\,0\,0\,0\,0\,1\,1\,1\,0\,1)$

$= (A_1 | A_2 | A_3)$

$= Y$ (say)

$Y\ P_I^t = (A_1M | A_2M_1^t | A_3N_1^t)$

$\hookrightarrow (0\,0\,0\,0\,1\,0\,1\,0\,1\,0\,1\,0\,0\,0 | 0\,1\,1\,0\,1\,1\,0\,0\,0\,0 | 0\,0\,1\,0\,1\,0\,0\,0)$

$= X_1$ (say)

$X_1P_I \hookrightarrow (1\,0\,0\,0\,1\,0\,1\,0\,1\,0\,1\,0\,0\,0 | 0\,0\,1\,0\,0\,0\,1\,1 | 0\,0\,0\,0\,0\,0\,0\,1\,1\,1\,0\,1)$

$= Y_1$ (say) $= (B_1 | B_2 | B_3)$

$Y_1\ P_I^t = (B_1M | B_2M_1^t | B_3N_1^t)$

$\hookrightarrow (1\,0\,1\,0\,1\,0\,1\,0\,1\,0\,1\,0\,0\,0 | 0\,1\,1\,0\,1\,1\,0\,0\,0\,0 | 0\,0\,1\,0\,1\,0\,0\,0)$

$= X_2$ (say).

We see $X_2P_1 \hookrightarrow X_3$ (say).

Thus $X_3 = X_2$ is a fixed super vector. Hence the super hidden pattern of the super dynamical system is a super fixed pair given by

{(1 0 1 0 1 0 1 0 1 0 1 0 0 0 | 0 1 1 0 1 1 0 0 0 0 | 0 0 1 0 1 0 0 0), (1 0 1 0 1 0 1 0 1 0 1 0 0 0 | 0 0 1 0 0 0 1 1 | 0 0 0 0 0 0 0 1 1 1 0 1)}.

Thus if the nodes all of the which carry negative nature are in the ON state we see the resultant from the super hidden pattern.

The nodes which was in the ON state was, the city students (classmates of URCS) illtreat them as they are poorly dressed and lack communication skills, the best in the students do not come out as the teacher is partial and the students suffer inferiority complex and all other nodes from the super row vector remained in the OFF state. We found the effect of this X on the super dynamical system.

The nodes which came to on state are as follows:

Students suffer from poverty, have family problems, suffer inferiority complex, problem with spoken and written English, city students do not mix with them; students are bored and restless in the classroom, students fear hence they sit quiet in the class without learning the subject, students are dejected as the teacher has no knowledge of the subject. The best in the students do not come out because the teacher is partial and undisciplined in class, students are irregular to class and suffer from inferiority complex further the teachers are indisciplined, teachers are ill behaved, teachers are without any sensitiveness to URCS feelings hurt the feelings of the URCS students and do not part any education but irresponsible and while away the time without even teaching the subject. Finally they (teachers) are irregular to class, indifferent to URCS, unapproachable and insult the URCS. Thus our study mainly shows ON state of negative attributes in the super row vector leads to ON state of all other negative attributes of the space.

This is also directly proved from the just discussed ON state super row vector which has only three negative attributes in the ON state.

Now we proceed onto study the ON state of three positive attributes in the ON state.

Let X = (0 0 0 0 0 0 0 0 0 0 0 0 0 1 | 1 0 0 0 0 0 0 0 0 0 | 0 0 0 0 0 0 1 0) be the given state super row vector by an expert. We wish to find the effect of X on the dynamical system P_I.

$XP_I \hookrightarrow$ (0 0 0 1 0 1 0 0 0 0 0 0 1 1 | 1 0 0 1 1 1 0 0 | 1 1 1 1 1 1 1 0 0 0 0 0)

$=$ Y (say).

Let

$Y = (A_1 | A_2 | A_3) = (A_1 \ A_2 \ A_3)$

$Y\ P_I^t = (A_1 M | A_2\ M_1^t | A_3 N_1^t)$

$\hookrightarrow$ (0 1 0 1 0 1 0 0 0 0 0 1 1 1 | 1 0 0 1 0 0 1 1 1 1 | 1 1 0 1 0 1 1 1)

$=$ X_1 (say)

$X_1P_I \hookrightarrow$ (0 1 0 1 0 1 0 0 0 0 0 1 1 1 | 1 1 0 1 1 1 0 0 | 1 1 1 1 1 1 1 0 0 0 0 0) $=$ Y_1 (say)

$Y_1 P_I^t \hookrightarrow Y_2$ (say).

We see $Y_2 = Y_1$ is a super fixed point which is the super hidden pattern of the dynamical system. It is clear we have taken the 3 positive attributes and the resultant also give only the ON states of almost all the positive attributes in both the super row vectors. We see the super fixed point pair is {(0 1 0 1 0 1 0 0 0 0 0 1 1 1 | 1 1 0 1 1 1 0 0 | 1 1 1 1 1 1 1 0 0 0 0 0), (0 1 0 1 0 1 0 0 0 0 0 1 1 1 | 1 0 0 1 0 0 1 1 1 1 | 1 1 0 1 0 1 1 1)}.

Suppose another natural question is whether ON state of one negative attribute and two positive attributes, what will be the integrated hidden pattern?

Let X = (0 0 1 0 0 0 0 0 0 0 0 0 0 | 1 0 0 0 0 0 0 0 0 0 | 0 0 0 0 0 1 0 0) be the given super row state vector which has only three nodes to be in the ON state of which two are positive attributes and one is a negative attributes namely poverty which hinders the progress of the students in this

commercialized materialistic world. To find the effect of X on the dynamical system P_I.

$XP_I \hookrightarrow (1\,0\,1\,0\,0\,0\,0\,0\,0\,0\,0\,0\,0 \mid 1\,0\,0\,1\,1\,1\,0\,0 \mid 0\,1\,1\,1\,1\,1\,1\,0\,0\,0\,0\,0)$

$Y = (A_1 \mid A_2 \mid A_3)$

$Y\,P_I^t = (A_1\,M \mid A_2\,M_1^t \mid A_3\,N_1^t)$

$\hookrightarrow (1\,0\,1\,0\,1\,0\,1\,0\,0\,0\,0\,0\,0 \mid 1\,0\,0\,1\,0\,0\,1\,1\,1\,1 \mid 1\,1\,0\,1\,0\,1\,1\,1)$

$= X_1$ (say)

$X_1P_I \hookrightarrow (1\,0\,1\,0\,1\,0\,1\,0\,0\,0\,1\,0\,0\,0 \mid 1\,1\,0\,1\,1\,1\,0\,0 \mid 1\,1\,1\,1\,1\,1\,1\,0\,0\,0\,0\,0)$

$= Y_1$ (say) $= (B_1 \mid B_2 \mid B_3)$

$Y\,P_I^t = (B_1\,M \mid B_2\,M_1^t \mid B_3\,N_1^t)$

$\hookrightarrow (1\,0\,1\,0\,1\,0\,1\,0\,1\,0\,1\,0\,0\,0 \mid 1\,0\,0\,1\,0\,0\,1\,1\,1\,1 \mid 1\,1\,0\,1\,0\,1\,1\,1)$

$= X_2$ (say).

$X_2\,P_I \hookrightarrow (1\,0\,1\,0\,1\,0\,1\,0\,1\,0\,1\,0\,0\,0 \mid 1\,1\,0\,1\,1\,1\,0\,0 \mid 1\,1\,1\,1\,1\,1\,1\,0\,0\,0\,0\,0)$

$= X_3$ (say) $(= X_2)$.

Thus the super hidden pattern of the dynamical system is a fixed pair of points given by {(1 0 1 0 1 0 1 0 1 0 1 0 0 0 | 1 1 0 1 1 1 0 0 | 1 1 1 1 1 1 1 0 0 0 0 0), (1 0 1 0 1 0 1 0 1 0 1 0 0 0 | 1 0 0 1 0 0 1 1 1 1 | 1 1 0 1 0 1 1 1)}.

We see when the students feel the poverty, he has family problems, he suffers inferiority complex and has problems with the spoken and written english. Over all this shows the poverty among the URCS has several negative effects which ought to be taken into account.

Now we see poverty breeds family problems, inferiority complex all leading to problem with spoken and written English. On the other hand when they feel comfortable in class, a positive attribute / node

(i) they do not wish to miss a single class,

(ii) they show good grasp of the subject,

(iii) they freely communicate with teacher,

(iv) they get motivated

(v) students do not fear the teacher and freely clear their doubts and also are impartial

(vi) available to clear the students' doubts,

(vii) takes special care of URCS and

(viii) takes extra efforts to complete the syllabus

Similarly if students are motivated all the positive attributes of both students and teachers come to ON state.

Thus we have worked with several different ON state of the nodes and derived conclusions based on them. The conclusion and suggestions are presented in the last chapter of this thesis.

Finally we compare the hidden pattern of the Fuzzy Cognitive Maps (FCMs) model with that of the hidden pattern of the Linguistic Fuzzy Cognitive Maps (LFCMs) model.

We, at the outset see a attribute in the resultant vector may be in the ON state or OFF state. That is a 1 or a 0 in case of FCMs but however in case of this new LFCMs model we see the fuzzy linguistic terms are terms like '+ often', or 'true' 'to some extent' and so on. They are adjectives.

In FCMs the resultant is 1 or 0 which do not give beyond 'ON' or OFF state' on the contrary in case of LFCMs the resultants are adjectives which precisely indicates the attributes status, as true or to some extent or often or fair or etc. Further this gives a nice and valid interpretation of the hidden

pattern. We cannot say in the FCMs model beyond the fact it is ‘ON’ or ‘OFF’.

We have also worked with the FRMs model and LFRMs model. We see the FRMs model gives only a pair of state vectors as the hidden pattern and in this case also we get only the ‘ON’ or ‘OFF’ state of the attributes. On the contrary we see in case of LFRMs model the hidden pattern is a pair of state vectors which are linguistic terms like bad, better, good, fair and so on. Once again this is the main advantage of using this newly constructed LFRMs model in our study.