



CHAPTER 4



CHAPTER - 4

FUZZY ANALYSIS OF PROBLEMS FACED BY URCS USING THE FLCMs AND FLRM_s MODELS

In this chapter, we use the new Fuzzy Linguistic Cognitive Maps (FLCMs) model constructed in chapter two of this thesis to study the Underprivileged Rural College Students (URCS) studying in city colleges. At the outset, we wish to state we have mainly made use of the elaborate questionnaire filled by the URCS. Those questionnaires which was properly filled alone was used in this study, as some of them were not upto the standard of processing.

This chapter has three sections. In the first section, we describe the problem and give justification for using the FLCMs models. In section two this model is used in the URCS problem. In section three we describe the problem between students and external forces like city students, teachers and management using the new FLRM_s model constructed in chapter two of this thesis. We have not used parents for in case of rural underprivileged students; as their parents do not play a major role expected if they are alcoholic and quarrelsome at home this has some negative effect on their children. Apart from this they may deny education to their children by sending them to cheap daily wage jobs. So we thought it deem fit to ignore the effect of parents of URCS as they are not really of imparting any suggestion regarding education in majority of the cases.

4.1 DESCRIPTION OF THE PROBLEM AND JUSTIFICATION FOR USING THIS MODEL

Here, after analyzing the filled in elaborate questionnaire using the experts, we found some of the striking problems faced by the Underprivileged

Rural College Students (URCS) studying in city colleges. The attributes given by the experts is taken. At the outset the data collected by us is an unsupervised one further we decided to use only the linguistic terms to find the effect of one attribute over the other. We found that FLCMs model can give the hidden pattern when the attributes / concepts under study is interrelated and linguistic in nature. We are justified in using this new fuzzy linguistic cognitive maps model constructed in chapter two of this thesis for above said reasons.

4.2 ANALYSIS OF PROBLEMS FACED BY RURAL STUDENTS USING THE NEW FLCMs MODEL

Now in the following section we proceed onto show how this new model is used to study the problems of the URCS studying in city colleges.

The expert in this case has selected the following attributes as the problems faced by the URCS in city colleges.

- S₁ - Rural students suffer inferiority complex
- S₂ - Lack of communication skills (writing or reading)
- S₃ - Lack of understanding the teaching due to language problems.
- S₄ - Personality - dress etc
- S₅ - Poverty - economic background
- S₆ - Social problems
- S₇ - Teachers attitude

We will describe each of these attributes in a line or two.

S₁: Rural students suffer inferiority complex: Rural students as soon as they enter city and the city colleges, they suffer a cultural shock due to several reasons. Main among them is due to the way city students and city based people behave be it, a city auto driver or a city bus driver or

even a tea shop owner in the city. This makes them suffer for, they openly comment, he is from a village in a colloquial Tamil, which forces them to feel inferior.

- S₂: Lack of communication: The rural students cannot in general communicate as city students. Further we see their rural language be it Tamil or English is not as eloquent as the city students language. This also leads to some psychological problems for them.
- S₃: Lack of understanding the teaching (lectures), due to language problems. Due to language problems URCS are not in a position to understand or follow the lessons taken in the class. This also adds to the psychological problems in rural students.
- S₄: Personality. The very dress, hair style the way they hold themselves proves them to be a rural students, hence wherever they go the city students in general laugh at them or at times ill-treat them.
- S₅: Poverty or economic background. Most of the rural students who come to city for their college education belong to a poor or lower middle class economic background, so they are in despair and suffer silently. For their very dress, the bag they carry, devoid of cellphone, laptops, wrist watches, good foot wear etc. make them feel small or inferior before the city students.
- S₆: Social problems; Social problem is that they cannot immediately mingle with the city students and their appearance more a mental make up or self confidence in show them to be less in every thing in the city set up due to dress, caste, behaviour or economy or due to their low self esteem and inferiority complex.
- S₇: Teachers attitude: City teachers do not understand the state of mind of the URCS, on the other hand they may ask questions which will make the student loose even the little hopes which they have. Further the

rural students may not follow the accent or the language in which the lessons are taught, so a teacher seldom understands their problems.

The fuzzy linguistic attributes associated with these seven concepts in this problem are ; $L = \{0, \pm \text{very true}, \pm \text{mostly true}, \pm \text{true}, \pm \text{true to some extent}, \pm \text{partially false}, \pm \text{false}, \text{never}, \pm \text{often}, \pm \text{very often}, \pm \text{little}, \pm \text{very little}, \pm \text{not that much and so on}\}$.

The fuzzy linguistic graph given by an expert is as follows.

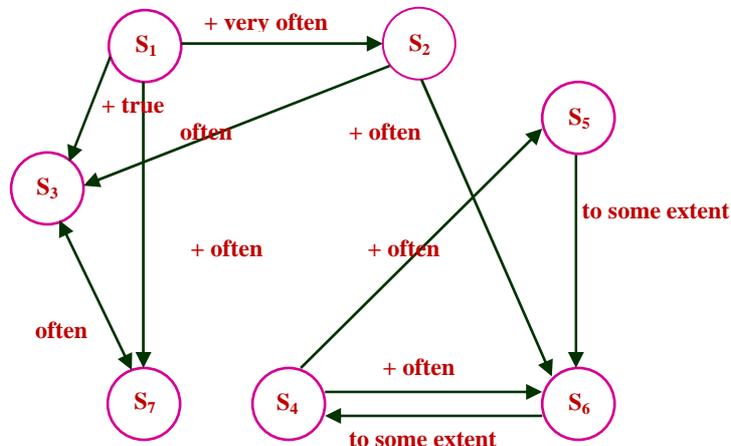


FIGURE 4.2.1

Let M be the fuzzy linguistic matrix associated with the fuzzy linguistic graph which is as follows:

$$M = \begin{matrix} & \begin{matrix} S_1 & S_2 & S_3 & S_4 & S_5 & S_6 & S_7 \end{matrix} \\ \begin{matrix} S_1 \\ S_2 \\ S_3 \\ S_4 \\ S_5 \\ S_6 \\ S_7 \end{matrix} & \left[\begin{array}{ccccccc} 0 & +\text{very often} & +\text{true} & 0 & 0 & 0 & +\text{often} \\ 0 & 0 & +\text{often} & 0 & 0 & +\text{often} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & +\text{often} \\ 0 & 0 & 0 & 0 & +\text{often} & +\text{often} & 0 \\ 0 & 0 & 0 & 0 & 0 & \text{to some extent} & 0 \\ 0 & 0 & 0 & \text{to some extent} & 0 & 0 & 0 \\ 0 & 0 & +\text{often} & 0 & 0 & 0 & 0 \end{array} \right] \end{matrix}$$

Suppose we are given the state vector $x = (+ \text{often}, 0, 0, 0, 0, 0, 0)$ to be in the ON state. To find the effect of x on the dynamical system M .

We find xM using the max min operation; and let

$$\max \min (x, M) = xM = (0, + \text{often}, + \text{often}, 0, 0, 0, + \text{often});$$

We after updating the resultant vector xM we get x_1 ;

$$x_1 = (+ \text{often}, + \text{often}, + \text{often}, 0, 0, 0, + \text{often});$$

we find now the effect of x_1 on the dynamical system M ; $\max \min \{x_1, M\} = x_1M = (0, + \text{often}, + \text{often}, 0, 0, + \text{often}, + \text{often},)$ after updating x_1M we get $x_2 = (+ \text{often}, + \text{often}, + \text{often}, 0, 0, + \text{often}, + \text{often});$ we now find the effect of x_2 on M , $\max \min \{x_2, M\} = x_2M = (0, + \text{often}, + \text{often}, \text{to some extent}, 0, + \text{often}, + \text{often})$ after updating x_2M we get $x_3 = (+ \text{often}, + \text{often}, + \text{often}, \text{to some extent}, 0, + \text{often}, + \text{often})$.

Now we find effect of x_3 on M , this is given by $\max \min \{x_3, M\} = x_3M = (0, + \text{often}, + \text{often}, \text{to some extent}, \text{to some extent}, + \text{often}, + \text{often})$.

Now we update x_3M and get $x_4 = (+ \text{often}, + \text{often}, + \text{often}, \text{to some extent}, \text{to some extent}, + \text{often}, + \text{often})$.

We find the effect of x_4 on M ;

$\max \min \{x_4, M\} = x_4M = (0, + \text{often}, + \text{often}, \text{to some extent}, \text{to some extent}, \text{often}, + \text{often});$ after updating we get

$x_5 = (+ \text{often}, + \text{often}, + \text{often}, \text{to some extent}, \text{to some extent}, + \text{often}, + \text{often})$ to be the hidden pattern.

Thus the ‘+ often’ state of the concept C_1 results in a fixed point which is such that ‘often’ the rural students who suffer inferiority complex, lack communication, and ‘often’ they do not follow the teachers teaching in the class and to some extent the inferiority complex of the rural students is due to their personality i.e., hair style dress etc; “to some extent”, these rural people who suffer with complex are poor and often they find it difficult to mingle with the other students and also often it is the teachers attitude to question them in the class unnecessarily.

We study with one more state vector namely the attribute, lack of understanding in the class (S_3) is ‘+ true’ state to be ON and all other concepts are in the OFF state. To find the effect of $y = (0, 0, + \text{true}, 0, 0, 0, 0)$ on the dynamical system M.

$\max \min \{y, M\} = yM = (0, 0, 0, 0, 0, 0, + \text{often})$; after updating yM we get $y_1 = (0, 0, + \text{true}, 0, 0, 0, + \text{often})$.

To find the effect of y_1 on M; $\max \min \{y_1, M\} = y_1M \leftrightarrow (0, 0, \text{true}, 0, 0, 0, \text{often})$ is the fixed point. (‘ \leftrightarrow ’ denotes the vector has been only updated).

Thus we see the hidden pattern is a fixed point and only the concept S_7 is in the ‘+ often’ state that is lack of understanding in the class is due to the teachers attribute and all other concepts remain in the OFF state.

Suppose we consider the state vector $m = (0, 0, 0, 0, \text{true}, 0, 0)$, to find the effect of m on the dynamical system M, that is ‘poverty’ alone is in the ‘true’ state.

To find the effect of m on M; we find $\max \min \{m, M\} = mM = (0, 0, 0, 0, \text{to some extent}, 0)$ after updating we get $m_1 = (0, 0, 0, 0, \text{true}, \text{to some extent}, 0)$.

Now the effect of m_1 on the dynamical system gives $\max \min \{m_1, M\} = m_1M = (0, 0, 0, \text{to some extent}, 0, \text{to some extent}, 0)$ after updating we get $m_2 = (0, 0, 0, \text{to some extent}, \text{true}, \text{to some extent}, 0)$. The effect of m_2 on M gives after updating.

$$m_3 = (0, 0, 0, \text{to some extent}, \text{true}, \text{to some extent}, 0)$$

Thus we see if Poverty is in ‘true’ state and all other attributes are in the OFF state then we see this directly affects personality to ‘some extent’ also they face ‘social problems’ ‘to some extent’.

One can work with any other state. We give the conclusions and suggestions based on our study in the following.

At the outset we would like to say that in most of the study of social issues / problems it is better to use fuzzy linguistic cognitive maps model instead of Fuzzy Cognitive Maps. The main reason is that this model is free from the arbitrariness of thresholding. These FLCMs models built in chapter two of this thesis is best suited in studying or analyzing the social issues.

It is useful for even if an expert is a non mathematician he/she can easily serve as an expert for any other expert can always give fuzzy linguistic values from L. Further in this problem of rural students the following are the conclusions.

1. Poverty affects the students personality and to 'some extent' involves only the social problems.
2. When the node lack of understanding is in the class 'true' state, we see no node becomes 'ON' only the node / concept teacher attitude comes to 'often' state.
3. If the 'often' is the state of "Rural students suffer from the inferiority complex" then we see the hidden pattern says the students suffer from lack of communication 'often' results in lack of understanding, the teaching in class, they suffer 'to some extent' personality problems also 'to some extent' they suffer from poverty, 'often' they suffer social problems and 'often' teachers attitude also affects the students suffering from inferiority complex.

If the students are willing to take up part-time job, either in the campus or in the close by places they should be encouraged which would help them to feel better with some earning.

Thus we see the 'often' state of 'students suffering from inferiority complex' leads to the on state of all the other attributes. So we suggest if rural

students are given proper counseling and short term training before joining colleges certainly it will help them to overcome all problems.

Secondly teachers should be trained to handle rural students with care and concern. When these two are achieved all other psychological problems can be set right.

If the students get this sort of counseling at school level it would be nice that; at the college level they can learn some good subject. This is one of the suggestions given in this thesis.

4.3 STUDY OF PROBLEMS FACED BY URCS FROM THE ELABORATE QUESTIONNAIRE USING FLRMs MODEL

When we analysed the collected filled in questionnaire we had the following fact. The URCS studying in city college mostly depended heavily on their teachers. Even if one of the teachers happen to be motivating or affectionate or take interest in them the student become endowed with many positive attributes (when we say positive attributes we mean those qualities like self confidence, regular to class, hard working, showing interest in studies etc. By negative attributes of these students we mean suffering from inferiority complex, irregular to class, disinterested in classes; etc). Further not only good or impartial teachers impact was on them, these URCS developed drastically in their capacities. So we in this problem take students attributes on one side say domain space and the attributes of teachers are taken as the attribute of the range space. The only model which can cater to the needs of this unsupervised data is the new Fuzzy Linguistic Relational Maps (FLRMs) model constructed in chapter two of this thesis. For this alone can give the hidden pattern as a pair of fuzzy linguistic vectors which also gives the interrelationship between students on one side and teachers on the other side.

We now briefly describe the linguistic attributes of both domain and the range spaces and the fuzzy linguistic set from where these state vectors take their attributes.

Since our main aim of the analysis is to see that the URCS studying in city colleges must study well and leave the college with good marks and a placement, we have constructed a FLRMs model and analyse only the influence of teachers on students. Further from all the filled in questionnaires, discussions and interviews the main feedback we could get was that teachers played the major role in the life of students in general and URCS in particular.

We first list the attributes of the teacher T_1, T_2, \dots, T_5 and then that of the students, S_1, S_2, \dots, S_6 .

Also as we are studying the performance aspect of students we use term like good, bad, very good, best, fair, very bad, average and 0. The same terms also can signify the teachers quality. The attributes related with teachers are:

- T_1 - teaching is good
- T_2 - partial
- T_3 - impartial
- T_4 - unapproachable
- T_5 - kind, understanding and motivating the students.

All the terms are self explanatory.

Now we give the attributes related with the students.

- S_1 - studies well
- S_2 - disinterested in studies
- S_3 - never come to class
- S_4 - regular to class
- S_5 - cannot understand the lectures in the class
- S_6 - never mix with anyone.

Now we use the Linguistic Fuzzy Relational Maps model to study the problem. We have taken a teacher who is very devoted and has served over 30 years as an expert to give the opinion.

He has taken T_1, \dots, T_5 as attributes of the domain space and S_1, S_2, \dots, S_6 as the attributes of the range space. The fuzzy linguistic graph given by the expert is as follows:

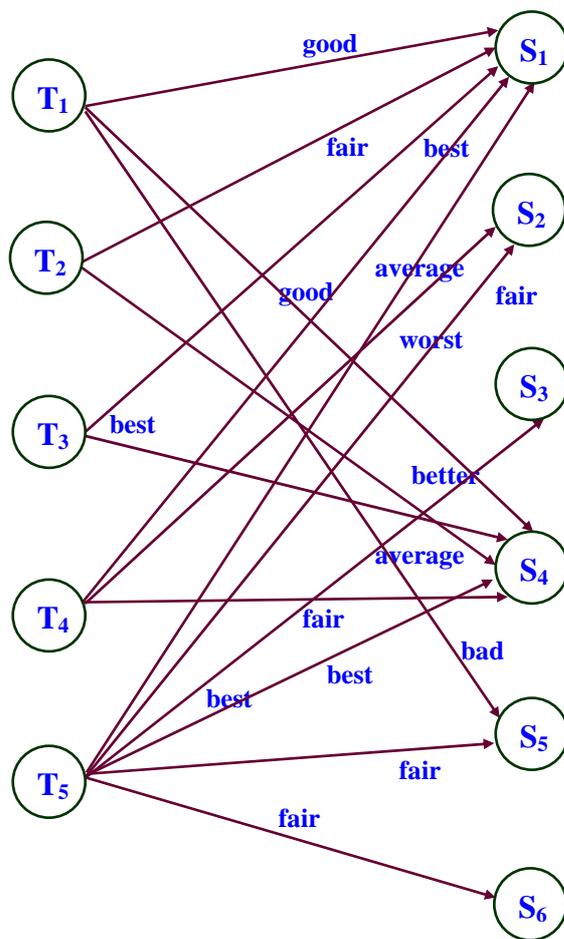


FIGURE 4.3.1

Now the expert interprets the fuzzy linguistic graph as follows:

He thinks if a student studies well and teacher teaches well his/her performance in general will be good.

Further even if the teacher is partial his/her performance may change from good to fair. He may not become a bad student. However if the teacher is impartial his/her performance in studies will be at its best.

Finally if the teacher is unapproachable also his/her performance as a student will be only average, but if the teacher motivates certainly the students studies will be at his/her best.

Now we see if the student is disinterested in studies, then the teacher teaching well or partial or impartial has no effect on him/her. If he/she happens to be a terror his/her interest is at the worst; however if the teacher motivates his/her performance or interest in study may go to a fairly well state. It is observed it is very difficult to change the mind of the student who is disinterested in studies.

If the student never comes to class then certainly that student has zero impact on the teacher who teaches well, or he/she is partial or impartial or unapproachable.

However chances can make him/her better if the teacher is interested in understanding and motivating them.

Likewise the interpretation goes for each and every edge of the fuzzy linguistic graph given by the expert. The expert has also discussed with us about how he/she has related. Let M denote the related connection fuzzy linguistic matrix of the fuzzy linguistic direct graph.

$$M = \begin{matrix} & \begin{matrix} S_1 & S_2 & S_3 & S_4 & S_5 & S_6 \end{matrix} \\ \begin{matrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \end{matrix} & \left[\begin{array}{cccccc} \text{good} & 0 & 0 & \text{good} & \text{bad} & 0 \\ \text{fair} & 0 & 0 & \text{average} & 0 & 0 \\ \text{best} & 0 & 0 & \text{best} & 0 & 0 \\ \text{average} & \text{worst} & 0 & \text{fair} & 0 & 0 \\ \text{best} & \text{fair} & \text{better} & \text{best} & \text{fair} & \text{fair} \end{array} \right] \end{matrix}$$

Now we proceed onto give the effect of some of the fuzzy linguistic state vectors on the fuzzy dynamical system M of the FLRMs.

Suppose the state from the domain space viz.; the teaching is ‘good’ alone is in the ‘ON’ state and all other fuzzy linguistic states are ‘0’.

To find the effect of the fuzzy linguistic state vector $X = (\text{good}, 0, 0, 0, 0)$ on the fuzzy linguistic dynamical system M.

We use the $\max \min \{X, M\}$ (or $\max \min \{Y, M^t\}$).

$$\begin{aligned} \max \min \{X, M\} &\quad \leftrightarrow (\text{good}, 0, 0, \text{good}, \text{bad}, 0) \\ &= Y_1 (\text{say}) \end{aligned}$$

$$\begin{aligned} \max \min \{Y_1, M^t\} &\quad \leftrightarrow (\text{good}, \text{fair}, \text{good}, \text{fair}, \text{good}) \\ &= X_1 (\text{say}) \end{aligned}$$

$$\begin{aligned} \max \min \{X_1, M\} &\quad \leftrightarrow (\text{good}, \text{fair}, \text{better}, \text{good}, \text{fair}, \text{fair}) \\ &= Y_2 (\text{say}) \end{aligned}$$

$$\begin{aligned} \max \min \{Y_2, M^t\} &\quad \leftrightarrow (\text{good}, \text{fair}, \text{good}, \text{fair}, \text{good}) \\ &= X_2 (\text{say}) (= X_1). \end{aligned}$$

We see the fuzzy linguistic hidden pattern is a fixed pair given by $\{(\text{good}, \text{fair}, \text{good}, \text{fair}, \text{good}), (\text{good}, \text{fair}, \text{better}, \text{good}, \text{fair}, \text{fair})\}$.

Suppose the teachers teaching is ‘good’ then invariably he/she is not that partial he/she is a impartial good teacher. He/she is fairly approachable and is kind and understanding with students and motivates them is in good state.

On the other hand the students study well, even the disinterested student in studies becomes fairly ‘better’, the student who never comes to class becomes ‘better’ than before.

Those who are regular to class perform well, that is ‘good at studies, those who never mix with others becomes less rigid and those students who

cannot understand in class now with a teacher who teaches well understands fairly well in the class.

Thus we see if a positive node is in the ON state in the teacher's attribute; many positive changes occur in the students.

Thus it is strongly recommended that teachers should teach well in the class and teachers should be supervised by government / management so that students perform well.

Suppose from the domain space one wants to work with the ON state the teacher is partial and hence 'bad' and all other fuzzy linguistic states are in the OFF state.

$$\text{Let } X = (0, \text{bad}, 0, 0, 0)$$

be the given fuzzy linguistic state vector. To find the effect of X on the fuzzy linguistic dynamical system M.

$$\begin{aligned} \max \min \{X, M\} &\quad \leftrightarrow (0, \text{bad}, 0, 0, 0) \\ &= Y_1 (\text{say}) \end{aligned}$$

$$\begin{aligned} \max \min \{Y_1, M^t\} &\quad \leftrightarrow (\text{bad}, \text{bad}, \text{bad}, \text{bad}, \text{bad}) \\ &= X_1 (\text{say}) \end{aligned}$$

$$\begin{aligned} \max \min \{X_1, M\} &\quad \leftrightarrow (\text{bad}, \text{bad}, \text{bad}, \text{bad}, \text{bad}, \text{bad}) \\ &= Y_2 (\text{say}) \end{aligned}$$

$$\begin{aligned} \max \min \{Y_2, M^t\} &\quad \leftrightarrow (\text{bad}, \text{bad}, \text{bad}, \text{bad}, \text{bad}) \\ &= X_2 (\text{say}). \end{aligned}$$

We see the fuzzy linguistic pattern is a fixed pair given by $\{(\text{bad}, \text{bad}, \text{bad}, \text{bad}, \text{bad}), (\text{bad}, \text{bad}, \text{bad}, \text{bad}, \text{bad}, \text{bad})\}$.

We see thus if the teacher is partial and bad only the teacher is personified as a bad person by the students and this is infact true in real world

situation also for a person that too in the noble profession of teaching is partial he/she will be bad in every other teaching factors.

Also such teachers cannot awake any of the students good qualities, students tend to become bad in studies and only bad in regularity and so on. Thus the teachers at the outset must be counseled to be impartial in class and while evaluating the answer papers of the students. Partiality is a killer attitude in teachers. It kills the students spirits.

Now if the “teacher is kind, understanding and motivates the students”, only that node is ‘on’ with good as the fuzzy linguistic attribute; to find the effect of this ‘ON’ state on the fuzzy linguistic dynamical system M.

$$\text{Let } X = (0, 0, 0, 0, \text{good})$$

be the given state vector ;

$$\begin{aligned} \max \min \{X, M\} &\quad \leftrightarrow \quad (\text{good, fair, better, good, fair, fair}) \\ &= \quad Y_1 \text{ (say)} \end{aligned}$$

$$\begin{aligned} \max \min \{Y_1, M^t\} &\quad \leftrightarrow \quad (\text{good, fair, good, fair, good}) \\ &= \quad X_1 \text{ (say)} \end{aligned}$$

$$\begin{aligned} \max \min \{X_1, M\} &\quad \leftrightarrow \quad (\text{good, fair, better, good, fair, fair}) \\ &= \quad Y_2 \text{ (say) } (=Y_1). \end{aligned}$$

Thus the fuzzy linguistic hidden pattern is a fixed pair given by {(good, fair, good, fair, good), (good, fair, better, good, fair, fair)}.

If the teacher is kind, understanding and motivates the student he / she is good in teaching, fair not that partial or impartial that is he / she is good fairly approachable. So the teacher has all the good traits not a bad one. From the students side we see they are good at studies, disinterested students in studies perform fairly well, those who never come to class show better

attendance, those who are regular to class have good attendance, those who do not understand in class fairly understand and show improvement and above all, even the loners try to become socially better. This is the impact of a good teacher who is kind, understanding and motivates the students.

Now we just study some of the ON state of the nodes from the range space that is fuzzy linguistic terms associated with URCS.

Let us study the ON state of the fuzzy linguistic term the students are regular to class.

$$\text{Let } X = (0, 0, 0, \text{good}, 0, 0);$$

To find the effect of X on the fuzzy linguistic dynamical system M.

$$\begin{aligned} \max \min \{X, M^t\} &\quad \leftrightarrow (\text{good, average, good, fair, good}) \\ &= Y (\text{say}) \end{aligned}$$

$$\begin{aligned} \max \min \{Y, M\} &\quad \leftrightarrow (\text{good, fair, better, good, fair, fair}) \\ &= X_1 (\text{say}) \end{aligned}$$

$$\begin{aligned} \max \min \{X_1, M^t\} &\quad \leftrightarrow (\text{good, fair, good, fair, good}) \\ &= Y_1 (\text{say}) \end{aligned}$$

$$\begin{aligned} \max \min \{Y_1, M\} &\quad \leftrightarrow (\text{good, fair, better, good, fair, fair}) \\ &= X_2 (\text{say}) = (X_1). \end{aligned}$$

Thus we see the fuzzy linguistic hidden pattern is a fixed pair given by $\{(\text{good, fair, better, good, fair, fair}), (\text{good, fair, good, fair, good})\}$.

The interpretations are carried out in a similar way mentioned earlier. Suppose student is 'bad' at studies and is disinterested in it; we see nature of the teacher, that is generally in that teachers class the students are disinterested in that subject.

$$\text{Let } X = (0, \text{bad}, 0, 0, 0, 0);$$

to find the effect of X on the dynamical system M.

$$\begin{aligned} \max \min \{X, M^t\} &\leftrightarrow (0, 0, 0, \text{worst}, \text{bad}) \\ &= Y_1 \text{ (say)} \end{aligned}$$

$$\begin{aligned} \max \min \{Y_1, M\} &\leftrightarrow (\text{bad}, \text{bad}, \text{bad}, \text{bad}, \text{bad}, \text{bad}) \\ &= X_1 \text{ (say)} \end{aligned}$$

$$\begin{aligned} \max \min \{X_1, M^t\} &\leftrightarrow (\text{bad}, \text{bad}, \text{bad}, \text{bad}, \text{bad}) \\ &= Y_2 \text{ (say)} \end{aligned}$$

$$\text{and } \max \min \{Y_2, M\} \leftrightarrow X_2 .$$

The fixed point is pair given by $\{(\text{bad}, \text{bad}, \text{bad}, \text{bad}, \text{bad}), (\text{bad}, \text{bad}, \text{bad}, \text{bad}, \text{bad}, \text{bad})\}$. Thus all the nodes in both the resultant vectors are ‘bad’.

So if the students are disinterested in studies it reflects that the teacher is to be blamed for he / she has no good qualities associated with her / his teaching profession.

Thus any bad attribute necessarily awakens the bad attributes and a good attributes paves way to a mixed qualities in the teacher as well as in the students as seen from the hidden pattern.

This is the new tool which speaks of all the qualities in words and not in numbers. So it is easy even for a non mathematician to understand the problem at hand.

Finally the main merit of this model is as follows: The advantage of using this newly constructed fuzzy linguistic cognitive maps model and the fuzzy linguistic relational maps model is that we at each stage of the working; one need not threshold the state vector. Thus the result is not only sensitive but no manual modification is made at any stage while working with the problem so the personal bias of the expert is not included in this model or to be more precise the solution is free from personal bias. That is all types of modification and approximations which many contain the bias of the expert is not present in this model.