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Study of Stress experienced by Plus two Students using Combined Overlap Block Fuzzy Cognitive maps

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Abstract

In this paper we study the stress experienced by plus two students studying in schools in Chennai using Combined Overlap block Fuzzy cognitive maps (COBFCMs) model. The papers studies the stress created by parents teachers, tuition centres etc., This paper has four sections. Section one is introductory in nature. Section two describes the problem COBFCMs model is applied to the problem in section three. Final section gives the conclusions based on our study.

Key words: Fuzzy Cognitive Maps, Hidden pattern, fixed point, Combined overlap block, Fuzzy Cognitive Maps Models.

1 Introduction

In this paper the problems faced by plus two students studying in Chennai city schools is discussed. Children belonging to rich or upper middle class or middle class or lower middle class face this problem. Further these children's parents are graduates or are well aware of the means of winning a medical or an engineering seat on merit in case they belong to these lower and upper middle classes[1-2].

From this study it is clearly evident that in case of poor or very poor or lower middle class they do not make their children go to tuition classes or even go to school regularly. They face tensions entirely of a different form:

1. No breakfast or any proper food though not nourishing food.
2. Part time employment before and after school hours so no time to read, this is done to help the family.
3. When parents are drunk in night no time even to do the home work hence they spend sleepless nights.
4. No proper electricity so they read under street lights.
5. No cooperation of any form from their parents.
6. No proper infra structures or teachers in the schools where they study.

This study is very important but is not carried out in this paper. Here only stress caused by parents, teachers, school administrators

and tutorial centers on the plus two students studying in science stream in city schools of Chennai belonging to a better social strata are studied and analysed using fuzzy models[4-6].

This paper has three sections first one introductory in nature. Second section describes and analysis the problem. In the third section CBOFCMs models described[7] are used to study the problems.

4.2 Description and Analysis of the Problem:

The study and analysis of the problem from interviews and discussions revealed that the best suited model for the approach of this problem is Combined Overlap Block Fuzzy Cognitive Maps (COBFCMs) model. All the attributes related with the problem given by parents, teachers, students, educationalist and tutorial class instructors (tuition center teachers) are listed in this section as given by the experts.

S_1 - Parents imposing professional course on their children against their wishes

S_2 - Extra tuitions after and before school hours

S_3 - No time to relax or sometimes even do the home work

S_4 - Stress and anxiety level of students

S_5 - Regular tests given at schools and tuition centers

S_6 - Teachers experience stress and strain whole coaching them

S_7 - Parental support

S_8 - Controlling the study environment (No TV, Cell phone, internet etc.)

S_9 - Friends influence on them

S_{10} - Parents restricted social movement

S_{11} - Arrangement of transportation

S_{12} - Parents availing leave for their children's study

S_{13} - Placing pressure by constant advice (Don't waste time, you can do better, for your own good)

S_{14} - Comparing their children's performance with close relatives

S_{15} - No proper eating and sleeping habits

S_{16} - Children monitored round the clock by parents causing anxiety and tension to them (children)

S_{17} - A need for professional course of their child for social and economic status of the family

S_{18} - Gain of social status by earning money and settling/visiting western countries

S_{19} - Marks and professional qualification a cultural expectations (Parents boosting of their child's good performance happens to a cultural expectation)

S_{20} - Students desire to earn admission by merit

S_{21} - Children studying in best and highly prestigious institutions a pride to parents in society

S_{22} - Choice of course selection to students done by parents – children depressed many a times

S_{23} - Exam systems highly disappointing by-hearting (rote memory) the total course content

S_{24} - Course material unnecessary and irrelevant

S_{25} - Only testing memory not talent (testing methods are unfair and useless)

S_{26} - Home work at school and tuition centers burdens the students

S_{27} - Teachers act as machines as school authorities force them to get % results with flying ranks

S_{28} - Parents become debtors due to giving their children tutorials and other comforts for travel, good food etc.

S_{29} - Parents advice against science, law and arts stream courses

S_{30} - Children deprived of all physical activities

S_{31} - Children loose the charm and happiness in life

S_{32} - Entrance exams another continued torture

S_{33} - Parents never teach their children

S_{34} - Children are misfits for they do not have any general knowledge about environment, politics, nationalization and globalization etc.

These were given by the group of experts who were parents, teachers, students, school authorities, educationalist, doctors, socio scientist, public personalities and psychologists. One should not be mislead why the use of experts as doctors, the doctors included where the ones who had treated over hundreds of plus two children in the eve of exams. They shared a very different view both about these students and parents like "my child has memory loss give some tonics / medicines to improve memory". "My child has no energy to cope up with daily tuition classes and school please prescribe some tonic. "My child often gets headache" please see to it till he completes plus two he does not get headache. Some said "my child often suffers from flu and fever just before exams" and so on. Only a few of the discussion are mentioned here, doctors said most of the cases he dealt with these plus two students were due to stress and anxiety coupled with depression. They said parents could not or were not willing to understand their problem[7-10].

Some doctors said they advised their parents to allow their child daily for some outdoor games like cricket or football or at least a walk in fresh air. Thus in this study doctors too were chosen as experts. Now one can not put in all the experts opinion and formulate a big COBFCMs so 9 experts where chosen using lots and divided them into three groups. They were given the liberty to choose any set of attributes mentioned earlier[1-6].

The first group of three experts comprises of doctor, students and parents. The second group of three experts consists of public personality, psychologists and educationalist. The third group of three experts were teachers, senior students and a socio scientist. COBFCMs model is used to analyse the problem using these sets of experts.

At the outset one is justified in using these models as in the first place the data collected is an unsupervised one. Further the problem involves lot of feelings both emotional and psychological.

3 COBFCMS Model to Study the Depression, Anxiety and Stress Experienced by Plus two Students Studying in Chennai City Schools:

In this section the stress, anxiety and depression experienced by plus two students is analysed using three sets of experts mentioned in section 2 of this paper.

The first set of experts consists of doctor, student and parent, they give their opinion

in the form of the directed graph using attributes selected from the 34 attributes given in section 2 of this paper and ultimately using them the Combined Overlap Block FCMs (COBVCMs) model is constructed to get the integrated results of all the three experts.

The first expert is a doctor who has treated over 300 plus two students before the exams and during the exams for the past six years. He wishes to work with the following set if attributes from the set of 34 attributes

$$B_1=\{S_1, S_2, S_3, S_4, S_8, S_{13}, S_{14}, S_{15}, S_{30}\} \subseteq \{S_1, S_2, \ldots, S_{34}\}.$$

The directed graph T_1 given by the doctor is as follows:

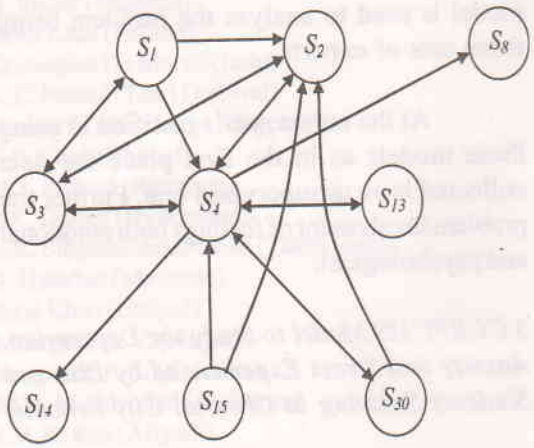

Figure 1

Now using the directed graph T_1 given by the doctor the related connection matrix W_1, is obtained which is as follows:

$$W_1 = \begin{array}{c} \\ S_1 \\ S_2 \\ S_3 \\ S_4 \\ S_8 \\ S_{13} \\ S_{14} \\ S_{15} \\ S_{30} \end{array} \begin{array}{c} \begin{array}{ccccccccc} S_1 & S_2 & S_3 & S_4 & S_8 & S_{13} & S_{14} & S_{15} & S_{30} \end{array} \\ \begin{bmatrix} 0 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \end{array}.$$

Now the second expert who is a student gives his opinion He wishes to work with the following attributes from the set of 34 attributes $B_2=\{S_1, S_2, S_3, S_4, S_5, S_6, S_8, S_9, S_{13}, S_{14}, S_{16}, S_{22}\} \subseteq \{S_1, S_2, \ldots, S_{34}\}$. The directed graph T_2 given by the student is as follows:

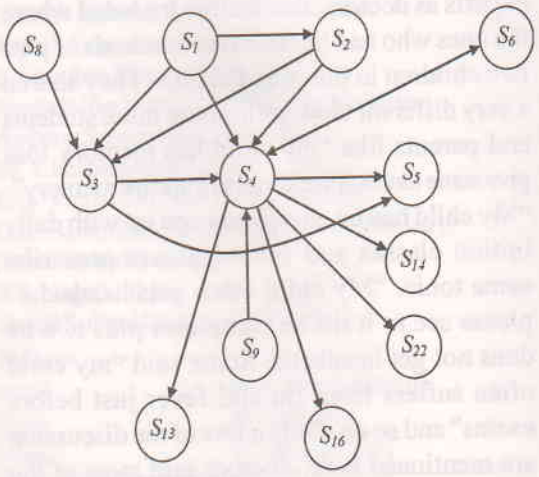

Figure 2

Let W_2 be the connection matrix associated with the directed graph T_2 given by the second expert.

$$W_2 = \begin{array}{c} \\ S_1 \\ S_2 \\ S_3 \\ S_4 \\ S_5 \\ S_6 \\ S_8 \\ S_9 \\ S_{13} \\ S_{14} \\ S_{16} \\ S_{22} \end{array} \begin{array}{c} \begin{array}{cccccccccccc} S_1 & S_2 & S_3 & S_4 & S_5 & S_6 & S_8 & S_9 & S_{13} & S_{14} & S_{16} & S_{22} \end{array} \\ \begin{bmatrix} 0 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \end{array}.$$

Next the experts opinion of a parent using the following attributes from the set of 34 attributes, $B_3 = \{S_1, S_2, S_4, S_8, S_{13}, S_{14}, S_{16}, S_{17}\} \subseteq \{S_1, S_2, \ldots, S_{34}\}$ is given.

Let T_3 be the directed graph given by the third expert which is as follows:

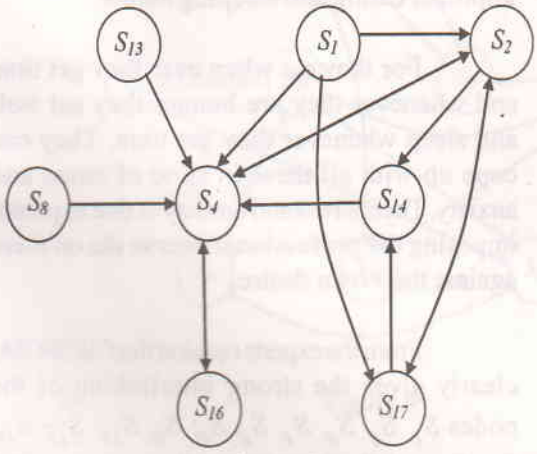

Figure 3

Let W_3 be the connection matrix of the directed graph T_3 given by the third expert.

$$W_3 = \begin{array}{c} \\ S_1 \\ S_2 \\ S_4 \\ S_8 \\ S_{13} \\ S_{14} \\ S_{16} \\ S_{17} \end{array} \begin{array}{c} \begin{array}{cccccccc} S_1 & S_2 & S_4 & S_8 & S_{13} & S_{14} & S_{16} & S_{17} \end{array} \\ \begin{bmatrix} 0 & 1 & 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 \end{bmatrix} \end{array}.$$

Now using the three connection matrices W_1, W_2 and W_3 of the FCMs the Combined Overlap Block Fuzzy Cognitive Maps (COBFCMs) matrices described[7]. For more about this structure refer[7].

The Combined Block Overlap Fuzzy Cognitive Maps (COBFCMs) connection matrix W is as follows:

$$W = \begin{array}{c} \\ S_1 \\ S_2 \\ S_3 \\ S_4 \\ S_5 \\ S_6 \\ S_8 \\ S_9 \\ S_{13} \\ S_{14} \\ S_{15} \\ S_{16} \\ S_{17} \\ S_{22} \\ S_{30} \end{array} \begin{array}{c} \begin{array}{ccccccccccccccc} S_1 & S_2 & S_3 & S_4 & S_5 & S_6 & S_8 & S_9 & S_{13} & S_{14} & S_{15} & S_{16} & S_{17} & S_{22} & S_{30} \end{array} \\ \begin{bmatrix} 0 & 3 & 2 & 3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 2 & 3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 2 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 2 & 1 & 0 & 1 & 1 & 1 & 0 & 2 & 2 & 0 & 2 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \end{array}$$

Now using W as the dynamical system of the COBFCMs (CBOFCMs) model (both abbreviations are used in[7] which is also used in this paper) the hidden patterns of the initial state vectors are found. Let the expert work with the node S_1 in the on state. To find the effect of S_1 on the dynamical system W.

Let $X_1 = (1\,0\,0 \ldots 0)$; to find the hidden pattern of X_1 using W.

$X_1W = (0\,3\,2\,3\,0\,0\,0\,0\,0\,0\,0\,0\,1\,0\,0)$
$\rightarrow (1\,1\,1\,1\,0\,0\,0\,0\,0\,0\,0\,0\,1\,0\,0) = Y_1$ (say)

($\rightarrow$ denotes the vector X_1W has been updated and thresholded).

$Y_1W \rightarrow (1\,1\,1\,1\,1\,1\,1\,0\,1\,1\,0\,1\,1\,1\,1) = Y_2$ (say)
$Y_2W \rightarrow (1\,1\,1\,1\,1\,1\,1\,0\,1\,1\,0\,1\,1\,1\,1) = Y_3 (= Y_2)$.

Thus the hidden pattern of X_1 is a fixed point given by $(1\,1\,1\,1\,1\,1\,1\,0\,1\,1\,0\,1\,1\,1\,1)$. All nodes come to on state except S_9 and S_{15}. That is parents imposing a professional course on their child has no influences on friends influence on them – S_9 and No proper eating and sleeping habits – S_{15}.

Next the expert works with the on state of the node S_2.

Let $X_2 = (0\,1\,0 \ldots 0)$ be the initial state vector to find the effect of X_2 on the dynamical system W.

$X_2W \rightarrow (0\,1\,1\,1\,0\,0\,0\,0\,0\,0\,0\,0\,1\,0\,0) = T_1$ (say)
$T_1W \rightarrow (1\,1\,1\,1\,1\,1\,1\,0\,1\,1\,0\,1\,1\,1\,1) = T_2$ (say)
$T_2W \rightarrow (1\,1\,1\,1\,1\,1\,1\,0\,1\,1\,0\,1\,1\,1\,1) = T_3 (= T_2)$

Thus the hidden pattern is a fixed point given by $(1\,1\,1\,1\,1\,1\,1\,0\,1\,1\,0\,1\,1\,1\,1)$. Extra tuition has nothing to with friends influence – S_9 and No proper eating and sleeping habits – S_{15}.

The expert works with the on state of the node S_{13}.

To find the effect of $X_{13} = (0\,0\,0\,0\,0\,0\,0\,0\,1\,0\,0\,0\,0\,0\,0)$ on the dynamical system W.

$X_{13}W \rightarrow (0\,0\,0\,1\,0\,0\,0\,0\,1\,0\,0\,0\,0\,0\,0) = R_1$ (say)
$R_1W \rightarrow (0\,1\,1\,1\,1\,1\,1\,0\,1\,1\,0\,1\,0\,1\,1) = R_2$ (say)
$R_2W \rightarrow (1\,1\,1\,1\,1\,1\,1\,0\,1\,1\,0\,1\,1\,1\,1) = R_3$ (say)
$R_3W \rightarrow (1\,1\,1\,1\,1\,1\,1\,0\,1\,1\,0\,1\,1\,1\,1) = R_4 (= R_3)$

Placing pressure by constant advice makes on all states except S_9 and S_{15}. Most of the on states of the nodes makes all other nodes to on state except the nodes S_9 and S_{15}. This is mainly due to the fact stress and anxiety level of the students is highly due to all other nodes mentioned by the 3 experts. Students are not stressed by friends as it has no effect on the system; likewise students do not bother improper eating and sleeping habits.

For they eat when ever they get time and whenever they are hungry they eat well and sleep whenever they get time. They can cope up with all these in spite of stress and anxiety. Their stress and anxiety is due to parent imposing the professional course etc on them against their own desire.

From the experts opinion the CBOFCMs clearly gives the strong interlinking of the nodes S_1, S_2, S_3, S_4, S_5, S_6, S_8, S_{13}, S_{14}, S_{16}, S_{17}, S_{22} and S_{30} though not all experts worked

with all the 16 nodes. Further we come to the conclusion is that all the nodes spin around the node S_4 and S_4 is interlinked also with S_1, S_2 and S_3 and all the four nodes are interlinked than any other nodes in CBOFCMs.

Next proceed onto work with the second set of experts on the same set of 34 nodes mentioned in section two of this paper. These experts are also given the right to choose any number of nodes from the set of 34 nodes.

The expert is from public he works with the following nodes $C_1 = \{S_1, S_2, S_3, S_4, S_6, S_{16}, S_{22}, S_{23}, S_{24}, S_{25}, S_{30}, S_{31}, S_{34}\} \subseteq \{S_1, S_2, \ldots, S_{34}\}$. Let D_1 be the directed graph given by him.

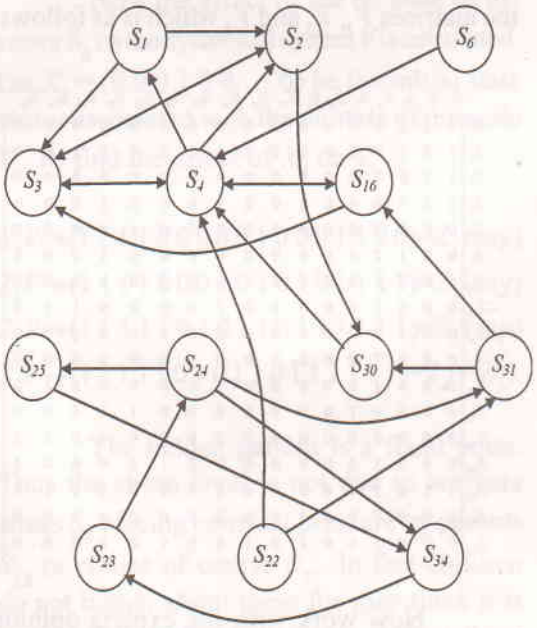

Figure 4

Let V_1 denote the connection matrix of the directed graph given by the expert who is a public personality.

$$V_1 = \begin{array}{c} \\ S_1 \\ S_2 \\ S_3 \\ S_4 \\ S_6 \\ S_{16} \\ S_{22} \\ S_{23} \\ S_{24} \\ S_{25} \\ S_{30} \\ S_{31} \\ S_{34} \end{array} \begin{array}{c} \begin{array}{cccccccccccc} S_1 & S_2 & S_3 & S_4 & S_6 & S_{16} & S_{22} & S_{23} & S_{24} & S_{25} & S_{30} & S_{31} & S_{34} \end{array} \\ \begin{bmatrix} 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \end{array}.$$

Next the expertise of the psychologist who has given the following directed graph D_2 and has worked of the following nodes from the set of 34 nodes $C_2=\{S_3, S_4, S_6, S_8, S_{13}, S_{14}, S_{16}, S_{30}, S_{31}, S_{34}\} \subseteq \{S_1, S_2, \ldots, S_{34}\}$.

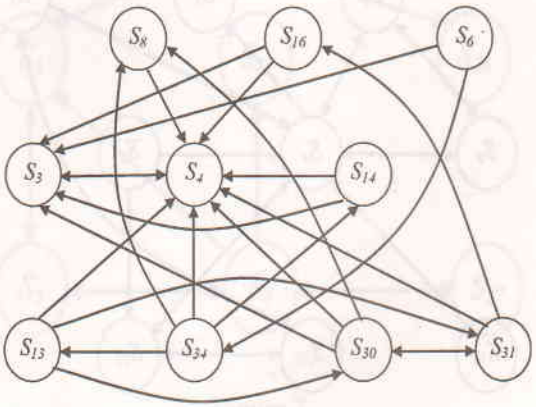

Figure 5

Let V_2 be the related connection matrix of the directed graph D_2 which is as follows:

$$V_2 = \begin{array}{c} \\ S_3 \\ S_4 \\ S_6 \\ S_8 \\ S_{13} \\ S_{14} \\ S_{16} \\ S_{30} \\ S_{31} \\ S_{34} \end{array} \begin{array}{c} \begin{array}{cccccccccc} S_3 & S_4 & S_6 & S_8 & S_{13} & S_{14} & S_{16} & S_{30} & S_{31} & S_{34} \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 \\ 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 \end{bmatrix} \end{array}.$$

Now we get the directed graph D_3 given by the third expert who is an educationalist using the nodes from the set of 34 nodes; $C_3 = \{S_1, S_2, S_3, S_4, S_5, S_6, S_{14}, S_{23}, S_{25}\} \subseteq \{S_1, S_2, \ldots, S_{34}\}$ is as follows. Let D_1 be the directed graph given by him.

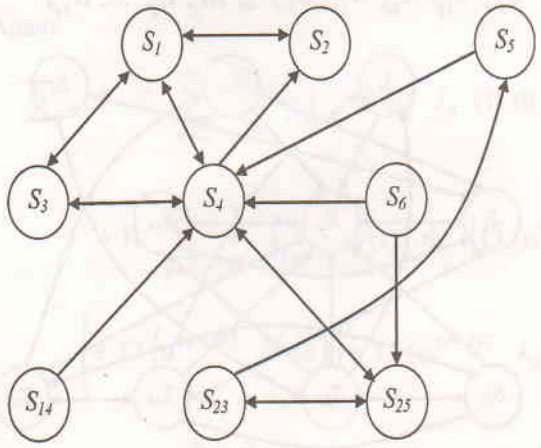

Figure 6

The connection matrix V_3 associated with the directed graph D_3 is as follows:

$$V_3 = \begin{array}{c} \\ S_1 \\ S_2 \\ S_3 \\ S_4 \\ S_5 \\ S_6 \\ S_{14} \\ S_{23} \\ S_{25} \end{array} \begin{array}{c} \begin{array}{ccccccccc} S_1 & S_2 & S_3 & S_4 & S_5 & S_6 & S_{14} & S_{23} & S_{25} \end{array} \\ \begin{bmatrix} 0 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 0 \end{bmatrix} \end{array}.$$

We now using the three experts opinion get the Combined Block Overlap FCMs (CBOFCMs) connection matrix V related with the matrices V_1, V_2 and V_3 which is as follows:

$$V = \begin{array}{c} \\ S_1 \\ S_2 \\ S_3 \\ S_4 \\ S_5 \\ S_6 \\ S_8 \\ S_{13} \\ S_{14} \\ S_{16} \\ S_{22} \\ S_{23} \\ S_{24} \\ S_{25} \\ S_{30} \\ S_{31} \\ S_{34} \end{array} \begin{array}{c} \begin{array}{cccccccccccccccccc} S_1 & S_2 & S_3 & S_4 & S_5 & S_6 & S_8 & S_{13} & S_{14} & S_{16} & S_{22} & S_{23} & S_{24} & S_{25} & S_{30} & S_{31} & S_{34} \end{array} \\ \begin{bmatrix} 0 & 2 & 2 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 2 & 2 & 3 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 \\ 1 & 1 & 0 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 2 & 0 & 0 & 0 & 0 & 2 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \end{array}.$$

Now work with the experts opinion using the matrix V associated with the COBFCMs model. Suppose the node S_1 is in the on state to find the effect of $X_1 = (1\ 0 \ldots 0)$ on V.

$X_1V \to (1\,1\,1\,1\,0\,0\,0\,0\,0\,0\,0\,0\,0\,0\,0\,0) = Y_1$ (say)
$Y_1V \to (1\,1\,1\,1\,0\,0\,0\,0\,0\,1\,0\,0\,0\,1\,1\,0\,0) = Y_2$ (say)
$Y_2V \to (1\,1\,1\,1\,0\,0\,0\,0\,0\,1\,0\,1\,0\,1\,1\,1\,1) = Y_3$ (say)
$Y_3V \to (1\,1\,1\,1\,1\,0\,1\,0\,1\,1\,0\,1\,1\,1\,1\,1\,1) = Y_4$ (say)
$Y_4V \to (1\,1\,1\,1\,1\,0\,1\,0\,1\,1\,0\,1\,1\,1\,1\,1\,1) = Y_5 (= Y_4)$.

Thus the hidden pattern of the CBOFCMs is a fixed point.

However parents imposing the professional courses, does not affect teachers stress and strain in coaching them S_6 that is why S_6 is in the off state S_{13} parents placing pressure by constant advice does not affect S_{13} and S_{22} the choice of course selection to students is also in the off state.

Now the effect of the on state of the vector S_4 on the dynamical system V is calculated. Let $X_4 = (0\,0\,0\,1\,0\,0 \ldots 0)$ be the initial state vector associated with the on state of the node S_4. To find the effect of X_4 on V.

$X_4V \to (1\,1\,1\,1\,0\,0\,0\,0\,0\,1\,0\,0\,0\,1\,1\,0\,0) = Z_1$ (say)
$Z_1V \to (1\,1\,1\,1\,0\,0\,0\,0\,0\,1\,0\,1\,0\,1\,1\,1\,1) = Z_2$ (say)
$Z_2V \to (1\,1\,1\,1\,1\,0\,1\,0\,1\,1\,0\,1\,1\,1\,1\,1\,1) = Z_3$ (say)
$Z_3V \to (1\,1\,1\,1\,1\,0\,1\,0\,1\,1\,0\,1\,1\,1\,1\,1\,1) = Z_4 (= Z_3)$.

The hidden pattern is a fixed point. Thus the stress level is not due to teachers stress S_6 placing constant pressure by parents S_{13} or choice of course S_{22}. In fact children do not bother about these for they think it is for good but all other factors affect them drastically. However on state of S_6 alone say $X_6 = (0\,0\,0\,0\,0\,1\,0\,0\,0\,0\,0\,0\,0\,0\,0\,0\,0)$ gives the resultant vector as $P = (1\,1\,1\,1\,1\,1\,1\,0\,1\,1\,0\,1$ $1\,1\,1\,1\,1)$ thus only teacher stress have no impact on placing pressure by parents S_{13} and Parents choosing their career S_{22}.

Next the third set of experts are used to study the problem of stress, anxiety and expression levels of the plus two students The third set of experts were teachers, senior students now studying in professional colleges and socio scientist.

The teacher who is an expert wishes to work with the flowing set of nodes T_1 from the 34 nodes T_1 from the 34 nodes given in section 2 of this paper.

Let $T_1 = \{S_4, S_5, S_6, S_{23}, S_{27}, S_{26}\} \subseteq \{S_1, S_2, \ldots, S_{34}\}$ be the set of attributes with which the teacher works. Let H_1 be the directed graph of the FCM given by the teacher which is as follows:

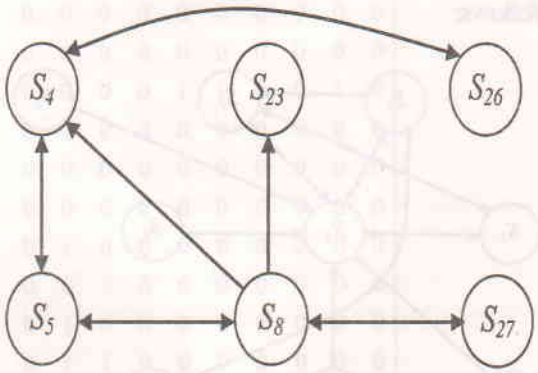

Figure 7

Let L_1 denote the connection matrix associated with directed graph H_1 which is as follows:

$$L_1 = \begin{array}{c} \\ S_4 \\ S_5 \\ S_6 \\ S_{23} \\ S_{26} \\ S_{27} \end{array} \begin{array}{c} \begin{array}{cccccc} S_4 & S_5 & S_6 & S_{23} & S_{26} & S_{27} \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \end{bmatrix} \end{array}.$$

The second expert who is a senior student wishes to work with set of nodes T_2 from the set of 34 nodes.

$T_2 = \{S_1, S_2, S_3, S_4, S_5, S_8, S_{13}, S_{14}, S_{18}, S_{19}, S_{20}, S_{21}\} \subseteq \{S_1, S_2, \ldots, S_{34}\}$.

Let H_2 be the directed graph given by the senior student of this problem which is as follows:

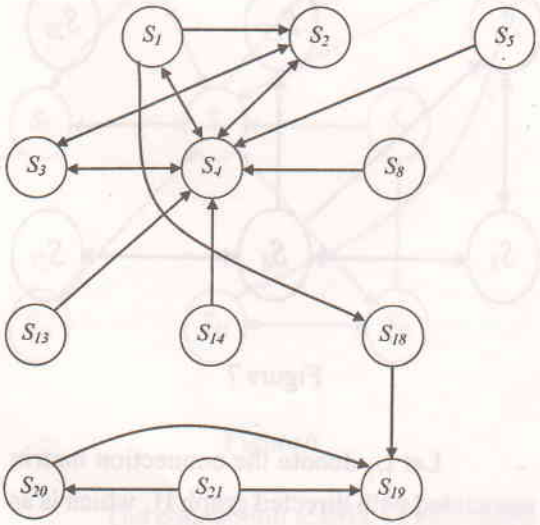

Figure 8

Let L_2 be the connection matrix of the directed graph H_2 of the FCMs.

$$L_2 = \begin{array}{c} \\ S_1 \\ S_2 \\ S_3 \\ S_4 \\ S_5 \\ S_8 \\ S_{13} \\ S_{14} \\ S_{18} \\ S_{19} \\ S_{20} \\ S_{21} \end{array} \begin{array}{c} \begin{array}{cccccccccccc} S_1 & S_2 & S_3 & S_4 & S_5 & S_8 & S_{13} & S_{14} & S_{18} & S_{19} & S_{20} & S_{21} \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 \end{bmatrix} \end{array}.$$

Finally the socio scientist wishes to work with the set of nodes $T_3 = \{S_1, S_2, S_3, S_4, S_5, S_6, S_{19}, S_{24}, S_{25}, S_{28}\} \subseteq \{S_1, S_2, \ldots, S_{34}\}$.

Let H_3 be the directed graph given by the third expert which is as follows:

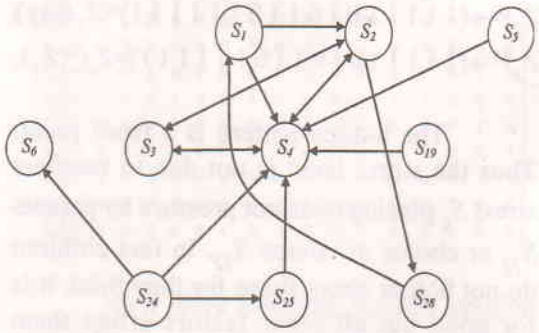

Figure 9

Let L_3 be the connection matrix related to the directed graph H_3 of the FCM.

$$L_2 = \begin{array}{c} \\ S_1 \\ S_2 \\ S_3 \\ S_4 \\ S_5 \\ S_6 \\ S_{19} \\ S_{24} \\ S_{25} \\ S_{28} \end{array} \begin{array}{c} \begin{array}{cccccccccc} S_1 & S_2 & S_3 & S_4 & S_5 & S_6 & S_{19} & S_{24} & S_{25} & S_{28} \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \end{array}.$$

Now using the connection matrices L_1, L_2 and L_3 of the FCMs the combined Overlap block FCMs, connection matrix L is obtained

$$L_2 = \begin{array}{c} \\ S_1 \\ S_2 \\ S_3 \\ S_4 \\ S_5 \\ S_6 \\ S_8 \\ S_{13} \\ S_{14} \\ S_{18} \\ S_{19} \\ S_{20} \\ S_{21} \\ S_{23} \\ S_{24} \\ S_{25} \\ S_{26} \\ S_{27} \\ S_{28} \end{array} \begin{array}{c} \begin{array}{cccccccccccccccccc} S_1 & S_2 & S_3 & S_4 & S_5 & S_6 & S_8 & S_{13} & S_{14} & S_{18} & S_{19} & S_{20} & S_{21} & S_{23} & S_{24} & S_{25} & S_{26} & S_{27} & S_{28} \end{array} \\ \begin{bmatrix} 0 & 2 & 0 & 2 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 2 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 2 & 0 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 2 & 2 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 3 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \end{array}.$$

L serves as the connection matrix of the COBFCMs. Now the effect of the on state of $X_1 = (1\ 0\ 0\ \ldots\ 0)$ is found using L

$X_1L \rightarrow (1\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 1) = Y$ (say)

$YL \rightarrow (1\ 1\ 1\ 1\ 1\ 0\ 0\ 0\ 0\ 1\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 1) = Y_1$ (say)

$Y_1L \rightarrow (1\ 1\ 1\ 1\ 1\ 1\ 0\ 0\ 0\ 1\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 1) = Y_2$ (say)

$Y_2L \rightarrow (1\ 1\ 1\ 1\ 1\ 1\ 0\ 0\ 0\ 1\ 1\ 0\ 0\ 1\ 1\ 0\ 0\ 1\ 1) = Y_3$ (say)

$Y_3L \rightarrow (1\ 1\ 1\ 1\ 1\ 1\ 0\ 0\ 0\ 1\ 1\ 0\ 0\ 1\ 1\ 1\ 0\ 1\ 1) = Y_4$ (say)

$Y_4L \rightarrow (1\ 1\ 1\ 1\ 1\ 1\ 0\ 0\ 0\ 1\ 1\ 0\ 0\ 1\ 1\ 1\ 0\ 1\ 1) = Y_5 (= Y_4$ say)

Thus parents wishing imposing to put them in professional course makes on all the nodes S_2, S_3, S_4, S_5, S_6, S_{18}, S_{19}, S_{23}, S_{24}, S_{25}, S_{27} and S_{28}.

Only the nodes S_8, S_{13}, S_{14}, S_{20}, S_{21} and S_{26} in the off state; that controlling the environment does not come to on state for it is automatically made when the child has to work round the clock.

Placing pressure by constant advice does not arise for already they are pressed by the imposition of a course that is not their choice a bigger depression. Comparing with other children does not affect them as they are already affected.

They are not keen to earn the seat by merit for they know very well parents by hook or crook will get them a seat. No more they are bothered about the pride of their pride of their parents if they study in prestigious institutions. Finally homework does not have any impact on them.

Next the effect of S_{20} is seen on the dynamical system. Let $X = (0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 0)$ be the one which gives on state of S_{20} and all other nodes are in the off state; that is students aspire to win the seat by merit alone is in the on state

$XL \rightarrow (0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 1\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 0) = Z$(say)

$ZL \rightarrow (0\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 1\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 0) = Z_1$(say)

$Z_1L \rightarrow (0\ 1\ 1\ 1\ 1\ 0\ 0\ 0\ 0\ 1\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0) = Z_2$ (say)

$Z_2L \rightarrow (0\ 1\ 1\ 1\ 1\ 1\ 0\ 0\ 0\ 0\ 1\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 1) = Z_3$ (say)

$Z_3L \rightarrow (0\ 1\ 1\ 1\ 1\ 1\ 0\ 0\ 0\ 0\ 1\ 1\ 0\ 0\ 1\ 1\ 0\ 1\ 1) = Z_4$ (say)

$Z_4L \rightarrow (0\ 1\ 1\ 1\ 1\ 1\ 0\ 0\ 0\ 0\ 1\ 1\ 0\ 1\ 1\ 1\ 0\ 1\ 1) = Z_5$ (say)

$Z_4L \rightarrow (0\ 1\ 1\ 1\ 1\ 1\ 0\ 0\ 0\ 0\ 1\ 1\ 0\ 1\ 1\ 1\ 0\ 1\ 1) = Z_6 (= Z_5$ say)

The hidden pattern is a fixed point given by Z_5. So in the first place the students desire to earn the seat by merit are not affected by parents imposing the course on them that is why S_1 is in the off state they go for extra tuitions S_2 is on; they have no time to relax so S_3 is on. They are stressed as S_4 is on. They face regular tests so S_5 is on, they also realize the stress of their teachers hence S_6 is on.

However S_8 is in the off state as they are not bothered about the environmental control. S_{13} and S_{14} are off as they do not bother about the pressure of parents by constant advice and comparing with either children. At this point they do not bother social status so S_{18} is off.

However S_{19} is on for marks and professional qualification is a cultural expectation. They are not bother about the pride of parents so S_{21} is only off. However these children who wish to get admission by merit feel exam system is highly disappointing S_{23}, course materials unnecessary and irrelevant S_{24} and it is only testing memory S_{26} so all these nodes S_{23}, S_{24} and S_{26} come to on state.

4. Conclusion

After working with several on state of the nodes all the nodes are very strongly influencing the other nodes this show from the CBOFCMs all the factors equally play a role on the students depression, stress and anxiety.

One can not say one of the attributes has less influence than the other. In fact they exert exactly the same amount of influence on the students. Thus this model proves almost all the attributes defined in the section has more or less the same effect. This is established by working with the set experts of in case of both the CBOFCMs. Thus the all attributes have same amount of impact.

Further all the hidden patterns given by both the CBOFCMs are fixed points forcing us to conclude none of the factors take a cyclic turn they take the fixed solution. Finally all the nodes chosen by the experts are very intrinsically and strongly intertwined with each other.

Homework does not bother them so it is in the off state but S_{27} and S_{28} are in the on state as these children see their parents become debtors S_{28} that is why they want to win the seat by merit and they are bothered about the teachers acting as machines. Thus when students want to win the state which is a very true situation of the present day plus two students teachers and parents plight coupled with the government carelessness in the evaluation and course content offered to them.

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