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A STUDY ON IMPACT OF STRESS ON HUMAN LIFE AND THE MAJOR FACTOR OF STRESS USING COMBINED DISJOINT BLOCK FUZZY COGNITIVE MAPS (CDBFCM)

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ABSTRACT

Stress is the body's reaction to any change that requires an adjustment or response. Stress is a normal part of life. One can experience stress from environment,their body and thoughts.The main reason for stress is analyzed using Combined Disjoint Block Fuzzy Cognitive Maps (CDBFCM).This method is introduced by W.B. Vasantha Kandasamy and A.Victor Devadoss is analyzed in this paper. The Combined Disjoint Block FCM is defined in this method becomes effective when the number of concepts can be grouped and are large in numbers. In this paper we analyzed the problems and find out the major reasons for stress using neutrosophic tool. This paper has five sections. First section gives the information about the development of Fuzzy Cognitive Maps and about the causes of stress. Second section gives preliminaries of Fuzzy Cognitive Maps and Combined Disjoint Block Fuzzy Cognitive Maps.In section three, we explain the method of determining the method of determining the hidden pattern. In the fourth section, we give the concepts of problem. Final section gives the conclusion based on our study.

KEYWORDS: Combined disjoint Fuzzy Cognitive Maps,Stress.

INTRODUCTION

In 1965 L.A. Zadeh has introduced a mathematical model called Fuzzy Cognitive Maps. After a decade in the year 1976, Political scientist R.Axelord[6] used this Fuzzy model to study decision making in social and political systems. Then B.Kosko [1],[2],[3] enhanced the power of cognitive maps considering fuzzy values for the concepts of the cognitive maps and fuzzy degrees of interrelationships between concepts. FCMS can successfully represent knowledge and human experience,introduced concepts to represent the essential elements and the cause and effect relationships among the concepts to model the behaviour of any system. It is a very convenient simple and powerful tool,which is used in numerous fields such as social, economical,Medical etc. Stress, a common problem is one of the leading causes to effect human health. The purpose of study is to identify the risk groups. Stress is a normal part of life. One can experience stress From environment, their body and thoughts. Stress is the body's reaction to any change that requires an adjustment or response. The body reacts to these changes with physical,mental and emotional responses. In this paper, various factors for stress are discussed and finally the major factors are identified.

PRELIMINARIES

Fuzzy Cognitive Maps (FCMs) are more applicable when the data in the first place is an unsupervised one. The FCMs work on the opinion of experts. FCMs model the world as a collection of classes and casual relations between classes.

Definition

When the nodes of the FCM are fuzzy sets then they are called fuzzy nodes.

Definition

FCMs with edge weights or casualities from the set -1,0,1 are called simple FCMs.

Definition

An FCMs is a directed graph with concepts like policies,events etc, as nodes and casualities as edges. It represents casual relationships between concepts.

Definition

Consider the nodes/concepts C_1, C_2,…, C_n of the FCM. Sup-pose the directed graph is drawn using edge weight $e_{ij} \in \{-1, 0, 1\}$. The matrix E be defined by E = (e_{ij}) where e_{ij} is the weight of the directed

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edge C_iC_j. E is called the adjacency matrix of FCM, also known as the connection matrix of the FCM.
It is important to note that all matrices associated with an FCM are always square matrices with diagonal entries as zero.

Definition
Let $C_1, C_2, \dots, C_n$ *be the* be the nodes of an FCM. A= $(a_1, a_2, \dots, a_n)$ where
$e_{ij} \in \{-1, 0, 1\}$. A is called the instantaneous state vector and it denotes the on-off position of the node at an instant. $a_i = 0$ if a_i is off and $a_i = 1$ if a_i is on for i = 1, 2,…, n.

Definition
Let $C_1, C_2, \dots, C_n$ *be the* be the nodes of an FCM. Let $\overline{C_1C_2}, \overline{C_2C_3}, \overline{C_3C_4}, \dots, \overline{C_iC_j}$ be the edges of the FCM($i \neq j$). Then the edges form a directed cycle. An FCM is said to be cyclic if it possesses a directed cycle. An FCM is said to be acyclic if it does not possesses any directed cycle.

Definition
An FCM is said to be cyclic is said to have a feedback.

Definition
When there is a feedback in an FCM, , i.e, when the casual relations flow through a cycle in a revolutionary way, the FCM is called a dynamical system.

Definition
Let $\overline{C_1C_2}, \overline{C_2C_3}, \overline{C_3C_4}, \dots, \overline{C_{n-1}C_n}$ be a cycle. When C_i is switched on and if the casuality flows through the edges of a cycle and if it again causes C_i, we say that the dynamical system goes round and round. This is true for any node C_i for i = 1,2,…,n. The equilibrium state for this dynamical system is called the hidden pattern.

Definition
If the equilibrium state of a dynamical system is a unique state vector,then it is called a fixed point. Consider an FCM with $C_1, C_2, \dots, C_n$ as nodes. For example let us start the dynamical system by switching on C_1. Let us assume that the FCM settles down with C_1 *and* C_n *on* i.e., in the state vector remains as$(1,0,0, \dots 0)$*is* called fixed point.

Definition
If the FCM settles down with a state vector repeating in the form $A_1 \rightarrow A_2 \rightarrow \dots \rightarrow A_i \rightarrow A_1$ then this equilibrium is called a limit cycle.

Definition
Finite number of FCMs can be combined together to produce the point effect of all the FCMs. Let $E_1, E_2, \dots, E_p$ be the adjacency matrices of the FCMs with nodes $C_1, C_2, \dots, C_n$ then the combined FCM is got by adding all the adjacency matrices $E_1, E_2, \dots, E_p$. We denote the combined FCM adjacency matrix by E =$E_1 + E_2 + \cdots + E_p$.

Definition
Let $C_1, C_2, \dots, C_n$ be n distinct attributes of a problem n very large and a non prime. If we divide n in to k equal classes i.e., k/n = t which are disjoint and if we find the directed graph of each of these k classes of attributes with t attributes each, then their corresponding connection matrices are formed and these connection matrices are joined as bloks to form a n×n matrix. This n×n connection matrix forms the combined disjoint the large and a non prime. If we divide n into k equal classes i.e., k/n=t which are disjoint and if we find the directed graph of each of there k classes of attributes with t attributes each, then their corresponding connection matrices are formed and these connection matrices are joined as blocks to form a n x n matrix. This n x n connection matrix forms the combined disjoint block FCM of unequal classes/size.

Definition
Suppose A = $(a_1, a_2, \dots, a_n)$ is a vector which is passed in to a dynamical system E. Then AE = $(a_1', a_2', \dots, a_n')$ after thresholding and updating the vector suppose we get $(b_1, b_2, \dots, b_n)$, we denote that by
$(a_1', a_2', \dots, a_n') \urcorner (b_1, b_2, \dots, b_n)$.
Thus the symbol ⌝ means the resultant vector has been thresholded and updated.
FCMs have several advantages as well as some disadvantages. The main advantage of this method is simple.It functions on expert's opinion. When the data happens to be an unsupervised one the FCM becomes handy.This is the only known fuzzy technique that gives the hidden pattern of the situation. As we have a very well known theory, which states that the strength of the data depends on ,the number of experts opinions. At the same time the disadvantages of the combined FCM is when the weightages are 1 and -1 for the same C_iC_j , we have the sum adding to zero, thus at all times the

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connection matrices $E_1, E_2, \ldots, E_k$ may not be conformable for addition.
Combined conflicting opinions tend to cancel out and assisted by the strong law of large numbers, a consensus emerges as the sample opinion approximates the underlying population opinion. This problem will be easily overcome if the FCM entries are only 0 and 1.

METHOD OF DETERMINING THE HIDDEN PATTERN

Let $C_1, C_2, \ldots, C_n$ be the nodes of an FCM,with feedback. Let E be the associated adjacency matrix. Let us find the hidden pattern when C_1 is switched on. When an input is given as the vector A_1 = (1,0,….,0), the data should pass through the relation matrix E. This is done by multiplying A_1 by the matrix E. Let A_1E = $(a_1, a_2, \ldots, a_n)$ with the threshold operation that is by replacing a_i by 1 if $a_i \geq$ k and a_i by 0 if $a_i <$ k (k is a suitable positive integer). We update the resulting concept ; the concept C_1 is included in the updated vector by making the first coordinate as 1 in the resulting vector. Suppose A_1E ┐ A_2 then consider A_2E and repeat the same procedure. This procedure is repeated till we get a limit cycle or a fixed point.

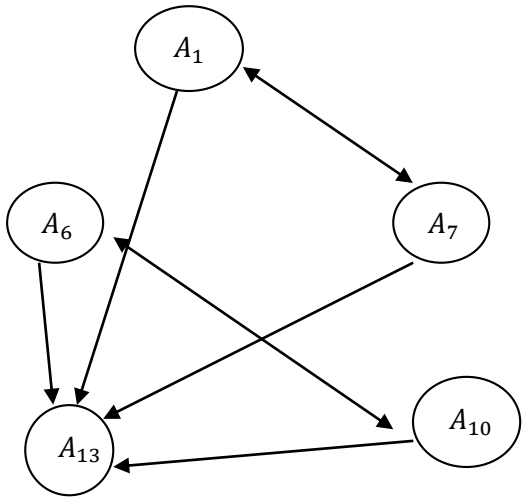
CONCEPTS OF THE PROBLEM

Using the linguistic questionnaire and the expert's opinion we have taken the following fifteen attributes $\{A_1, A_2, \ldots, A_{15}\}$.

A_1 – Working under dangerous conditions
A_2 - Divorce.
A_3 - Fear and uncertainity
A_4 - Un realistic expectations
A_5 – death of a loved one
A_6- Heavy work load
A_7 – Being insecure
A_8 – Attitudes and Perceptions
A_9- Loss of a job
A_{10}– Working long hours
A_{11} - Change
A_{12} - Chronic illness or Injury.
A_{13}- being un happy in job
A_{14}- Traumatic event
A_{15} – Emotional Problems
These 15 attributes are divided into 3 classes C_1, C_2, C_3 with 5 in each class.

Let $C_1 = \{A_1, A_6, A_7, A_{10}, A_{13}\}$
$C_2 = \{A_2, A_5, A_9, A_{12}, A_{15}\}$
$C_3 = \{A_3, A_4, A_8, A_{11}, A_{14}\}$

Now we take the expert opinion for each of these classes and take the matrix associated with the combined disjoint block FCMs. The experts opinion for the class
$C_1 = \{A_1, A_6, A_7, A_{10}, A_{13}\}$ is in the form of the directed graph.



According to this expert the attribute working under dangerous conditions is interrelated with being insecure.The attribute heavy work load is interrelated with working long hours. Also the attributes working under dangerous conditions, heavy work load, being insecure, working long hours are all the reasons for un happy in job which leads to stress. The related connection matrix M_1 is given below.

$$M_1 = \begin{bmatrix} 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

The directed graph is given by the expert on .The directed graph is given by the expert on $\{A_2, A_5, A_9, A_{12}, A_{15}\}$ which forms the class C_2

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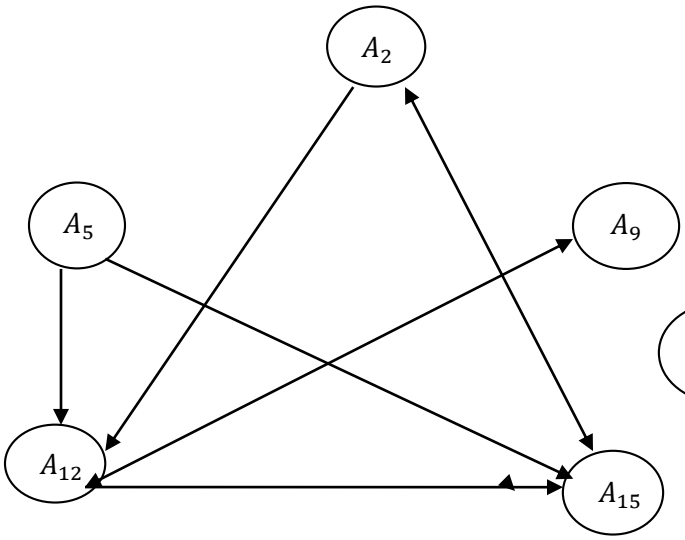
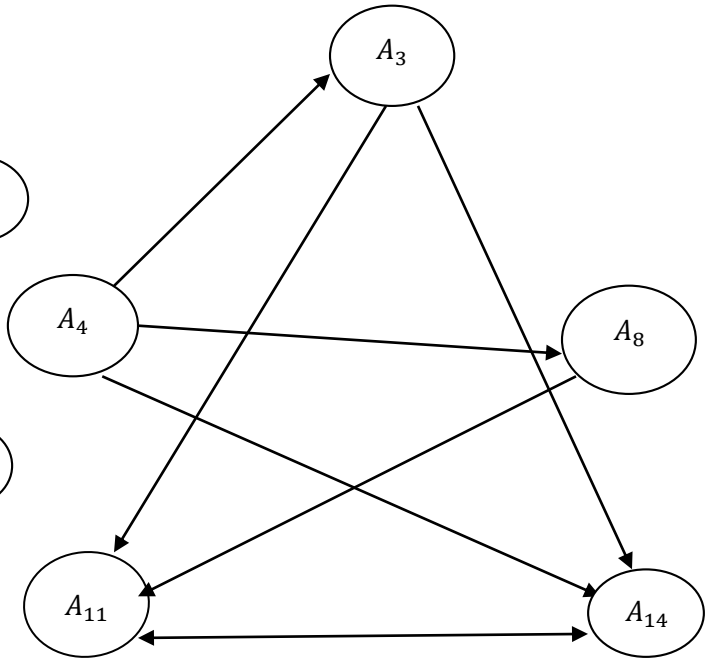


According to this expert the attribute loss of a job is interrelated with chronic illness or injury. Also the attribute loss of a job is interrelated with emotional problems. The attribute divorce is interrelated with emotional problems. The attribute divorce is related to chronic illness or injury. Also the attributes death of a loved one,chronic illness or injury leads to emotional problems which leads to stress.the attribute death of a loved one leads to chronic illness or injury.The related connection matrix is given below.

$$M_2 = \begin{bmatrix} 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 & 0 \end{bmatrix}$$

The directed graph is given by the expert on A_3 ,A_4 ,A_8 ,A_{11} ,A_{14} which forms the class C_3



According this expert the attribute change is interrelated with traumatic event. The attribute fear and uncertainity is related to change and traumatic event. The attribute un realistic expectations is related to attitudes and perceptions ,traumatic event ,fear and uncertainity. The attribute attitudes and perceptions is related to change.
The related connection matrix is given below

$$M_3 = \begin{bmatrix} 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 \end{bmatrix}$$

Now the combined disjoint block connection matrix of the fuzzy cognitive maps F is given by

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F =

$$\begin{bmatrix}
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 \\
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0
\end{bmatrix}$$

Suppose we consider the on state of the attributeworking under dangerous conditions and all other states are off the effect of

X=

(1 0 0 0 0 0 0 0 0 0 0 0 0 0 0)

on the CDBFCM is given by

XF ┐

(1 0 0 0 0 0 1 0 0 0 0 0 1 0 0)

= X_1 (say)

X_1 F ┐

(1 0 0 0 0 0 1 0 0 0 0 0 0 0 0)

= X_2 (say)

X_2 F ┐

(1 0 0 0 0 0 1 0 0 0 0 0 0 0 0)

= X_3 = X_2

X_1 is a fixed point of the dynamical system. When the state A_1 is on they felt insecurity in job which leads to stress. Suppose we consider the on state of the attributes fear and uncertainity,death of a loved one,heavy work load,attitudes and perceptions,working long hours,traumatic event,emotional problems and all other nodes are in off state. Now we study the effect of the dynamical system F. Let .

T=

(0 0 1 0 1 1 0 1 0 1 0 0 0 1 1))

be the state vector depicting the on state vector T in to the dynamical system F.

TF ┐(1 1 0 0 0 1 0 0 1 1 1 1 0 1 1)=T_1

T_1F ┐(1 1 0 0 0 1 1 0 0 1 1 0 1 1 1)=T_2(say)

T_2F ┐(1 1 0 0 0 1 1 0 1 1 1 1 1 1 1)=T_3(say)

T_3F ┐(1 1 0 0 0 1 1 0 0 1 1 0 1 1 1) = T_4(say) =T_2

Then T_2 is a fixed point of the dynamical system. Thus the attributes $A_3, A_5, A_6, A_8, A_{10}, A_{14}, A_{15}$ are in the on states,then the attributes Fear and ncertainity,Unrealistic expectations.death of a loved one,Attitudes and perceptions,Loss of a job and Chronic illness or injury is in the off state and all other attributes become on.

CONCLUSION

We analyzed what are the reasons for stress using CDBFCM model. The limit point of the dynamical system reveals that the attributes A_1,A_2,A_6,A_7,A_{10},A_{11},A_{13},A_{14},A_{15} are the main reasons for stress. This means , Working under dangerous conditions,Divorce,Heavy work load,Being insecure, Working long hours,change, Being unhappy in job, Traumatic event and Emotional problems are all the main reasons for stress.

REFERENCES

1. B.Kosko " Fuzzy Cognitive Maps", International Journal of man-machine studies,January(1968), 62-75.
2. B.Kosko, ``Hidden patterns in combined and Adaptive Knowledge Networks", Proc. Of the First IEE International conference on Neural Networks (ICNN-86(1988)377-393).
3. B.Kosko,``Neural Networks and fuzzy systems: A Dynamical System Approach to Machine Intelligence", Prentice Hall of India,1997.
4. George J.Klir/Bo Yuan,``Fuzzy sets and Fuzzy logic: Theory and applications", Prentice Hall of India.
5. H.J. Zimmermann, `` Fuzzy set theory and its applications", Fourth Edition Springer, 2011.
6. R.Axelord,"Structure of decision: The cognitive maps of political elites", Princeton,N.J: Princeton University Press, 1976
7. W.B.Vasantha Kandasamy and Smarandache Florentin, ``Analysis of social aspects of migrant labours living with HIV/AIDS using Fuzzy Theory and Neutrosophic Cognitive maps, Xi-quan, Phoenix(2004).
8. W.B.Vasantha Kandasamy and A.Victor Devadoss, ``Some New Fuzzy Techniques", Jour. Of.Math& comp. sci. (Math.Ser.), Vol.17, No.2 ,(2004), 157-160.