A STUDY ON THE ISSUES/PROBLEMS PERTAINING TO SINGLE PARENTS-USING FUZZY COGNITIVE BIMAPS (FCBMS) MODEL

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Abstract: The impact of Family Formation change on the cognitive social and emotional wellbeing of the next generation says Paul R. Amato. The percentages of children, who live with two parents, have been declining day by day among all racial and ethnic groups. A single parent is a parent with one or more children who is not living with any of the children's other parents. This paper analyses the impact of Issues/Problems pertaining to Single Parents using Fuzzy Cognitive Bimaps model .This paper consists of four sections. Section one is introductory in nature that deals withthe description of the title. Section two deals with the description of FCBM. Section three gives the study and analysis of the problem. Section four gives the conclusion and suggestion based on the study.

Keywords: FCBMs, Hidden pattern, fixed point.

Introduction: Issues/problems pertaining to the single parents are a universal one. Around 25% of the children below 18 years live in a lone parent family. And 90 % of lone parents are women. The issues pertaining to single parents are vague and uncertain. And the views about their problems too vary from region to region, time to time and age to age. It is said that the average age for a lone parent is 35. At any one time less than three parents of lone parents are teen aged. We have varying statistics from different parts of the world. In this paper, that contains four sections, we are attempting to study the issues pertaining to lone parents from Indian point of view, collecting data from 50 single parents of both the sexes, from Chennai 45 mothers and 5 fathers, Tamil Nadu.

Types of Single – Parent Families or Lone – Parent Families:

The single parent families or lone parent families can broadly be classified into the following five major categories :

1. Families where one of the parent lost his/her life due to natural or accidental death or by committing suicide.
2. Families where there was disagreement between the parents and live separately. On mutual agreement they amy be living alone or with another person. Or they have applied for divorce and mutually agreed for it and got legally separated or one has applied for divorce and the other not willing to agree to it as case is pending in the family court.
3. The husband deserted the wife along with one or more children.
4. The wife deserted the husband along with the child (ren)
5. The child is born to an unwed mother.

The Problems of Single Parent and the Children: Single parents all over the world are facing innumerable problems socially, economically, educationally, emotionally, etc. Health wise too they are affected due to over work, stress and trauma they face. Naturally it affects the normal growth and development of the children. The society look at the single mother always with suspicion. The child doesn't enjoy the equal status in the peer group. Due to single income the education of the child stops in the middle. The marriage of the girl born out of welock or living with the single parent in the absence of the father becomes a question mark. The problems faced by the single parents and the children from such families suffer a lot if the persons turn out to be a women/girl one can imagine the problems they encounter.

Fuzzy Cognitive Bimap(FCBM): 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 used this fuzzy model to study decision making in social and political systems. Then B. Kosko enhanced the power of cognitive maps considering fuzzy values for the concepts 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 behavior of any system. Here we construct a Fuzzy Cognitive Bimap. Fuzzy Cognitive Bimaps can function simultaneously as two FCM models each having a different sets of attributes and different experts. Thus if we have two FCMs given by two different experts with two different set of attributes on the same problem we can use the Fuzzy Cognitive Bimaps model i.e., if M_1 is the connection matrix of the FCM given by the expert on the problem p and M_2 is the connection matrix of the FCM given by another expert on the same problem p, both the experts using two different sets of attributes give the bimatrix $M=M_1UM_2$ which is the connection bimatrix of the Fuzzy Cognitive Bimaps (FCBM).

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 worlds as a collection of classes and causal relation between classes.

Definition 2.1.1: An FCM is a directed graph with concepts like policies, events etc as nodes and causalities as edges. It represents causal relationship between concepts.

Definition 2.1.2: When the nodes of the FCM are fuzzy sets then they are called as fuzzy nodes.

Definition 2.1.3: FCMs with edge weights or causalities

from the set {-1, 0, 1} are simple FCMs.

Definition 2.1.4: The edges e_{ij} take values in the fuzzy causal interval [-1,1]. $e_{ij} = 0$ indicates no causality,$e_{ij} > 0$ indicates causal increase C_j increases as C_i increases (Or C_j Decreases as C_i Decreases). $e_{ij} < 0$ indicates causal decrease or negative causality. C_j decreases as C_i increases (and or C_j increases as C_i decreases). Simple FCMs have edge values in {-1, 0, 1}. Then if causality occurs, it occurs to a maximal positive or negative degree. Simple FCMs provide a quick first approximation to an expert stand or printed causal knowledge. If increase (Or decrease) in one concept leads to increase (or decrease) in another, then we give the value 1.If there existsnorelation between the two concepts, the value 0 is given. If increase (or decrease) in one concept decreases (or increases) another, then we gives the value -1. Thus, FCMs are described in this way. Consider the nodes or concepts C_1, …,C_n of the FCM. Suppose the directed graph is drawn using edge weight $e_{ij} \in \{0, 1, -1\}$. The matrix E be defined by E= (e_{ij}), where the e_{ij} is the weight of the directed edge C_iC_j. E is called the adjacency matrix of the 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 2.1.5: Let C_1, C_2,….C_n be the nodes of an FCM. Let A=(a_1, a_2,…., a_n), where $a_i \in \{0,1\}$. A is called the instantaneous state vector and it denoted 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, where i = 1, 2, …, n.

Definition 2.1.6: Let C_1 , C_2 , …, C_n be the nodes of an FCM. Let $C_1 C_2$, $C_2 C_3$, …,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 possess any directed cycle.

Definition 2.1.7: An FCM with cycles is said to have a feedback.

Definition 2.1.8: Where there is a feedback in an FCM, i.e., When the causal relations flow through a cycle in a revolutionary way, The FCM is called a dynamical system.

Definition 2.1.9: Let $\overrightarrow{C_1C_2}$, $\overrightarrow{C_2}$ C_3,…,$\overrightarrow{C_iC_j}$, be a cycle when C_i is switched on and if the causality 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 2.1.10: If the equilibrium state of a dynamical system is a unique state vector, then it is called a fixed point. Consider a FCM with C_1, C_2, …,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. the state vector remains as (1, 0, 0,…, 0, 1) this state vector (1, 0, 0, …, 0, 1) is called the fixed point.

Definition 2.1.11: If the FCM settles down with a state vector repeating in the form $A_1 \rightarrow A_2 \rightarrow \dots A_I \rightarrow A_1$. Then this equilibrium is called limit cycle.

Definition 2.1.12: Fuzzy Cognitive bimaps (FCBMs) are fuzzy signed directed bigraphs with feedback. The directed edge e_{ij}^p from causal conceptc_i^p to conceptc_j^p measures how much c_i^pcauses c_j^p , (p = 1, 2). The time varying concept function c_i^p(t) measures the non-negative occurrence of some fuzzy event, perhaps the strength of a political statement, in medical analysis or so on. The edge valuese_{ij}^p takes values in the fuzzy causal interval [-1, 1],$e_{ij}^p = 0$ indicates no causality, $e_{ij}^p > 0$ indicates causal increase, c_j^pincreases as c_i^pincreases (orc_j^p decreases as c_i^pdecreases); $e_{ij}^p < 0$ indicates causal decrease or negative causality c_i^pdecreases as c_j^pincreases (and or c_i^pincreases or c_j^pdecreases) (p = 1, 2).

Simple FCBMs have edge values $e_{ij}^p \in \{-1, 0, 1\}$, (p = 1, 2).

Analysis of theimpact of media on youthusing Fuzzy Cognitive Bimaps(FCBMs)

By administering linguistic questionnaire to the two sets of experts

Expert's opinion from single female / Male parent

Expert's opinion from children affected by the cause

The main attributes taken from the *Expert's opinion from single female / Male parent* are given below

C_1 - Lack of sufficient income.

C_2 - Stressed due to excess work both in office and in the house.

C_3 - Stressed and traumatized when the society around look with suspicion on her fidelity.

C_4 - Unable to answer the queries raised by the child about father.

C_5 - Hard to cope up with sexual urge.

C_6 - Health problem due to over work & stress.

The main attributes taken from the *Expert's opinion from children affected by the cause*are given below

S_1- Children suffer emotional behaviour problems

S_2- Children become independent and hard working.

S_3- Children involved in decision making unlike the children of duel parents.

S_4- Children behave naughty / disobedient.

S_5- Mother is more strict unlike in normal families

S_6- Mother feels inferiority complex with regard to child care

S_7-Deserted father lives anin disciplined suicidal life.

The connection bimatrix $M=M_1UM_2$ and associated directed graph with this pair of attributes {C_1, C_2, C_3,… C_6} and{S_1, S_2, S_3,… S_7} are given below:

M_1=

	C_1	C_2	C_3	C_4	C_5	C_6
C_1	0	1	0	0	0	0
C_2	0	0	0	0	1	0
C_3	0	0	0	0	0	1
C_4	0	0	0	0	0	1
C_5	0	1	0	0	0	0
C_6	1	1	1	1	0	0

Fig 1: Relational Matrix M1

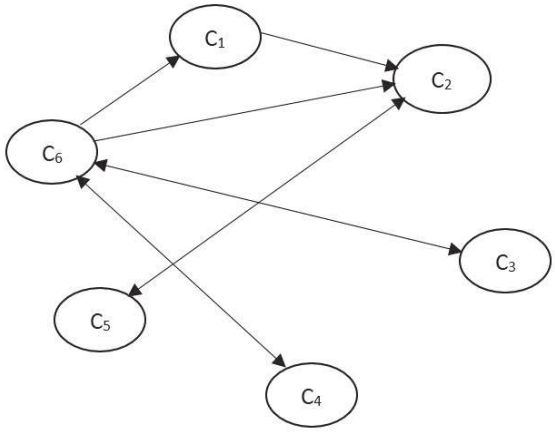

Fig 2: Relational Graph for Matrix M1

M_2=

	S_1	S_2	S_3	S_4	S_5	S_6	S_7
S_1	0	1	1	1	0	0	0
S_2	0	0	1	0	0	0	0
S_3	0	1	0	0	0	0	0
S_4	1	0	0	0	0	1	0
S_5	1	0	0	1	0	0	0
S_6	0	0	1	0	0	0	0
S_7	1	0	0	0	0	0	0

Fig 3: Relational Matrix M2

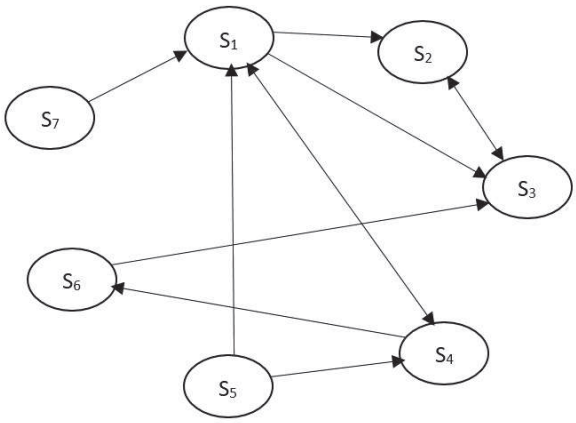

Fig 4: Relational Graph for Matrix M2

We work with the ON state of a bivector

1. $X = X_1 \cup X_2 = (000001) \cup (1000000)$ $XoM = (X_1 \circ M_1) \cup (X_2 \circ M_2)$
2. $\longrightarrow$ $(111101) \cup (1111000) = Y_1 \cup Y_2 = Y$
3. $YoM = (Y_1 \circ M_1) \cup (Y_2 \circ M_2)$
4. $\longrightarrow$ $(111111) \cup (1111010) = Z_1 \cup Z_2 = Z$
5. $ZoM = (Z_1 \circ M_1) \cup (Z_2 \circ M_2)$
6. $\longrightarrow$ $(111111) \cup (1111010) = Z_1 \cup Z_2 = Z$
7. This leads to the fixed bivector.
8. $X = X_1 \cup X_2 = (100000) \cup (0010000)$

$XoM = (X_1 \circ M_1) \cup (X2 \circ M_2)$

$\longrightarrow$ $(110000) \cup (0110000) = Y_1 \cup Y_2 = Y$

$YoM = (Y_1 \circ M_1) \cup (Y_2 \circ M_2)$

$\longrightarrow$ $(110011) \cup (0110000) = Z_1 \cup Y_2 = Z$

$ZoM = (Z_1 \circ M_1) \cup (Y_2 \circ M_2)$

$\longrightarrow$ $(111111) \cup (0110000) = W_1 \cup Y_2 = W$

$WoM = (W_1 \circ M_1) \cup (Y_2 \circ M_2)$

$\longrightarrow$ $(111111) \cup (0110000) = W_1 \cup Y_2 = W$

This leads to the fixed bivector.

Similarly the same procedure is carried over by keeping other nodes to be in on state and the result is obtained.

Conclusions: While analyzing using FCBM model

1. For the first case when the attributes C_6 and S_1 are in the on state, we obtained all the attributes given by the *Expert's opinion from single female / Male parent* i.e C_1, C_2, C_3, C_4, C_5 and C_6 reaching the on state. Whereas the attributes S_5 and S_7 reaching off state and rest other attributes i.e S_1, S_2, S_3, S_4 and S_6 given by the *Expert's opinion from children affected by the cause resulting in on state.*
2. For the second case when the attributes C_1 and S_3 are in the on state, we obtained all the attributes given by the *Expert's opinion from single female / Male parent* i.e C_1, C_2, C_3, C_4, C_5 and C_6 reaching the on state. Whereas the attributes S_2 and S_3 reaching on state and rest other attributes i.e S_1, S_4, S_5, S_6 and S_7 given by the *Expert's opinion from children affected by the cause resulting in off state.*

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