

AN ANALYSIS OF THE CAUSE AND EFFECT OF SINGLE PARENTHOOD IN PARENTING THEIR CHILDREN USING COMBINED INDUCED FCM AND EXTENDED FUZZY CLUSTERING MODEL

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Abstract

The main objective of this paper is to propose a new fuzzy model called Combined Induced FCM and Extended

Fuzzy Clustering model which is the extension of the fuzzy model called Induced FCM and Extended Fuzzy Clustering. The fuzzy models and their applications in the analysis of the real world problems yield incredible results. They are an effective tool in the decision making process for any uncertain environment. The newly proposed fuzzy model first works on the multiple expert's opinion using combined FCM and then the algorithm of extended fuzzy clustering model is implemented in order to categorize the attributes taken for the analysis into three range of clusters and to obtain the dominant among them. One such real life problem like the cause and effect of single parenting in parenting their children is taken for study. The situation in which a child or children brought up by only one parent is defined as single parenthood. The reasons for such single parenthood varied from one family to the other. The situation is uncertain in nature. The attitude of single parents in bringing up their children varied from one individual to the other. The behaviour of the children brought by the single parent also varied from one family to the other. Most children are severely affected due to single parenthood. The emotional, social and education development of those children are severely affected compared to the children who are brought up by dual parents. The need of analyzing such a real world problem in this modern technology is very much essential. Fuzzy models are best suited to analyze such a vague situation. This paper consists of four sections. Section one is introductory in nature. Section two gives the hidden pattern of Combined Induced FCM and Extended Fuzzy Clustering model. Section three analyses the problem using the proposed fuzzy model. Section four gives the conclusion and discussion of the problem based on the result obtained.

AMS Subject Classification:

Key Words and Phrases: component; formatting; Induced FCM, Combined Induced FCM, Fuzzy Clustering, Extended Fuzzy Clustering, Single Parenting.

1 Introduction

In this modern era, where every individual in the family needs to work and earn to meet the ever increasing consumer attitude, there is hardly any time left to build the required family relations and members of the family. We find frequent quarrels and fight among members of the family leading to divorce, separation and suicide. In this paper, we use fuzzy models to highlight the dominant issues faced by single parents in bringing up the children. The issue of divorce between husband and wife and the consequent problem of parenting is a confused one. Hence fuzzy models are highly suitable in studying such an issue. [1], [7]

2 Method of Hidden Patern

2.1 Induced Fuzzy Cognitive Maps (IFCM)

The hidden pattern of Induced FCM has the basis and an improvement of FCM model. The algorithm of IFCM is slightly changed from that of FCM model to obtain the optimal solution of the problem.

Step1: The unsupervised data collected from expert's as attributes for the analysis are considered as the nodes

Step2: Based on the opinion of the experts directed graph is drawn

Step3: Based on the directed graph, the association matrix is constructed

Step4: The instantaneous state vector is passed on to the association matrix to obtain the resultant vector

Step5: The resultant vector is then threshold and updated

Step6: The resultant vector is passed on to the same association matrix to obtain n number of resultant vectors

Step7: Among the n number of resultant vectors, the vector with maximum number of one's is considered as the final resultant vector and the process is repeated until the fixed point or limit cycle is reached.

Step8: The same procedure is repeated for n number of experts to obtain the collective response of the problem taken for analysis [3]

2.2 Hidden pattern to find Membership values for the Attributes

Step1: Based on 10- point rating scale, the mean value (x) is given for the attributes taken for the analysis

Step2: The range of clusters are made as Low, Moderate and High for the analysis

Step3: An element x is selected from the domain D

Step4: If x is less than end value 1 and greater than beginning value 2 then the x lies in between the clusters 1 and 2 with $\mu_k(x) = ev1 - x : x - bv2$, else x lies in cluster 1 only with $\mu_k(x) = 1$

Step5: If x is less than end value 2 and greater than beginning value 3 then the x lies in between the clusters 2 and 3 with $\mu_k(x) = ev2 - x : x - bv3$, else x lies in cluster 2 only with $\mu_k(x) = 1$

Step5: If x is greater than beginning value 3 then it lies exactly in cluster 3 only with $\mu_k(x) = 1$

Step6: The process is repeated for all x in the domain D . [2]

2.3 Algorithm to find a Membership values for the Attributes for the Extended Fuzzy Clustering Model

Step1: The membership value of each attribute in the range of clusters is obtained

Step2: If $\mu_k(x)$ in the cluster Low is less than or equal to the $\mu_k(x)$ in the cluster Moderate and then $\mu_k(x)$ in the cluster Moderate is less than or equal to the $\mu_k(x)$ in the cluster High then the $\mu_k(x)$ for that attribute is threshold and updated with 1 in the cluster High else $\mu_k(x)$ in the cluster Moderate is threshold and updated as 1

Step3: If $\mu_k(x)$ in the cluster Low is less than or equal to the $\mu_k(x)$ in the cluster Heighten the $\mu_k(x)$ for that attribute is threshold and updated with 1 in the cluster High else $\mu_k(x)$ in the cluster Low is threshold and updated as 1

Step4: The process is carried for all the obtained membership values in the range of clusters of the attributes [5]

3 INTRODUCTION AN ANALYSIS ON THE CHALLENGES ENCOUNTERED BY SINGLE PARENTSAND THEIR REFLECTION ON CHILDREN'S GROWTH USING COMBINED INDUCED FCM AND EXTENDED FCLM

Single parent of both genders were interviewed for their challenges faced to live their life in this society. They openly shared their thoughts and problems that they faced in bringing up their children in an acceptable way to this society. As the uncertainty lies in the qualitative behavior each individual stated varied problems. From the collective opinion of the data given by them, the following thirteen nodes were taken for the study. [6]

- N1* - Poverty
- N2* - Highly stressed due to the double task of working hard in the house as well as in the office
- N3* - Parents feel stressed and traumatized due to the suspicious look of the society around
- N4* - Unable to answer the queries of the growing child
- N5* - Difficult to contain the growing sexual urge
- N6* - Health hazards due to over work and stress
- N7* - Children turn out to be smart hard working realizing the difficulties of the single parent
- N8* - Children face untold emotional behaviour problems
- N9* - Children take independent decision and become assertive
- N10* - Children turn out to be unruly and disobedient.
- N11* - Parents turn out to be strict task master in parenting
- N12* - Parents suffer inferiority complex while performing the task of parenting
- N13* - Deserted father life turns out to be in disciplined leading to alcoholism and suicidal thought

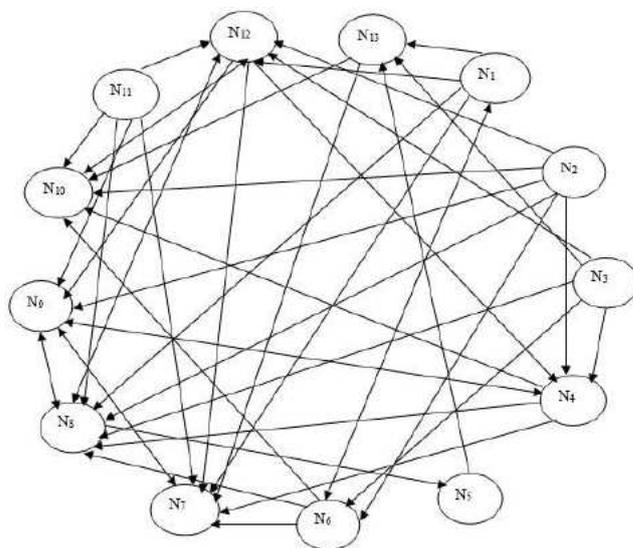


Figure 1: Directed graph of IFCM - Single Parent

	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃
N ₁	0	0	0	0	0	1	1	1	0	0	0	1	1
N ₂	0	0	0	1	0	1	0	1	1	1	0	1	0
N ₃	0	0	0	1	0	1	0	1	0	0	0	1	1
N ₄	0	0	0	0	0	0	1	1	1	1	0	0	0
N ₅	0	0	0	0	0	0	0	0	0	0	0	0	1
N ₆	1	0	0	0	0	0	1	1	0	1	0	0	0
N ₇	0	0	0	0	0	0	0	0	1	0	0	0	0
N ₈	0	0	0	0	1	0	0	0	1	0	0	1	0
N ₉	0	0	0	1	0	0	1	1	0	0	0	0	0
N ₁₀	0	0	0	0	0	0	0	0	0	0	0	1	0
N ₁₁	0	0	0	0	0	0	1	1	1	1	0	1	0
N ₁₂	0	0	0	1	0	0	1	1	1	1	0	0	0
N ₁₃	0	0	0	0	0	0	1	0	1	0	0	0	0

Figure 2: Association matrix of IFCM - Single Parent

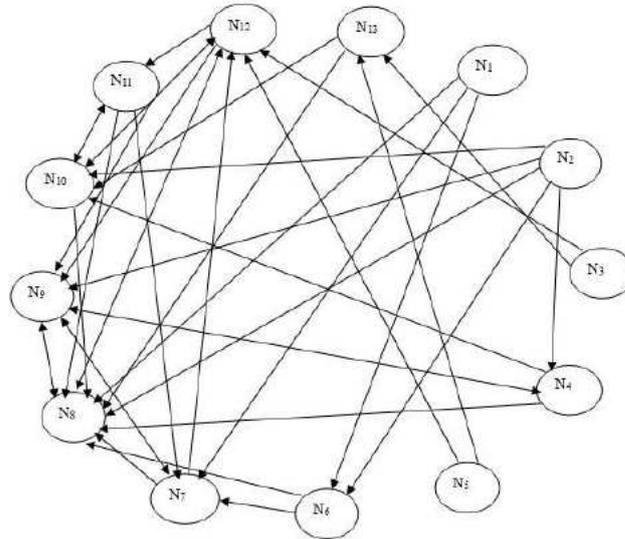


Figure 3: Directed graph of IFCM - NGO's

	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃
N ₁	0	0	0	0	0	1	1	1	0	0	0	0	0
N ₂	0	0	0	1	0	1	0	1	1	1	0	0	0
N ₃	0	0	0	0	0	0	0	0	0	0	0	1	1
N ₄	0	0	0	0	0	0	0	1	1	1	0	0	0
N ₅	0	0	0	0	0	0	0	0	0	0	0	1	1
N ₆	0	0	0	0	0	0	1	1	0	0	0	0	0
N ₇	0	0	0	0	0	0	0	1	1	0	0	1	0
N ₈	0	0	0	0	0	0	0	0	1	0	0	1	0
N ₉	0	0	0	1	0	0	1	1	0	0	0	0	0
N ₁₀	0	0	0	0	0	0	0	1	0	0	1	1	0
N ₁₁	0	0	0	0	0	0	1	1	1	1	0	0	0
N ₁₂	0	0	0	0	0	0	0	1	1	1	1	0	0
N ₁₃	0	0	0	0	0	0	0	1	0	1	0	0	0

Figure 4: Association matrix of IFCM - NGO's

	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃
N ₁	0	0	0	0	0	1	1	1	0	0	0	1	1
N ₂	0	0	0	1	0	1	0	1	1	1	0	1	0
N ₃	0	0	0	1	0	1	0	1	0	0	0	1	1
N ₄	0	0	0	0	0	0	1	1	1	1	0	0	1
N ₅	0	0	0	0	0	0	0	1	0	0	0	1	1
N ₆	1	0	0	0	0	0	1	1	0	1	0	0	0
N ₇	0	0	0	0	0	0	0	1	1	0	0	1	0
N ₈	0	0	0	0	1	0	0	0	1	0	0	1	1
N ₉	0	0	0	1	0	0	1	1	0	0	0	0	0
N ₁₀	0	0	0	0	0	0	0	1	0	0	1	1	0
N ₁₁	0	0	0	0	0	0	1	1	1	1	0	1	0
N ₁₂	0	0	0	1	0	1	1	1	1	1	1	0	0
N ₁₃	1	0	0	0	0	0	1	1	1	1	0	0	0

Figure 7: Association matrix of CIFCM

Process 1:

For the first node i.e. “Poverty” is kept in the on state and other nodes in off state.

Let $G_1 = (1000000000000)$

$G_1 E \downarrow (0000011100011) = G_1^1$

$G_1^1 E \infty (0000011100011) \times E$

$= (0000010000000) \times E \downarrow (1000001101000)$

$= (0000001000000) \times E \downarrow (0000000110010)$

$= (0000000100000) \times E \downarrow (0000100010011)$

$= (0000000000010) \times E \downarrow (0001011111100)$

$= (0000000000001) \times E \downarrow (1000001111000)$

Maximum number of 1's is G_2 (i.e) (0001011111100)

Consider $G_2 = (1001104643142)$

$G_2 E \downarrow (1001101111111) = G_2^1$

$G_2^1 E \infty (1001101111111) \times E$

$= (1000000000000) \times E \downarrow (0000011100011)$

$= (0001000000000) \times E \downarrow (0000001111001)$

$= (0000100000000) \times E \downarrow (0000000100011)$

$= (0000001000000) \times E \downarrow (0000000110010)$

$= (0000000100000) \times E \downarrow (0000100010011)$

$= (0000000010000) \times E \downarrow (0001001100000)$

$= (0000000001000) \times E \downarrow (0000000100110)$

$= (0000000000100) \times E \downarrow (0000001111010)$

$= (0000000000010) \times E \downarrow (0001011111100)$

$$= (0000000000001) \times E \downarrow (1000001111000)$$

Maximum number of 1's is G_3 (i.e) (0001011111100)

Thus $G_3 = G_2$

Therefore the fixed point is (0001011111100).

Process 2:

Second node i.e. "Highly stressed due to the double task of working hard in the house as well as in the office" is kept in the on state and other nodes in off state.

Let $G_1 = (0100000000000)$

$$G_1 E \downarrow (0001010111010) = G_1^1$$

$$G_1^1 E \infty (0001010111010) \times E$$

$$= (0001000000000) \times E \downarrow (0000001111001)$$

$$= (0000010000000) \times E \downarrow (1000001101000)$$

$$= (0000000100000) \times E \downarrow (0000100010011)$$

$$= (0000000010000) \times E \downarrow (0001001100000)$$

$$= (0000000001000) \times E \downarrow (0000000100110)$$

$$= (0000000000010) \times E \downarrow (0001011111100)$$

Maximum number of 1's is G_2 (i.e) (0001011111100)

Consider $G_2 = (1001104643142)$

$$G_2 E \downarrow (1001101111111) = G_2^1$$

$$G_2^1 E \infty (1001101111111) \times E$$

$$= (1000000000000) \times E \downarrow (0000011100011)$$

$$= (0001000000000) \times E \downarrow (0000001111001)$$

$$= (0000100000000) \times E \downarrow (0000000100011)$$

$$= (0000001000000) \times E \downarrow (0000000110010)$$

$$= (0000000100000) \times E \downarrow (0000100010011)$$

$$= (0000000010000) \times E \downarrow (0001001100000)$$

$$= (0000000001000) \times E \downarrow (0000000100110)$$

$$= (0000000000010) \times E \downarrow (0000001111010)$$

$$= (0000000000001) \times E \downarrow (0001011111100)$$

$$= (0000000000000) \times E \downarrow (1000001111000)$$

Maximum number of 1's is G_3 (i.e) (0001011111100)

Thus $G_3 = G_2$

Therefore the fixed point is (0001011111100).

Process 3:

Sixth node i.e. "Health hazards due to over work and stress" is kept in the on state and other nodes in off state.

Let $G_1 = (0000010000000)$

$$G_1^1 E \downarrow (1000001101000) = G_1^1$$

$$\begin{aligned}
G_1^1 E &\infty (1000001101000) \times E \\
&= (1000000000000) \times E \downarrow (0000011100011) \\
&= (0000001000000) \times E \downarrow (0000000110010) \\
&= (0000000100000) \times E \downarrow (0000100010011) \\
&= (0000000001000) \times E \downarrow (0000000100110)
\end{aligned}$$

Maximum number of 1's is G_2 (i.e) (0000011100011)

Consider $G_2 = (0000011100011)$

$$G_2 E \downarrow (1001111111111) = G_2^1$$

$$\begin{aligned}
G_2^1 E &\infty (1001111111111) \times E \\
&= (1000000000000) \times E \downarrow (0000011100011) \\
&= (0001000000000) \times E \downarrow (0000001111001) \\
&= (0000100000000) \times E \downarrow (0000000100011) \\
&= (0000010000000) \times E \downarrow (1000001101000) \\
&= (0000001000000) \times E \downarrow (0000000110010) \\
&= (0000000100000) \times E \downarrow (0000100010011) \\
&= (0000000010000) \times E \downarrow (0001001100000) \\
&= (0000000001000) \times E \downarrow (0000000100110) \\
&= (0000000000100) \times E \downarrow (0000001111010) \\
&= (0000000000010) \times E \downarrow (0001011111100) \\
&= (0000000000001) \times E \downarrow (1000001111000)
\end{aligned}$$

Maximum number of 1's is G_3 (i.e) (0001011111100)

Consider $G_3 = (1001104643142)$

$$G_3 E \downarrow (1001101111111) = G_3^1$$

$$\begin{aligned}
G_3^1 E &\infty (1001101111111) \times E \\
&= (1000000000000) \times E \downarrow (0000011100011) \\
&= (0001000000000) \times E \downarrow (0000001111001) \\
&= (0000100000000) \times E \downarrow (0000000100011) \\
&= (0000001000000) \times E \downarrow (0000000110010) \\
&= (0000000100000) \times E \downarrow (0000100010011) \\
&= (0000000010000) \times E \downarrow (0001001100000) \\
&= (0000000001000) \times E \downarrow (0000000100110) \\
&= (0000000000100) \times E \downarrow (0000001111010) \\
&= (0000000000010) \times E \downarrow (0001011111100) \\
&= (0000000000001) \times E \downarrow (1000001111000)
\end{aligned}$$

Maximum number of 1's is G_4 (i.e) (0001011111100)

Thus $G_4 = G_3$

Therefore the fixed point is (0001011111100).

Similarly the process is carried for all the nodes kept as instantaneous state vector and ends with (0001011111100) as the fixed point at all times. i.e

- N_4 - Unable to answer the queries of the growing child
- N_6 - Health hazards due to over work and stress
- N_7 - Children turn out to be smart hard working realizing the difficulties of the single parent
- N_8 - Children face untold emotional behaviour problems
- N_9 - Children take independent decision and become assertive
- N_{10} - Children turn out to be unruly and disobedient.
- N_{11} - Parents turn out to be strict task master in parenting are the dominant causes that induces the cause and effect of single parenting towards the growth of the children using Combined Induced FCM model. [4]

The newly introduced model collect the dominant causes that affect the problem using Combined Induced FCM model and apply Extended Fuzzy Clustering algorithm in order to categorize the major causes into three range of clusters namely Low, Moderate and High.

Cluster 1 ranged between 1 and 5 with mid-value 3, Cluster 2 ranged between 4 and 8 with mid-value 6 and cluster 3 ranged between 6 and 10 with mid-value 8. The ranges are overlapped which the added advantage of fuzzy is clustering. The process is carried for 10-point rating scale. The obtained three major causes are to the respondents for their opinions. Also the ratings and Standard Deviation of the nodes are subjected to the algorithm of finding membership value of the attributes.

Table 1: 3-cluster range of level of dominant cause

	Cluster 1	Cluster 2	Cluster 3
Range	1.0-5.0	4.0-8.0	6.0-10
Mid Value	3	6	8.0
Classification	Low	Medium	High

Table 2: Degree of belongingness of the attributes - EFCLM

Attributes	Mean	Low	Moderate	High	↳	Low	Moderate	High
N_4	7.2	0	0.4	0.6	↳	0	0	1
N_6	4.6	0.4	0.6	0	↳	0	1	0
N_7	6.2	0	0.9	0.1	↳	0	1	0
N_8	9.3	0	0	1	↳	0	0	1
N_9	3.2	1	0	0	↳	1	0	0
N_{10}	4.2	0.8	0.2	0	↳	1	0	0
N_{11}	6.8	0	0.6	0.6	↳	0	1	0

Using the algorithm (2.A.) the membership value of the attributes N_4 , N_6 , N_7 , N_8 , N_9 , N_{10} and N_{11} are obtained in the three range clusters.

Attribute N_8 , "Children face untold emotional behavior problems" with 8.5 as mean value falls in the cluster High with the membership value as 1.

Attribute N_9 , "Children take independent decision and become assertive:, with mean value 3.2 falls in the cluster Low with mean value1

Attribute N_4 , N_7 and N_{11} "Unable to answer the queries of the growing child", "Children turn out to be smart hard working realizing the difficulties of the single parent" and "Parents turn out to be strict task master in parenting" with mean value 7.2, 6.2 and 6.8 falls in the cluster Moderate and High

(ie) Attribute N_4 , "Unable to answer the queries of the growing child" lies 40% in the cluster moderate and 60% in the cluster High.

Attribute N_7 , "Children turn out to be smart hard working realizing the difficulties of the single parent" lies 90% in the cluster Moderate and 10% in the cluster High

Attribute N_{11} , "Parents turn out to be strict task master in parenting" lies 60% in the cluster Moderate and 40% in the cluster High.

Attributes N_6 and N_{10} (ie) "Health hazards due to over work and stress" and "Children turn out to be unruly and disobedient" with mean value 4.6 and 4.2 falls in the cluster Low and Moderate.

(ie) Attributes N_6 “Health hazards due to over work and stress”, lies in 40% in the cluster Low and 60% in the cluster Moderate

Attributes N_{10} “Children turn out to be unruly and disobedient” lies in 80% in the cluster Low and 20% in the cluster Moderate.

Attribute N_{12} , “Parents suffer inferiority complex while performing the task of parenting” falls under both the clusters 1 and 2 with membership value 0.4 in cluster Low and 0.6 in cluster Moderate.

Attribute N_{13} , “Deserted father life turns out to be in disciplined leading to alcoholism and suicidal thought” falls in the cluster Low with the membership value as 1.

4 Conclusion

Though the attributes N_4 , N_6 , N_7 , N_8 , N_9 , N_{10} and N_{11} are obtained as the major cause that induces the problem through CIFCM. Extended Fuzzy clustering method is subjected so that the attributes are ranged into clusters i.e., Low, Moderate and High.

Using Extended Fuzzy clustering model it is obtained N_4 and N_8 (ie) “Unable to answer the queries of the growing child” and “Children face untold emotional behaviour problems” lie in the cluster High.

Attributes N_6 , N_7 and N_{11} (ie) “Health hazards due to over work and stress”, “Children turn out to be smart hard working realizing the difficulties of the single parent” and “Parents turn out to be strict task master in parenting” lies in the cluster Moderate. Attributes N_9 and N_{10} (ie) “Children take independent decision and become assertive” and “Children turn out to be unruly and disobedient.” lies in the cluster Low.

The study highlights the major problems that arise due to single parenting. It is important that the children are provided with good parenting especially during the early stage that is from conception till six years of age. Psychologists claims that the major portion of child’s growth takes place during that period. Hence it is important that all the family members viz., parents, grandparents, siblings and in-laws take collective concerted effort in keeping the family relation intact so that the child enjoys sound parenting for its harmonious growth and development.

Future Work

Analyzing the problem faced by the Single parent in Tamil Nadu regarding their living and bringing up their children in many other Fuzzy Models.

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