

Study of Problems Faced by Parents of Children with Disability Using Fuzzy Cognitive Maps Model

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(Acceptance Date 24th April, 2015)

Abstract

In this paper the stress and social stigma suffered by parents of disabled children are analysed using Fuzzy Cognitive Maps (FCMs) model. Such study is new for researchers have studied only the problems faced by disabled children using mathematical models. However study of the problems faced by those parents using fuzzy models is absent in literature. Here the study is carried out by a pilot survey of 50 odd parents who have been interviewed for this purpose.

Key words: Fuzzy Cognitive Maps (FCMs) model, Hidden Pattern, Fixed point, Directed graph and connection matrix.

1 Introduction

In this paper we mainly study the problems faced by the parents of disabled children in rural areas. For it is estimated that over 80% of the population of people with disability live in rural areas. Further these parents suffer from acute poverty and most of them are uneducated who do not know the power of education, added to all these is the social stigma they suffer for having a disabled child. Interviews with them clearly confirmed that they suffer more mental stress than their disabled children. The main reason attributed for this is that the family is looked upon as a cursed one so they are invariably ostracized by other neighbouring families and by relatives.

This sort of ostracisation coupled with poverty makes them live under constant stress.

This paper has four sections, first one is introductory in nature. Section two describes the nodes used in the analysis of the problem and justification for using the FCMs model. In section three the FCMs model is used in the study of the problem. The final section gives the conclusions based on the model as well as the observations got from the interview and the suggestions given by the experts.

For the functioning of the Fuzzy Cognitive Maps model and their applications to various social problems refer¹⁻⁴.

2 Description of the problem and justification for using the FCMs models :

In this section a brief description of each of the attributes used and justification for using the FCMs model is given. The study was made by a pilot survey of 50 parents in rural areas who had disabled children. The following attributes were taken after discussion with experts and after analyzing the interviews.

- P₁ Social Stigma. These families face a social stigma for the status of their child. In many a families they are ostracized.
- P₂ Economic Burden. Parents of these families feel the economic burden of bring them up, so in many a cases they do not send them to school. In case of poor and very poor they neglect the disabled child; in many a cases they are always clothed with old, torn and dirty clothes. They attribute all this to poverty and many openly said they are only life long liability on them. So they feel spending money on them is a sheer waste.
- P₃ Education denied to these children. Most parents in rural areas do not wish to spend money educating their children and on their conveyance and stationaries.
- P₄ Parents are under stress. Many of the parents of these disabled children clearly acknowledged that they are under stress for reasons best known to them.
- P₅ Children remain only inside their home. Most parents feel disgraced to bring the child outside their home for public functions for they fear the insults from others and the humiliation they face from public.

P₆ No support from the government. They being uneducated do not find the help they can get from the government for their child. They are ignorant about such help. They mainly hide the existence of their child for the fear of social stigma.

P₇ Large family and the family income is less.

P₈ Poor or no education in the family of these disabled children. They being ignorant suffer more of social stigma due to poverty and illiteracy.

P₉ Poverty is the one of the major reasons for the neglect of their disabled child by parents or caretakers.

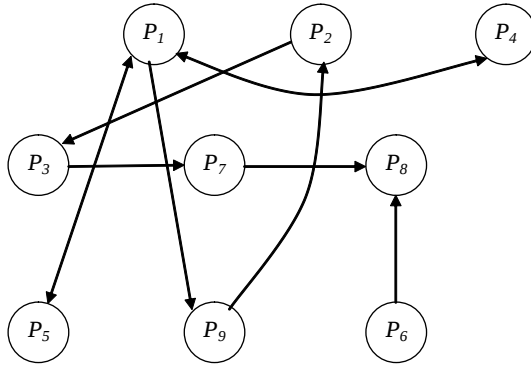
These were mainly given by all experts as well as majority of parents of these disabled children.

Further as all the nodes are packed with emotional and psychological feelings at the outset we are justified in using fuzzy models in general and FCMs models in particular. Further this model alone can give the hidden pattern of the problem as the data in hand is an unsupervised one.

3 Adoption of FCMs model to analyse the problem:

Using a expert who happens to be the parent of two disabled children has given his opinion on the problem. However we have taken several experts in this study which is given in the conclusions of this paper.

The directed graph given by the parent is as follows.



Let M be the connection matrix associated with the directed graph which forms the dynamical system of the FCMs model.

$$M = \begin{pmatrix} 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

The expert wishes first to work with the on state of the node P_1 alone using the dynamical system M .

Let $X = (1 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0)$ be the initial state vector in which only the node P_1 is in the on state and all other nodes are in the off state.

$$XM \rightarrow (1 \ 0 \ 0 \ 1 \ 1 \ 0 \ 0 \ 0 \ 1) = X_1 \text{ (say)}$$

($\rightarrow$ denotes the resultant vector has been

updated and thresholded)

$$X_1M \rightarrow (1 \ 1 \ 0 \ 1 \ 1 \ 0 \ 0 \ 0 \ 1) = X_2 \text{ (say)}$$

$$X_2M \rightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 0 \ 0 \ 0 \ 1) = X_3 \text{ (say)}$$

$$X_3M \rightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 0 \ 1 \ 0 \ 1) = X_4 \text{ (say)}$$

$$X_4M \rightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 0 \ 1 \ 1 \ 1) = X_5 \text{ (say)}$$

$$X_5M \rightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 0 \ 1 \ 1 \ 1) = X_6 (= X_5).$$

Thus the hidden pattern is a fixed point given by X_5 .

Hence when the node social stigma alone is in the on state all nodes comes to on state except the node P_6 , that is, “no support from the government”.

It is clear social stigma has nothing to do with no support from the government to the disabled children; however all the other nodes are so closely interrelated with social stigma.

Next the expert wishes to work with the node P_2 alone in the on state and all other nodes are in the off state.

Let $Y = (0 \ 1 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0)$ be the initial state vector in which only the node P_2 is in the on state; to find the effect of P_2 on the dynamical system, M .

We see what is the effect of the attribute economic burden alone in the on state.

$$YM \rightarrow (0 \ 1 \ 1 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0) = Y_1 \text{ (say)}$$

$$Y_1M \rightarrow (0 \ 1 \ 1 \ 0 \ 0 \ 0 \ 1 \ 0 \ 0) = Y_2 \text{ (say)}$$

$$Y_2M \rightarrow (0 \ 1 \ 1 \ 0 \ 0 \ 0 \ 1 \ 1 \ 0) = Y_3$$

$$Y_3M \rightarrow (0 \ 1 \ 1 \ 0 \ 0 \ 0 \ 1 \ 1 \ 0) = Y_4 (= Y_3).$$

Thus the hidden pattern of Y is a fixed point.

When the family feels it is the economic burden to have a disabled child then the nodes, P_3 , P_7 and P_8 alone come to on state and all other nodes remain in the off state, there by implying they do not educate (send them to school) their disabled children, the family size is large with poor income and they are themselves illiterates.

Next the expert works with the node P_6 alone in the on state; that is no government aid attribute alone is in the on state and all other nodes are in the off state. Let $Z = (0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0)$ be the initial state vector with the node P_6 alone in the on state^{5,6}.

To find the effect of Z on the dynamical system M .

$$ZM \rightarrow (0\ 0\ 0\ 0\ 0\ 1\ 0\ 1\ 0) = Z_1 \text{ (say)}$$

$$Z_1M \rightarrow (0\ 0\ 0\ 0\ 0\ 1\ 0\ 1\ 0) = Z_2 \text{ (say)}$$

$$Z_2M \rightarrow (0\ 0\ 0\ 0\ 0\ 1\ 0\ 1\ 0) = Z_3 (= Z_2).$$

Thus the hidden pattern is a fixed point. This node P_6 makes on only the node P_8 to on state and all other nodes remain in the off state.

That is no support from government clearly shows the family is not educated. Thus if they are educated certainly they could have found means to get the support of government.

Now we study the effect of $A = (0\ 0\ 0\ 0\ 0\ 0\ 0\ 1)$; that is only the node P_9 – poverty is in the on state and all other nodes are in the off state.

$$AM \rightarrow (0\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 1) = A_1 \text{ (say)}$$

$$A_1M \rightarrow (0\ 1\ 1\ 0\ 0\ 0\ 0\ 0\ 1) = A_2 \text{ (say)}$$

$$A_2M \rightarrow (0\ 1\ 1\ 0\ 0\ 0\ 1\ 0\ 1) = A_3 \text{ (say)}$$

$$A_3M \rightarrow (0\ 1\ 1\ 0\ 0\ 0\ 1\ 1\ 1) = A_4 \text{ (say)}$$

$$A_4M \rightarrow (0\ 1\ 1\ 0\ 0\ 0\ 1\ 1\ 1) = A_5 (= A_4)$$

Thus the hidden pattern is a fixed point.

The on state of poverty makes on the nodes on the nodes P_2 – Economic burden, P_3 – no education to these disabled children, P_7 – The large family and the family income is low and P_8 they are not educated comes to on state. Thus the conclusions were derived using several such experts opinions and is given in the following.

4 Conclusions

In this paper the following conclusions are made from the FCMs models as well as from the interviews:

1. Social Stigma is the root cause for all the problems faced by the parents of the disabled children.
2. Further these parents suffer more than their children.
3. The illiteracy status of the parents has made them give least importance to education. So most of the disabled children are either school dropouts or have never entered the school premises.
4. Government can empower the parents by giving some financial aid to them which in turn can help them to take better care of their disabled child.
5. Government should make TV shows to educate the public that disability is not a curse or a social stigma. Unless this is done these parents can not live in peace.
6. Government must introduce some plans to give employment to the disabled children who have denied education so that they can take care of themselves and be empowered. Some training classes for such employment should be given.

References

1. Kosko, B., Fuzzy Cognitive Maps, Int. J. of Man-Machine Studies, 24, 65-75 (1986).
2. Nidhi Singal, Education of children with disabilities in India, *A background paper for GMR 2010, Paper commissioned for the EFA Global Monitoring Report 2010, Reaching the marginalized, EFA Global Monitoring Report 2010* (2010).
3. Vasantha Kandasamy, W.B. and Smarandache, F., Fuzzy Cognitive Maps and Neutrosophic Cognitive Maps, Xiquan, Phoenix (2005).
4. Vasantha Kandasamy, W.B., Smarandache, F., and Praveen Prakash, A., *Mathematical Analysis of the problems faced by the People with Disabilities (PWDs) with specific Reference to Tamil Nadu*, Zip Publishing, Ohio (2012).
5. Vasantha Kandasamy W.B. and Smarandache, F., *Analysis of Social Aspects of Migrant Labourers Living with HIV/AIDS using Fuzzy Theory and Neutrosophic Cognitive Maps: With Specific Rerefence to Rural Tamilnadu in India*, Xiquan, Phoenix, USA (2004).
6. Nidhi Singal, Education of children with disabilities in India, *A background paper for GMR 2010, Paper commissioned for the EFA Global Monitoring Report 2010, Reaching the marginalized, EFA Global Monitoring Report 2010* (2010).