A STUDY ON PROBLEMS OF TRANSGENDER IN TAMIL NADU BY USING COMBINED FUZZY RELATIONAL MAPS (FRMS)

SARASWATHI.A, A.PRAVEENPRAKASH, MARY BINU ASHWINI

Abstract: In this paper we analyse the impact of various problems of Transgender in India using Fuzzy Relational Maps(FRMs) as well as the combined FRM constructed by W.B.Vasantha kandasamy and Yasmin Sultana. In day to day there are many trans-people facing problems in various ways. But their family and society don't take it seriously and don't take steps to seek solution to the problem. This FRM method is best suited for this study as the data we have is unsupervised one. This paper consists of five sections. First section is introductory in nature and narrates the major problems of the transgender. In section two we give the basics of FRM and combined FRM. In section three, we list the attributes relating to the domain and range space enlisting the causes and causalities relating to the problems of the transgender and their inter relationships are analyzed from the point of view of three expert opinion. Viz,(i) the transgender themselves (ii) their parents and (iii) the NGO involved in their rehabilitation. Hundred Transgender, fifty parents and two NGOs were interviewed using linguistic questionnaires to arrive at the three experts opinion. These inter relationships were analyzed using FRM model and finally Combined FRM is used to get their collective opinion.

Keywords: FRMs, CFRMs, Fixed point, Hidden pattern, Unsupervised data, Transgender.

Introduction: Transgender is an Umbrella term for persons whose gender identity and gender expressions or behaviours do not conform to that typically associated with the sex to which they were assigned at birth. Gender Identity refers to a persons internal sense of being male, female or something else. Gender expression refers to the way of person communicates gender identity to others through behavior, clothing, hair styles, voice or body characteristics etc.

Gender Identity or sexual Orientation. Transgender people may be straight, lesbian, gay, and bisexual, just as non Transgender people can be. There are many types of trans-people like Lesbian, Gay, Bisexual and Transgender.

Lesbian or gay woman: A transgender woman or a person who is assigned male at birth and transitions to female, who is attracted to other woman would be identified as lesbian or gay woman.

Gay man: A transgender man or a person who is assigned female at birth and transitions to male, who is attracted to other men would be identified as a gay man. Making fun of Transgender has always been a way of life since the evolution of human species. Transgender is a gender given to the world by the nature. And the recognition of such people by the government is still chaotic.

Every kid in the womb is initially a girl. It is over time and series of changes that the kid turns into a boy or remains a girl.

When these changes are incomplete, the kid becomes a transgender. Sometimes it is because of the hormonal change and the living environment that makes such changes. Transgender face a profusion of problems. Parents are the one who have to give moral support. But in this case they isolate their own kid. What in this world would be worst than being hated by one's own parents.

These Transgender are hardly educated. Most of them are pushed into sex work. And out of illiteracy they become vulnerable to deadly disease like HIV/AIDS. Those who leave no stones unturned are educated but when it comes to career, they are not considered. And the few who are employed are forced to have sex with their own peers.

Thus, in the long run they lose hope and self confidence and lead a life of stress and trauma. Their future remains a mystery. The government should take all possible steps to raise the standard of their lives. Those who are mentally affected should be given counseling. They need an identity and their need to be in time bound specific programmer to give them education, employment so that they live a happy life.

2. Basics of Fuzzy Relational Map (FRM) Model:

2.1 Fuzzy Relational Map (FRM): Initially the causal associations are divided into two disjoint units. To define a Fuzzy Relational Map these two disjoint units are taken as a domain space and a range space. Here the term disjoint we mean the sense of concepts which we have taken. Further it is assumed that no intermediate relations exist among the domain elements itself and within the elements of the range space. In general, the number of elements in the range space need not be equal to the number of elements in the domain space. In this discussion, the elements of the domain space are from the real vector space of dimension n and the range space is of dimension m. Here n need not be equal to m. The domain space and the range space are denoted by D

and R respectively. Thus $D = \{D_1, D_2, \ldots, D_n\}$ is the domain space, where each $D_i = \{(x_1, x_2, \ldots, x_n) \mid x_j = 0 \text{ or } 1\}$, for i = 1, …, n. Similarly $R = \{R_1, R_2, \ldots, R_m\}$ is the range space, where $R_j = \{(x_1, x_2, \ldots, x_m) \mid x_j = 0 \text{ or } 1\}$ for j=1, 2, …, m.

Definition: 2.1.1: A FRM is a directed graph or a map from Domain Space to Range Space with concepts like policies or events etc. as nodes and causalities as edges. It represents casual relations between spaces D and R.

Definition 2.1.2: The directed edge from D to R denotes the casuality of D on R, called relations. Every edge in the FRM is weighted with a number in the set {0, 1}.

Definition 2.1.3: Let Di and Rj denote the two nodes of an FRM. Let e_{ij} be the weight of the edge D_i Rj, $e_{ij} \in \{0,1\}$. The weight of the edge $D_i R_j$ is positive if increase in D_i implies increase in R_j or decrease in D_i implies decrease in R_j. i.e., casuality of D_i on R_j is 1. If e_{ij} =0 then D_i does not have any effect on R_j. We do not discuss the cases when increase in D_i implies decrease in R_j or decrease in D_i implies increase in R_j. When the nodes of the FRM are fuzzy sets, then they are called fuzzy nodes, FRMs with edge weights {0, 1} are called simple FRMs. Let D1, …,Dn be the nodes of the domain space D of an FRM and $R_1, \ldots, R_m$ be the nodes of the range space R of an FRM.

Definition 2.1.4: Let the matrix E be defined as $E = (e_{ij})$ where $e_{ij} \in \{0, 1\}$ is the weight of the directed edge D_iR_j(or R_jD_i), E is called the relational matrix of the FRM. It is appropriate to mention here that unlike the FCMs, the FRMs can be a rectangular matrix; with rows corresponding to the domain space and columns corresponding to the range space. This is one of the marked differences between FRMs and FCMs.

Definition 2.1.5: Let $D_1, \ldots, D_n$ and $R_1, \ldots, R_m$ be the nodes of an FRM. Let D_iR_j(or R_jD_i) be the edges of an FRM, j = 1, 2, …, m, i = 1, 2, …, n. The edges form a directed cycle if it possesses a directed cycle. An FRM is said to be acyclic if it does not possess any directed cycle.

Definition 2.1.6: An FRM with cycles is said to be an FRM with feedback. When the casual relations flow through a cycle in a revolutionary manner, the FRM is called a dynamical system.

Definition 2.1.7: Let D_iR_j(or R_jD_i), $1 \le j \le m$, $1 \le i \le n$. When R_j(or D_i) is switched on and if causality flows through edges of the cycle and if it again causes R_j(orD_i), we say that the dynamical system goes round and round. This is true for any node R_j(or D_j) for $1 \le i \le n$, (or $1 \le j \le m$). The equilibrium state of this dynamical system is called the hidden pattern. If the equilibrium state of the dynamical system is a unique state vector, then it is called a fixed point. Consider an FRM with $R_1 \ldots R_m$ and $D_1 \ldots D_n$ as nodes. For example let us start the dynamical system by switching on R_1or D_1. Let us assume that the FRM settles down with R_1 and R_m (or D_1 and D_n) on i.e. the state vector remains as (1 0 … 0 1) in R [or (1 0 … 0 1) in D], this state vector is called the fixed point. If the FRM settles down with a state vector repeating in the form $A_1 \rightarrow A_2 \rightarrow \ldots \rightarrow A_i \rightarrow A_1$or ($B_1 \rightarrow B_2 \ldots B_i \rightarrow B_1$) then this equilibrium is called a limit cycle.

2.1.8 Determination of Hidden pattern: Let $R_1, \ldots, R_m$ and $D_1, \ldots, D_n$ be the nodes of a FRM with feedback. Let E be the relational matrix. Find a hidden pattern when D_1 is switched ON, that is when an input is given as vector A_1 = (1 0 0 … 0) in D_1 the data should pass through the relational matrix E. This is obtained by multiplying A_1 with the relational matrix E. Let $A_1E = (r_1, \ldots, r_m)$. After thresholding and updating the resulting vector A_1E we get a vector B. Now we pass on B onto E^T to obtain BE^T. We update and threshold the vector BE^T so that the BE^T is equal to A_2. This procedure is repeated till we get a limit cycle or a fixed point.

3. Inter-relationship between the causes and causalities of problems of Transgender using CFRM model:

The following two disjoint spaces viz Domain space D and Range space R listing the causalities and causes for the problems of transgender respectively, were arrived at through linguistic questionnaire administered to the experts mentioned above:

Domain Space (Problems):

D1 – Poverty
D2 – No Education
D3 – No job
D4 – Forced to beg
D5 – No permanent shelter
D6 – Forced to sex work
D7 – Depression
D8 – Health Problem
D9 – No Relation
D10 – Hormones problem

Range Space (Reasons):

R1 – Ignorance and jobless
R2 – not allowed in decision making
R3 – Due to no money, no property
R4 - Loss of Identity
R5 - Marriage is Question mark
R6 – Pushed out from family
R7 – No legal rights, being sick always
R8 – Affected by HIV/AIDS and such other health issues.

3.1. The first expert opinion arrived through the responses from Transgender and the directed graph given below: The related matrix E1 of the directed graph is given by the following dynamical system **E1**

$$E_1 = \begin{bmatrix} 0&0&1&0&0&0&0&0 \\ 1&0&0&0&0&0&0&0 \\ 0&0&0&1&0&0&0&0 \\ 0&0&0&0&0&0&0&1 \\ 0&0&0&0&0&1&0&0 \\ 0&0&0&0&0&0&0&1 \\ 0&0&0&0&1&0&0&0 \\ 0&0&0&0&0&1&0&0 \\ 0&0&1&0&0&0&0&0 \\ 0&0&0&0&1&0&0&0 \end{bmatrix} \qquad E_1^T = \begin{bmatrix} 0&1&0&0&0&0&0&0&0&0 \\ 0&0&0&0&0&0&0&0&0&0 \\ 1&0&0&0&0&0&0&0&1&0 \\ 0&0&1&0&0&0&0&0&0&0 \\ 0&0&0&0&0&0&1&0&0&1 \\ 0&0&0&0&1&0&0&1&0&0 \\ 0&0&0&0&0&0&0&0&0&0 \\ 0&0&0&1&0&1&0&0&0&0 \end{bmatrix}$$

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ethod of finding the Hidden Pattern:

Let us consider the state vector A1where the node D5 " No permanent shelter " to be in the on state and the rest of the nodes are in the off-state.

Let A1 = (0 0 0 0 1 0 0 0 0 0)

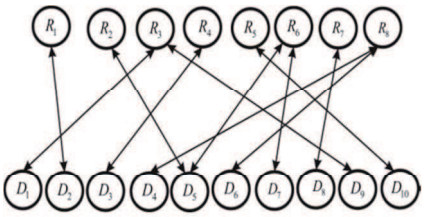
The effect of A1 on the dynamical system E1 is

A1E1= (0 0 0 0 0 1 0 0) = B1

Now B1 E_1^T =(0 0 0 0 1 0 0 1 0 0)= A2

Now A2E1 ⟶(0 0 0 0 0 1 0 0)= B1

When the node D5 is on state we get a fixed pair as {(0 0 0 0 1 0 0 1 0 0), (0 0 0 0 0 1 0 0)}



Graph of E_1

$$E_2 = \begin{bmatrix} 0&0&0&0&0&1&0&0 \\ 0&0&1&0&0&0&0&0 \\ 1&0&0&0&0&0&1&0 \\ 1&0&0&0&0&0&0&1 \\ 0&1&0&0&0&0&0&0 \\ 0&0&0&0&1&0&0&0 \\ 0&0&0&0&1&0&0&0 \\ 0&0&0&0&0&0&1&0 \\ 0&0&0&1&0&0&0&0 \\ 0&0&0&0&1&0&0&0 \end{bmatrix} \qquad E_2^T = \begin{bmatrix} 0&0&1&1&0&0&0&0&0&0 \\ 0&0&0&0&1&0&0&0&0&0 \\ 0&1&0&0&0&0&0&0&0&0 \\ 0&0&0&0&0&0&0&0&1&0 \\ 0&0&0&0&0&1&1&0&0&1 \\ 1&0&0&0&0&0&0&0&0&0 \\ 0&0&1&0&0&0&0&1&0&0 \\ 0&0&0&1&0&0&0&0&0&0 \end{bmatrix}$$

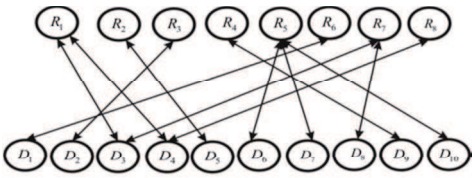
The related matrix E2 of the directed graph is given by

i.e., when D5 is 'on', then D8 and R6 in range space are in the on state .

"No permanent shelter" causes a life of 'nomad 'leading to unprotected sex and living in 'unhealthy circumstances leading to health hazard'. All these occur as the 'Transgender are pushed out of the family'

3.2 The second expert opinion was arrived at through the responses we received from the parents of the transgender.

The directed graph as per the second Expert's view is given below



Graph of E_2

Method of finding the Hidden Pattern:

Suppose A1= (0 0 0 0 1 0 0 0 0 0)

i.e., 'No permanent shelter ' is kept in the on state. Its effect on the directed matrix E2 is

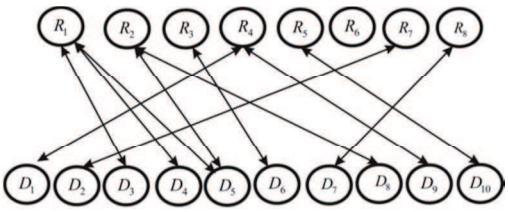
A1E2=(0 1 0 0 0 0 0 0)= B1

Now B1 E_1^T = (0 0 0 0 1 0 0 0 0 0)=A2

Now A2E2=(0 1 0 0 0 0 0 0)=B1

When the node D5 is in on state we get a fixed pair as {(0 0 0 0 1 0 0 0 0 0),(0 1 0 0 0 0 0 0)}

i.e., R2 is the on state in range s pace of the fixed pair.



Graph of E_3

The trans-genders are not allowed in decision making. Naturally when a person doesn't have a permanent shelter where does he stand in 'Decision Making'.

3.3 The third expert's opinion was the resultant of the responses we received from NGOs who are working for the rights and rehabilitation of the transgender.

The directed graph based on their view is given below

$$E_3 = \begin{bmatrix} 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{bmatrix}$$

The related matrix E3 of the directed graph is given by

$$E_3^T = \begin{bmatrix} 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{bmatrix}$$

Method of finding the Hidden Pattern:

Now the on state is D5 as earlier is in the on state i.e A1=(0 0 0 0 1 0 0 0 0 0)

The effect of A1 on the dynamical system E3is

A1E3= (0 1 0 0 0 0 0 0)=B1

Now B1 E_1^T = (0 0 0 0 1 0 0 1 0 0) = A2

A2E3 ⟶ (0 1 0 0 0 0 0 0)

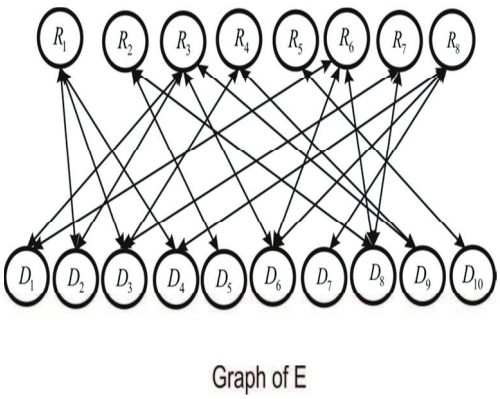
When D5 (No permanent shelter) in the Domain space is kept in ' on state', we note that D8(Health problem) in domain space R2(Not allowed in decision making) in range space come up to the 'on' state.

This is evident from the following pair (0 0 0 0 1 0 0 1 0 0), (0 1 0 0 0 0 0 0) . This result synchronizes with that of expert's view given by the First Expert.

Now proceed on to find the combined FRM: We take the opinion of the three expert's discussed above and find their collective opinions by combining them.

We draw the directed graph of all the three experts as given by

The sum of fuzzy relational matrices E1,E2 and E3 (E=E1+E2+E3)



Graph of E

$$E = \begin{bmatrix} 0 & 0 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 & 1 & 0 \\ 2 & 0 & 0 & 1 & 0 & 0 & 1 & 0 \\ 2 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 2 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 2 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 2 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 3 & 0 & 0 & 0 \end{bmatrix} \quad E^T = \begin{bmatrix} 0 & 1 & 2 & 2 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 2 & 0 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 2 & 0 & 0 & 3 \\ 1 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 0 & 0 \end{bmatrix}$$

Finding the Hidden Pattern:

Now as before consider the state vector

X1= (0 0 0 0 1 0 0 0 0 0), where D5is kept 'on' state

Therefore the effect of X1 on E is

X1E ⟶ (0 1 0 0 0 1 0 0) =Y1

Y1 ET ⟶(0 1 1 0 1 0 0 1 0 0) =X2

X2 E ⟶ (1 1 1 1 0 1 1 0) = Y2

Y2 ET ⟶(1 1 1 1 1 1 1 1 1 1) =X3

X3 E ⟶ (1 1 1 1 1 1 1 1) =Y3

Y3 ET ⟶(1 1 1 1 1 1 1 1 1 1) =X3

Look at the resultant hidden pattern of the state vector X1is a fixed point given by the pair { (1 1 1 1 1 1 1 1 1 1), (1 1 1 1 1 1 1 1) } This implies that when D5 (No permanent shelter) is kept in the on state, it leads to all the attributes of the both the domain and range space coming in 'on state'. It is natural that when a person do not have a permanent shelter to live along with his kith and kin, then it leads to all sorts of problems listed in the domain and range space as expressed by the respondents.

Conclusion: According to the First and third Expert's view, No permanent shelter (D5) relates to health problem (D8) and pushed out from family (R6). The second expert's view point highlighted that the person is not involved in the process of decision making (R2) when he doesn't have a house of his own (D5). The Combined FRM (CFRM) clearly brings out the point that when a person doesn't have a permanent shelter (D5), he is pushed to live with all possible problems conceived by persons concerned.

It is a known fact that in the case of any transgender as the person behaves against his/her accepted 'sex' at a particular age of growth, the strange behavior in them like wearing their sister's cloth in case of boy, wearing brother's shirt and pant in the case of a girl, were assumed to be a 'black mark' in the family. During such a transformation stage, to safe guard the prestige of the family, the parents and siblings treat them in such a way, the transgenders silently leave the house to freely express themselves the way they like by joining other trans people living a life of nomads unique to themselves. Having been pushed out from major life building institutions such as family , school, religious places etc, they live a life that fulfill their physical, social and emotional need. They are forced to beg, have sex for a pittance with whomsoever they happened to get falling a prey to the killer disease such as HIV/AIDS, STD etc...

Suggestions: For no fault of their own, trans people happened to be born as transgender and they have the right to life, education, health and a decent treatment in all walks of their life. Though they form a small proportion , may be less than one percent, they need to be given identity as Transgender, admitted in schools / colleges, given adult franchise, given job on priority basis and allowed to enjoy a life like any other normal person. Such awareness has been emerging in developed countries, such as US. The process of fulfilling their rights needs to be linked with allotting funds exclusively for their development. Time bound programmers should be farmed to include them in the field of health, education, shelter and employment. Only then they can live a life of happiness and contentment.

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Department of Mathematics, M.Tech, Department of CS
SRM University, Hindustan University, Sathyabhama University
Chennai- 603203,
saraswathigokul@yahoo.in,apraveenprakash@gmail.com,ambaswini91@gmail.com