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A Study on Problems of Hijras in West Bengal Based on Neutrosophic Cognitive Maps

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Abstract: This paper deals with the problems faced by Hijras in West Bengal in order to find its solutions using neutrosophic cognitive maps. Florentin Smarandache and Vasantha Kandasamy studied neutrosophic cognitive map which is an extension of fuzzy cognitive map by incorporating indeterminacy.Hijras is considered as neither man nor woman in biological point of view. They are in special gender identity (third gender) in Indian society. In their daily life, they have to face many of problems in social aspects. Some of the problems namely, absence of social security, education problem, bad habits, health problem, stigma and discrimination, access to information and service problem, violence, Hijra community issues, and sexual behavior problem are considered in this study. Based on the expert's opinion and the notion of indeterminacy, we formulate neutrosophic cognitive map. Then we studied the effect of two instantaneous state vectors separately on connection matrix E and neutrosophic adjacency matrix N(E).

Keywords: Fuzzy cognitive map, neutrosophic cognitive maps, indeterminacy, instantaneous state vector, Hijras

Introduction

The Hijra existence is deeply rooted in Indian culture. The great epic Ramayana references a third gender, neither male nor female, as individual whom Lord Rama blesses. Other Indian religious texts, including the Mahabharata, mention the additional examples of male deities adopting the female form and vice versa. It is important to notice that the ancient stories legitimize the Hijra existence and offer ample evidence of the profound spiritual connection with the Hijras. Ancient stories depicts that Hijras like to maintain their feminine identity. As a result, Hijras adhere to a strict, institutionalized code of conduct that defines the Hijra value system and way of life. Hijras are transgender male-to-female transitioned individuals. Their community does not include the individuals who change their sex from female to male or male to female.

The popular understanding of the Hijra as an alternative sex and gender is based on the model of the hermaphrodite, a person having both male and female sex organ.

The linguistic evidence suggests that Hijras are mainly thought of as more female than male. The word Hijra is a masculine noun, most widely translated into English as eunuch or hermaphrodite. Both these words reflect sexual impotence, which is understood in India to mean a physical defect impairing sexual function. It is widely believed in India that a man who has continued sexual relations in the receiver role will lose sexual vitality in his genitals and become impotent. It is sexual impotence (with women), then, and not sexual relations with men that defines the potential Hijra. Hijras identify themselves as incomplete men in the sense that they do not have desires for women that other men do. They attribute this lack of desire to a defective male sexual organ. Hijra role is defined biologically as a loss of virility, or as "man minus man". Thus, Indian emic sex and gender categories of Hijra collapse the tic categories of (born) hermaphrodites and eunuch. While ambiguous male genitalia serve as the most important culturally defined sign of the Hijra, in practical terms any indication of a loss of masculinity, whether impotence, effeminate behavior or desire for sexual relations with men in the receptor role, may be taken as a sign that one should join the Hijras.

Hijras are important part of our society. The central problem of a Hijra is the absence of social security. The other day to day problems are mental health, stigma and discrimination, access to information and services, violence, Hijra community issues, sexual behavior, and physical health problems. They are working under unsecured environment or work culture (short dance to take new born baby, clapping, biting dhol, collecting food, dresses forcefullyroo, etc. Sometimes they are seen in begging in train (local, passenger, express), begging in buses (local, express, long root). Some times they are seen snatching money bags or other things to protest the misbehavior of the passengers. They experience very inhumen situation in thier work place because of

misconception of the common people about the Hijras. On the other hand, Hijras are engaged in an old singing and dancing culture, acting, film producing, social activities etc.

Political scientist Robert Axelrod introduced the concept of cognitive maps (CMs) in 1976. He applied it in political science. Axelrod developed CMs, i.e. signed digraphs designed to capture the causal assertions of an individual with respect to a certain domain and then applied them in order to analyze the effects of alternatives, e.g. policies, business decisions, etc. upon certain goals. A cognitive map comprises of only two basic types of elements namely, nodes and edges. Nodes represent variable concepts and edges represent causal connections. In the field of cognitive maps, the concept of fuzzy set theory introduced by Zadeh was introduced by B. Kosko in 1986[3]. F. Smarandache and Vasantha Kandasamy [15] widely studied neutrosophic cognitive map (NCM) which is the extension of fuzzy cognitive map by incorporating indeterminacy. Chakrabarti and Pramanik [18] studied the problems of construction workers in West Bengal based on NCM. The concept of neutrosophic logic plays a vital role in several real life problems like law, information technology, stocks and share etc. Hijras' problem in West Bengal is one of the major problems in India. Nowadays, Hijras have to face many problems in their day to day life, although they are important part of our society. Some of the problems are discussed in the present study. The present study was done among 36 Hijras in West Bengal. Major problems of Hijras are absence of social security, mental health, stigma and discrimination, access to information and services, violence, regional issues, sexual behavior, and physical health problems. Rest of the paper is presented in the following way. Section II describes the preliminaries of NCM. Section III presents the method of finding hidden pattern. Section IV is devoted to present the modeling the problems of Hijras using NCM. Section V presents conclusions and future work.

Section II

Mathematical preliminaries:

Definition: 2.1 Neutrosophic graph: A Neutrosophic graph refers to a graph in which at least one edge is an indeterminacy denoted by dotted lines.

Definition: 2.2 Neutrosophic directed graph: A neutrosophic directed graph is a directed graph which has at least one edge to be indeterminacy.

Definition: 2.3 Neutrosophic oriented graph: A neutrosophic oriented graph refers to a neutrosophic directed graph having no symmetric pair of directed indeterminacy lines.

Definition: 2.4 Neutrosophic Cognitive Map (NCM): An NCM refers to a neutrosophic directed graph with concepts like policies, events etc. as nodes and causalities or indeterminate as edges. It reflects the causal relationship between concepts. Let us suppose that $C_1, C_2,\ldots, C_k$ represent k nodes. Also let each node be a neutrosophic vector from neutrosophic vector space V. So a node C_j,($j = 1, 2, \ldots, k$) can be represented by ($x_1, x_2, \ldots, x_k$) where x_i's are zero or one or I (I represents the indeterminacy) and $x_i = 1$ means that the node C_i is on state and $x_i = 0$ implies that the node is in the off state and $x_i = I$ means the node is an indeterminate state at that time or in that situation. Let C_m and C_n denote the two nodes of the NCM. The directed edge from C_m to C_n represents the causality of C_m on C_n called connections. Every edge in the NCM is weighted with a number in the set {-1, 0, 1, I}. Let α_{mn} denote the weight of the directed edge C_mC_n, $\alpha_{mn} \in \{-1, 0, 1, I\}$.

$\alpha_{mn}= 0$ if C_m does not have any effect on C_m,

$\alpha_{mn}= 1$ if increase (or decrease) in C_m causes increase (or decreases) in C_n, $\alpha_{mn}= -1$ if increase (or decrease) in C_m causes decrease (or increase) in C_n.

$\alpha_{mn}= I$ if the relation or effect of C_m on C_n is an indeterminate**.**

Definition: 2.5

NCMs with edge weight from the set {-1, 0, 1, I} are called simple NCMs.

Definition: 2.6

Let $C_1, C_2,\ldots, C_k$ be the nodes of a NCM. Let the neutrosophic matrix N(E) be defined as $N(E) =(\alpha_{mn})$, where α_{mn} is the weight of the directed edge C_mC_n, where $\alpha_{mn} \in \{-1, 0, 1, I\}$. N(E) is called the neutrosophic adjacency matrix of the NCM.

Definition: 2.7

Let $C_1, C_2, \ldots, C_k$ denote the nodes of the NCM. Let $A = (\alpha_1 ,..., \alpha_2 , \alpha_k)$, where $\alpha_m \in \{0, 1, I\}$. A is called the instantaneous state neutrosophic vector and it denotes the on – off – indeterminate state position of the node at an instant

$\alpha_m= 0$ if $\alpha_m$is off (no effect)

$\alpha_m= 1$ if $\alpha_m$is on (has effect

$\alpha_m= I$ if α_m is indeterminate (effect cannot be determined) for m = 1, 2,…, k.

Definition: 2.8

Let $C_1, C_2, \ldots, C_k$ be the nodes of the NCM. Let C_1C_2 , C_2C_3 , C_3C_4 , C_4C_5 , . . ., C_mC_n be the edges of the NCM. Then the edges constitute a directed cycle.

An NCM is said to be cyclic if it possesses a directed cyclic. An NCM is said to be acyclic if it does not possess any directed cycle.

Definition: 2.9

An NCM having cycles is said to have a feedback. When there exists a feedback in the NCM i.e. when the causal relations flow through a cycle in a revolutionary manner the NCM is termed a dynamical system.

Definition 2.10

Let C_1C_2, C_2C_3, $\overrightarrow{C_3C_4}$, $\overrightarrow{C_4C_5}$, . . ., $\overrightarrow{C_{k-1}C_k}$ be a cycle, when C_m is switched on and if the causality flows through the on and if the causality flows through the edges of a cycle and if it again causes C_m, then the dynamical system goes round and round. This is true for any node C_m, for m = 1, 2,…, k. The equilibrium state for this dynamical system is termed the hidden pattern.

Definition 2.11

If the equilibrium state of a dynamical system is a unique state vector, then it is called a fixed point. Consider the NCM with $C_1, C_2, \ldots, C_k$ as nodes.

For example, let us start the dynamical system by switching on C_1. Let us assume that the NCM settles down with C_1 and C_k on, i.e. the state vector remain as (1, 0,…, 1). This neutrosophic state vector (1, 0,…, 0, 1) is termed the fixed point.

Definition 2.12

If the NCM settles with a neutrosophic state vector repeating in the form:

$A_1 \rightarrow A_2 \rightarrow \ldots \rightarrow A_m \rightarrow A_1$, then this equilibrium is called a limit cycle of the NCM.

Section III

Determining the Hidden Pattern

Let $C_1, C_2, \ldots, C_k$ be the nodes of an NCM with feedback. Let us assume that E be the associated adjacency matrix. We find the hidden pattern when C_1 is switched on when an input is provided as the vector $A_1 = (1, 0, 0,\ldots, 0)$, the data should pass through the neutrosophic matrix N(E), this is performed by multiplying A_1 by the matrix N(E). Let $A_1N(E)$

$=(\alpha_1, \alpha_2 \ldots. \alpha_n)$ with the threshold operation that is by replacing α_m by 1 if $\alpha_m > p$ and α_m by 0 if $\alpha_m < p$ (p – a suitable positive integer) and α_m by 1 if α_m is not an integer. The resulting concept is updated; the concept C_1 is included in the updated vector by transforming the first coordinate as 1 in the resulting vector. Suppose $A_1N(E) \rightarrow A_2$, then consider $A_2N(E)$ and repeat the same procedure. The procedure is repeated till we get a limit cycle or a fixed point.

Section IV

Modeling of the problems of the Hijras in West Bengal using NCM

To assess the impact of problems faced by Hijras in the age group 14-45 years, data was collected from 36 Hijras in West Bengal. Based on linguistic questionnaire and the expert's opinion, we have considered the following concepts as $\{C_1, C_2, C_3, C_4, C_5, C_6, C_7, C_8, C_9,\}$. The following nodes are considered as the main nodes for the problem.

C_1- Absence of social security:

Hijras are in lack of employment support, poor access to government welfare schemes, problems in accessing BPL cards, ration cards and in opening bank accounts. Maximum Hijras are in low income level, low social status and low family bonding. Their process of earning money is very uncertain.

C_2-Education problem: Hijras belong to the third sex. In their school life they have to face much mental harassment from other companions. They have minimum social sympathy and empathy.

C_3-Bad habits: It includes smoking (bidi, cigarate etc), consumption of pan masala, gutka and addiction of drugs. They clap anywhere for their special identity. They demonstrate odd behaviors such as indicating their undeveloped sex organ in public place, rebuking, using slangy language and expressions in public place when they are provoked.

C_4- Health problem: There is a lack of health services availability as well as accessibility. Stigma against these communities forced them to remain invisible most of the time.

C_5- Stigma and discrimination: It is observed that Hijras have to face stigma and discrimination in all walks of lives. There is a need to generate more advocacy material on these issues. Most people in larger society have little or no knowledge about Hijras. This resulted in myths, unfounded fears and stigma against them.

C_6- Access to information and service problem: There is lack of information about human rights and issues like sexual and reproductive health. In West Bengal, there is no scope of government service for Hijras till now.

C_7- Violence: There are cases of sexual harassment of Hijras by state related stake holders. Institutional violence: They have to face violence everywhere. Hijras are often physically forced into having unsafe sex. Larger community leaders often take irrational decisions against them.

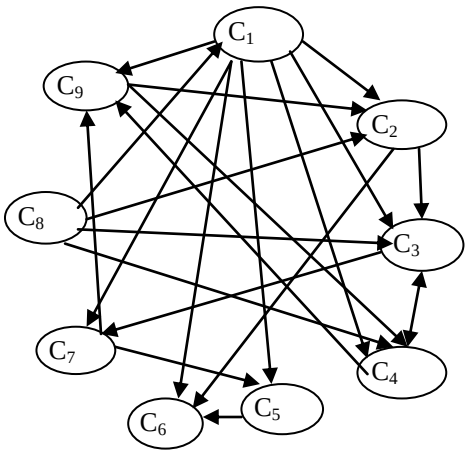
C_8- Hijra community issues: Hijras have closer knit community structures, but larger society is unaware about them. Hijra community leaders (Nayaks and Gurus) have total control over their communities. However, they do not necessarily possess information or the means for the development of their communities. The rigidity of their hierarchical community structure reflects that their Chelas (disciples or followers) could not question over their authority and suggest new ways of community development.

C_9- Sexual behavior problem: Hijras cannot enjoy normal sex life. Many women look like Hijras who spend their lives as sex workers. So there is a risk of HIV infection and vulnerability to HIV. Risk is based on

personal behavior, but vulnerability is related to the social environment in which one lives.

From NACO's point of view, targeted intervention programs focused on groups practicing high-risk sexual and other behaviors are the most important aspect. But in real life situation, everyone bear a unique and individual identity. These unique identities are closely related to a social position or situation for each person and each group of people. For Hijra sex workers, stigma and discrimination based on gender, sexuality and faith are part and parcel of their social situation, which increases their vulnerability to HIV. NACO has now acknowledged this situation. NACO is interested in observing how social inequities made each of these groups "differently vulnerable" to HIV. NACO also wants to make strategies in order to explore how these groups could be provided support in the form of safe spaces to combat the HIV epidemic. But pragmatic strategies can effectively made in order to deal the issues specific to Hijras if true picture of issues coming into light from the concerned Hijra community.

However more number of conceptual nodes can be added by the expert or investigator. Now we give the directed graph as well as neutrosophic directed graph in the following figures Fig.1 and Fig.2. Fig. 1 presents the directed graph with C_1, C_2,…,C_9 as nodes and Fig.2 presents the neutrosophic directed graph with the same nodes.



one way effect

two way effect

Fig. 1 Fuzzy cognitive map

The connection matrix E related to the graph in Fig.1 is given below:

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

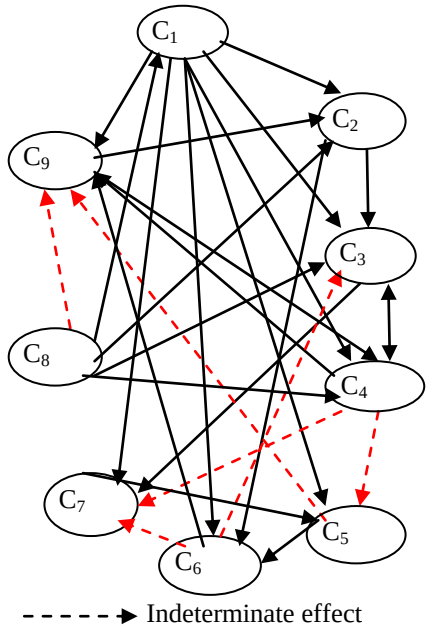


Fig. 2 Neutrosophicve map

The corresponding neutrosophic adjacency matrix N(E) related to the neutrosophic directed graph (see Fig.2) is given by the following matrix:

$$N(E)=\begin{bmatrix} 0 & 1 & 1 & 1 & 1 & 1 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & I & 0 & I & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & I \\ 0 & 0 & I & 0 & 0 & 0 & I & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & I \\ 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

Effect of two instantaneous state vectors separately on connection matrix E and Neutrosophic adjacency matrix N(E)

Case-I:

Suppose we take the instantaneous state vector A_1= (1 0 0 0 0 0 0 0 0)**,** the node "Absence of social security" is on state and all other nodes are off state.

At first, we study the effect of A_1 on E.

$A_1E=(0\ 1\ 1\ 1\ 1\ 1\ 1\ 0\ 1) \rightarrow (\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 0\ 1) = A_2$

$A_2E=(0\ 2\ 3\ 3\ 1\ 2\ 2\ 0\ 3) \rightarrow (1\ 1\ 1\ 1\ 1\ 1\ 1\ 0\ 1) = A_3 = A_2$

According to the expert's opinion, the node "Hijra community issues" have no effect on the Hijras in absence of social security and vice versa and all other nodes are on state.

Now we study the effect of A_1 on N(E).

$A_1N(E)=(0\ 1\ 1\ 1\ 1\ 1\ 1\ 0\ 1) \rightarrow$

$(1\ 1\ 1\ 1\ 1\ 1\ 1\ 0\ 1) = A_2$

$A_2N(E)=(0\ 2\ 3+I\ 3\ I+1\ 3\ 2+2I\ 0\ 3+I) \rightarrow$

$(1\ 1\ 1\ 1\ 1\ 1\ 1\ 0\ 1) = A_3 = A_2$

Thus according to the expert's opinion if C_1 is on state then the nodes C_2, C_3, C_4, C_5, C_6, C_7, C_9 are on state.

Case-II:

Again we take the state vector B_1

= (0 0 0 0 0 0 0 1 0), Hijra community issues (node) is on state and all other nodes are in off state. We will see the effect of B_1 on E and on N(E).

Now we find the effect of B_1=(0 0 0 0 0 0 0 1 0) on E.

$B_1E= (1\ 1\ 1\ 1\ 0\ 0\ 0\ 0\ 0) \rightarrow (1\ 1\ 1\ 1\ 0\ 0\ 0\ 1\ 0) = B_2$

$B_2E=(1\ 2\ 4\ 3\ 0\ 2\ 2\ 0\ 2) \rightarrow (1\ 1\ 1\ 1\ 0\ 1\ 1\ 1\ 1) = B_3$

$B_3E=(1\ 3\ 4\ 4\ 2\ 2\ 2\ 0\ 3) \rightarrow (1\ 1\ 1\ 1\ 0\ 1\ 1\ 1\ 1) = B_4$

$= B_3$

Thus when the node "Hijra community issuses" is on state we see, "Stigma and discrimination" have no effect on the Hijras and all other nodes are on state.

Now we find the effect of B_1=(0 0 0 0 0 0 0 1 0) On M(E).

$B_1M(E)=(1\ 1\ 1\ 1\ 0\ 0\ 0\ 0\ 0) \rightarrow (1\ 1\ 1\ 1\ 0\ 0\ 0\ 1\ 0) = B_2$

$B_2M(E)=(1\ 2\ 4\ 3\ 1+I\ 2\ 2+I\ 0\ 2+I) \rightarrow$

$(1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1) = B_3$

$B_3M(E)=(1\ 3\ 4+I\ 4\ 1+I\ 3\ 3+2I\ 0\ 3+2I\ ) \rightarrow$

$(1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1) = B_4 = B_3$

Therefore, when the node C_8 is on state then the nodes C_1, C_2, C_3, C_4, C_5, C_6, C_7, C_9 are on state. There is no nodes is on indeterminate state.

Conclusion

The problems of Hijras (Transgender) were studied based on NCM. It is noticed that if the Hijras (Transgender) are in social insecurity then they have to face educational problems and other factors like bad habits, health problem, access to information and service problem, violence, sexual behavior problems, stigma and discrimination.

Again, when regional issues increase or is on state, the following nodes namely, absence of social security, education problem, bad habits, health problem, access to information and service problem, stigma and discrimination, violence, sexual behavior problems will increase or are on states.

If new situation arises in the Hijras, new concepts need to be incorporated for modeling the problems of Hijras and that can be easily done by introducing new nodes.

Supreme Court of India recognizes Hijra (transgender) as 'third gender'(2014) [19]. However, government should implement the rights of Hijra (Transgender) and government should provide them education regarding their profession in order to avoid any unplesant and unexpected situations.

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