

## A Study on the Non –Awareness and Impact of Right to Information Act Among People in Tamil Nadu Region Using Neutrosophic Cognitive Maps (Ncms)

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### Abstract

*In this paper we analyzed the impact of Right to Information Act among public people using Neutrosophic Cognitive Map (NCM) which is the generalization of Fuzzy Cognitive Maps (FCMs). This paper has five sections. First section gives the information about the development of FCM and NCM. Second section gives the preliminaries of FCM's, NCM's and methods of determining the hidden pattern of NCM's. In section three, we give the description of the social issues regarding the non-awareness and impact of RTI. Section four gives adaption of NCM's to the problem and the final section gives the conclusion based on our study.*

**Index Terms:** Fuzzy Cognitive Maps, Neutrosophic Cognitive Maps, Right to Information Act.

### 1. Introduction

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 [1] used this fuzzy model to study decision making in social and political systems. Then B. Kosko [2,3,4] enhanced the power of cognitive maps considering fuzzy values for the concepts of the cognitive map 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. It is a very convenient simple and powerful tool, which is used in numerous fields such as social economical and medical etc. in this paper In this paper we use the Neutrosophic Cognitive Maps (NCMs) created by Florentine Smarandache [5,6] which is an extension / combination of the Fuzzy Cognitive Maps (FCMs) in which indeterminacy is included. It has also become very essential that the notion of Neutrosophic logic plays a vital role in several of the real world problems like law, medicine, industry, finance, IT, stocks and share etc.

### 2. 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 world as

a collection of classes and causal relations between classes.

#### 2.1 Definition:

A NCMs is a directed graph with concepts like policies, events etc, as nodes and causalities as edges. It represents causal relationship between concepts.

#### 2.2 Definition:

When the nodes of the NCM are fuzzy sets then they are called as fuzzy nodes.

#### 2.3 Definition:

NCMs with edge weights or causalities from the set  $\{-1, 0, 1, I\}$  are called simple NCMs

#### 2.4 Definition:

Let  $C_i$  and  $C_j$  denote the two nodes of the NCM. The directed edge from  $C_i$  to  $C_j$  denote the causality of  $C_i$  on  $C_j$  called connections. Every edge in the NCM is weighted with a number in the set  $\{-1, 0, 1, I\}$ . Let  $e_{ij}$  be the weight of the directed edge  $C_i C_j$ ,  $e_{ij} \in \{.1, 0, 1, I\}$ .  $e_{ij} = 0$  if  $C_i$  does not have any effect on  $C_j$ ,  $e_{ij} = 1$  if increase (or decrease) in  $C_i$  causes increase (or decreases) in  $C_j$ .  $e_{ij} = -1$  if increase (or decrease) in  $C_i$  causes decrease (or increase) in  $C_j$ .  $e_{ij} = I$  if the relation or effect of  $C_i$  on  $C_j$  is an indeterminate.

#### 2.5 Definition:

Let  $C_1, C_2, \dots, C_n$  be nodes of a NCM. Let the neutrosophic matrix  $N(E)$  be defined as  $N(E) = (e_{ij})$  where  $e_{ij}$  is the weight of the directed edge  $C_i C_j$ , where  $e_{ij} \in \{.1, 0, 1, I\}$ .  $N(E)$  is called the neutrosophic adjacency matrix of the NCM.

**2.6 Definition:**

Let  $C_1, C_2, \dots, C_n$  be the nodes of the NCM. Let  $A = \{a_1, a_2, \dots, a_n\}$ , where  $a_i \in \{0, 1, I\}$ .  $A$  is called the instantaneous state neutrosophic vector and it denotes the on-off -indeterminate state position of the node at an instant

$a_i = 0$  if  $a_i$  is off (no effect)

$a_i = 1$  if  $a_i$  is on (has effect)

$a_i = I$  if  $a_i$  is indeterminate (effect cannot be determined) for  $i = 1, 2, \dots, n$

**2.7 Definition:**

Let  $C_1, C_2, \dots, C_n$  be the nodes of the FCM. Let  $\overline{C_1 C_2}, \overline{C_2 C_3}, \dots, \overline{C_i C_j}$  be the edges of the NCM.

Then the edges form 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.

**2.8 Definition:**

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

**2.9 Definition:**

Let  $\overline{C_1 C_2}, \overline{C_2 C_3}, \dots, \overline{C_{n-1} C_n}$  be cycle, when  $C_i$  is switched on and if the causality flow 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  $i = 1, 2, \dots, n$  the equilibrium state for this dynamical system is called the hidden pattern.

**2.10 Definition:**

If the equilibrium state of a dynamical system is a unique state vector, then it is called a fixed point. Consider the NCM with  $C_1, C_2, \dots, C_9$  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  $C_n$  on, i.e. the state vector remain as  $(1, 0, \dots, 1)$  this neutrosophic state vector  $(1, 0, \dots, 0, 1)$  is called the fixed point.

**2.11 Definition:**

If the NCM settles with a neutrosophic state vector repeating in the form  $A_1 \rightarrow A_2 \rightarrow \dots \rightarrow A_i \rightarrow A_1$  then this equilibrium is called a limit cycle of the NCM.

**2.12 Definition:**

Finite number of NCMs can be combined together to produce the joint effect of all NCMs.

If  $N(E_1), N(E_2), \dots, N(E_p)$  be the neutrosophic adjacency matrices of a NCM with nodes  $C_1, C_2, \dots, C_n$  then the combined NCM is got by adding all the neutrosophic adjacency matrices  $N(E_1), N(E_2), \dots, N(E_p)$ . We denote the combined NCMs adjacency neutrosophic matrix by  $N(E) = N(E_1) + N(E_2) + \dots + N(E_p)$ .

**2.13 Method of Determining Hidden Pattern**

Let  $\{C_1, C_2, \dots, C_n\}$  be the nodes of an NCM, with feedback. Let  $E$  be the associated adjacency matrix. Let us find the hidden pattern when  $C_1$  is switched on when an input is given as the vector  $A_1 = (1, 0, 0, \dots, 0)$ , the data should pass through the neutrosophic matrix  $N(E)$ , this is done by multiplying  $A_1$  by the matrix  $N(E)$ . Let  $A_1 N(E) = \{a_1, a_2, \dots, a_3\}$  with the threshold operation that is by replacing  $a_i$  by 1 if  $a_i > k$  and  $a_i$  by 0 if  $a_i < k < (k - a$  suitable positive integer) and  $a_i$  by  $I$  if  $a_i$  is not a integer. We update the resulting concept, the concept  $C_1$  is included in the updated vector by making the first coordinate as 1 in the resulting vector. Suppose  $A_2 N(E) \rightarrow A_2$  then consider  $A_2 N(E)$  and repeat the same procedure. This procedure is repeated till we get a limit cycle or a fixed point.

**3. Description of the Problem**

The RTI Act specifies that citizens have a right to: request any information (as defined); take copies of documents; inspect documents, works and records; take certified samples of materials of work; and obtain information. Prior to the Act being passed by the Parliament, the RTI Laws were first successfully enacted by the state governments of Tamil Nadu in 1997. In this study how people are aware of this RTI has been discussed.

**3.1. Impact Factors**

An impact is anything that makes it more likely, you will get a particular social issue in our day to day life or in this society. But having one or more factors doesn't mean it's not benefited by the public – many people don't know what Right to Information Act is! Factors that are associated with the social issues of Right to Information Act include:

- **Lack of Awareness.**
- **Illiteracy.**
- **Not Effective actions/steps were taken.**
- **Public is not getting benefited.**
- **Social Responsibilities.**
- **Influence of Higher Authorities.**

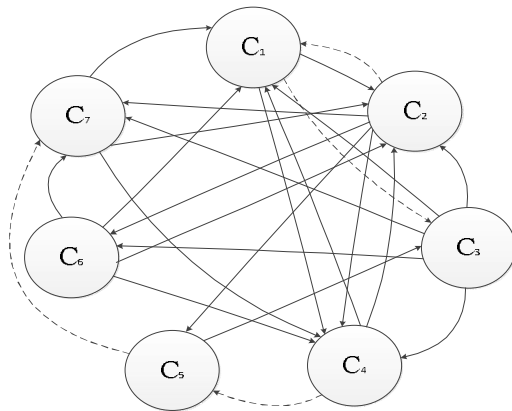
➤ **Corruption**

**4. Adaptation of NCM to the problem**

Using the survey and the experts opinion, We have taken the following seven concepts (factors) as  $\{C_1, C_2, C_3, C_4, C_5, C_6, C_7\}$ . The following factors are taken as the main nodes for our studies:

- $C_1$  – Lack of Awareness
- $C_2$  – Illiteracy
- $C_3$  – Not effective actions/steps was taken
- $C_4$  – Public is not getting benefited
- $C_5$  – Social Responsibilities
- $C_6$  – Influence of higher authorities
- $C_7$  – Corruption

Now based on the expert’s opinion also about the notion of indeterminacy we obtain the following neutrosophic directed graph:



The corresponding neutrosophic adjacency matrix  $M(E)$  related to the neutrosophic directed graph is given below

$$M(E) = \begin{matrix} & \begin{matrix} C_1 & C_2 & C_3 & C_4 & C_5 & C_6 & C_7 \end{matrix} \\ \begin{matrix} C_1 \\ C_2 \\ C_3 \\ C_4 \\ C_5 \\ C_6 \\ C_7 \end{matrix} & \begin{pmatrix} 0 & 1 & I & 1 & 0 & 0 & 0 \\ I & 0 & 0 & 1 & 1 & 1 & 1 \\ 1 & 1 & 0 & 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 0 & I & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & I \\ 1 & 1 & 0 & 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 1 & 0 & 0 & 0 \end{pmatrix} \end{matrix}$$

Suppose we consider the ON state of the attribute lack of awareness and all other states are OFF the effect of  $X = (1 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0)$  on the NCM is given by

$$XM(E) = (0 \ 1 \ I \ 1 \ 0 \ 0 \ 0) \Leftrightarrow (0 \ 1 \ 1 \ 1 \ 0 \ 0 \ 0) = X_1$$

$$X_1M(E) = (2I + 1 \ I + 1 \ 0 \ I + 1 \ I + 1 \ I + 1 \ I + 1) \Leftrightarrow (1 \ 1 \ 0 \ 1 \ 1 \ 1 \ 1) = X_2$$

$$X_2M(E) = (3 + I \ 4 \ I + 1 \ 4 \ I + 1 \ 1 \ I + 2) \Leftrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1) = X_3$$

$$X_3M(E) = (4 + I \ 5 \ I + 1 \ 5 \ I + 1 \ 2 \ 3 + I) \Leftrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1) = X_4 = X_3$$

( $X_3$  is a fixed point of the dynamical system). Thus when lack of awareness is ON stage, all factors are main causes for not-aware of RTI.

Suppose we consider, the ON state of the attributes lack of awareness, illiteracy and influence of higher authorities in the ON state and all other nodes are in the OFF state, the effect of  $Y = (1 \ 1 \ 0 \ 0 \ 0 \ 1 \ 0)$  on the NCM is given by

$$YM(E) = (I + 1 \ 2 \ I \ 3 \ 1 \ 1 \ 2) \Leftrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1) = Y_1$$

$$Y_1M(E) = (I + 4 \ 5 \ I + 1 \ 5 \ 2 \ 2 \ I + 3) \Leftrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1) = Y_2 = Y_1$$

( $Y_1$  is the fixed point of the dynamical system). Thus when lack of awareness, Illiteracy and Influence of higher authorities ON stage then all factors are main causes for not aware of RTI.

Suppose we consider, the ON state of the attributes Lack of awareness, Not effective, social responsibilities and influence of higher authorities in the ON state and all other nodes are in the OFF state, the effect of  $Z = (1 \ 0 \ 1 \ 0 \ 1 \ 1 \ 0)$  on the NCM is given by

$$ZM(E) = (2 \ 2 \ I + 1 \ 3 \ 0 \ 1 \ I + 2) \Leftrightarrow (1 \ 1 \ 1 \ 1 \ 0 \ 1 \ 1) = Z_1$$

$$Z_1M(E) = (I + 4 \ 5 \ I \ 5 \ 2 \ 2 \ 3) \Leftrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1) = Z_2$$

$$Z_2M(E) = (I + 4 \ 5 \ I + 1 \ 5 \ 2 \ 2 \ I + 3) \Leftrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1) = Z_3 = Z_2$$

( $Z_2$  is the fixed point of the dynamical system). When the attributes Lack of awareness, Not effective, social responsibilities and influence of higher authorities in the ON state, then all the factors are main causes for not aware of RTI.

**5. Conclusion**

While analyzing in NCMs, when lack of awareness is ON stage, all factors are main

causes for not aware of RTI. When lack of awareness, Illiteracy and Influence of higher authorities ON stage then all factors are main causes for not aware of RTI. When the attributes Lack of awareness, Not effective, social responsibilities and influence of higher authorities in the ON state, then all the factors are main causes for not aware of RTI.

## 6. References

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