

A Study on Gender Inequality in Education by Using Fuzzy Associative Memories

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Abstract: Education plays a major role for the development of human beings to recognize their rights in terms of social, political and economic growth of the country. More than one-third of women around the world who are illiterate are Indian women. Thus, the inequalities of women in education not only affects the women's lives but also on the economic developments of the country. This papers explores how Gender inequality in education affects the development of the society by using Fuzzy logic as it helps to study the uncertainties with the help of appropriate Fuzzy model. Here Section one deals with Introduction. Section two gives definitions of Fuzzy Associative Memories. Section three description of the problem is explained. Section four deals with the adaptation of the problem. Ultimately section five reveals the conclusion.

Keywords: Fuzzy Associative Memories, Gender inequality, Education.

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1. Introduction

Fuzzy set theory was introduced by L.A.Zadeh [1] in 1965 to deal vagueness and imprecise. In 1976 Axelrod [2] used cognitive maps to study decision making in social and political system. Fuzzy Associative Memories was pioneered by Bart Kosko in 1997 [5]. FAM gives gradation among the attributes. Researchers have developed FAM by introducing Adaptive FAM, Binary-input FAM, Adaptive IOFAM, Fuzzy hebb FAM, Recurrent FAM, Induced FAM [7] Recently Delphi adapted FAM, Level based Delphi adapted FAM, Linguistic Delphi adapted FAM and Triangular FAM have been introduced. Many Researchers have used FAM to study the impact of Pesticides on Agriculture labourers, impact of Climate change, evolutionary computation, to predict stock price index, inequality of widows, to analyze the feelings of HIV\AIDS women patients, to predict cement quality and effects of Globalisation in education. The aim of this paper is to bring out the causes of gender inequality in education in the society by using Fuzzy Associative Memories.

2. Definitions of the Fuzzy Associative Memories

Definition 2.1 ([5]). A fuzzy set is a map $\mu : X \rightarrow [0, 1]$, where X is an set called domain and $[0, 1]$ as range. For every element $x \in X$, μ assigns membership value in the interval $[0, 1]$. The geometry of fuzzy sets aids us to describe fuzziness.

Definition 2.2 ([5]). The n -dimensional unit hypercube is denoted as $I^n = [0, 1]^n = [0, 1] \times [0, 1]$. A fuzzy set defines a point in the cube I^n . Vertices of the cube I^n are non-fuzzy sets. The n -dimensional unit hyper cube In houses all the fuzzy subsets of the form $X = x_1, \dots, x_n$.

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Definition 2.3 ([5]). Fuzzy system defines mappings between cubes. Fuzzy system S maps fuzzy sets to fuzzy sets. That is, $S : I^n \rightarrow I^p$, where n and p are finite positive integers. The n -dimensional unit hypercube I^n consists of all the fuzzy subsets of the domain space $X = \{(x_1, \dots, x_n) | x_i \in R, i = 1, \dots, n\}$. Similarly I^p consists of all the fuzzy subsets of the range space $Y = \{(y_1, \dots, y_p) | y_i \in R, i = 1, \dots, p\}$. Hence X denotes a subset of R_n and Y denotes the subset of R_p . The system maps similar inputs to similar outputs. Thus the fuzzy system S maps balls of fuzzy sets in I^n to balls of fuzzy sets in I^p . These continuous fuzzy systems behave as an associative memory known as fuzzy associative memory. Thus fuzzy associative memories are transformations. Let A and B are represented by numerical fit vectors. Where $A = \{a_1, \dots, a_n\}$ and $B = \{b_1, \dots, b_p\}$, $a_i = \mu A(x_i)$ and $b_j = \mu B(y_j)$.

Definition 2.4 ([5]). The Fuzzy set association (A_i, B_i) is named as a “rule”. The antecedent term A_i and the consequent term B_i in the fuzzy set association (A_i, B_i) are known as input associant and output associant respectively. The FAM system maps points A_j near A_i to points B_j near B_i . If A_j is closer to A_i , then the point (A_j, B_j) is closer to (A_i, B_i) in the product space $I^n \times I^p$. In this sense FAMs map balls in I^n to balls in I^p . Using the rule between the antecedent A_i and consequent B_i , we get the connection matrix M . FAM gives the gradation among the causes as per the attributes chosen by the expert.

Definition 2.5 ([5]). If the equilibrium state of a dynamical system is a unique state vector, then it is called a fixed point.

Definition 2.6 ([5]). If the state vector repeats in the form of $A_1 \rightarrow A_2 \rightarrow A_3 \rightarrow A_1$ then this equilibrium is called limit cycle.

3. Description of the Problem

Education is the most important tool for empowering women in society as it not only improves the women’s personality but also develops them in economic, social and cultural development. Due to the practices of inequality they are still excluded from education in the society. If women is uneducated it increases high-level morality, low potential for earning, poor dietary status and little independence in the household. Cultural practices, family cost, early marriage, teenage pregnanices, ingnorange lack of parental support and socio cultural barriers are some of the factors responsible for gender inequality in education [3]. Census 2011 in India reveals the literacy rate of Male is 82.14% and female literacy rate is 65.46% [4]. According to United Nations Educational, Scientific and Cultural organisation(UNESCO) released the eAtlas of gender inequality in education (2016) reveals that Almost 16 millions girls between the ages 6 and 11 will never get chance to read or write , 1 out of 8 children between the ages 6 and 15 are denied to basic education and the girls are the first to be excluded, Globally 10% of all girls between the ages of 6 and 11 are denied to right to education compared to 8% of all boys and 757 millions adults and 115 million of youths cannot read or write . Two -Thirds of them are women [6]. In addition to it, the inequality of women in education brings a negative change for the development of the country.

4. Adaptation of the Problem

With the help of Experts opinion the data is collected from 250 women in Chennai by using unsupervised method. Attributes related to the cause of inequality of women in education

- (1). Male Dominance
- (2). Early marriage

- (3). Lack of Security
- (4). Ignore of parents
- (5). Social preference
- (6). Domestic works

Attributes related to the effects

- (1). Lack of economic growth
- (2). Poverty
- (3). Health
- (4). Low participation in Labour market
- (5). Violence against women
- (6). Lack of human rights

The expert's opinion is given in the form of relational matrix M

$$M = \begin{matrix} & \begin{matrix} E_1 & E_2 & E_3 & E_4 & E_5 & E_6 \end{matrix} \\ \begin{matrix} C_1 \\ C_2 \\ C_3 \\ C_4 \\ C_5 \\ C_6 \end{matrix} & \left[\begin{array}{cccccc} 0.7 & 0.3 & 0.4 & 0.7 & 0.6 & 0.8 \\ 0.6 & 0.5 & 0.8 & 0.6 & 0.5 & 0.8 \\ 0.8 & 0.2 & 0.6 & 0.7 & 0.6 & 0.3 \\ 0.7 & 0.6 & 0.9 & 0.6 & 0.5 & 0.6 \\ 0.9 & 0.6 & 0.4 & 0.5 & 0.8 & 0.5 \\ 0.6 & 0.8 & 0.5 & 0.7 & 0.6 & 0.5 \end{array} \right] \end{matrix}$$

An Attribute B (Early Marriage) is kept in ON state

$$B = (010000)$$

$$B.M = (0.6, 0.5, 0.8, 0.6, 0.5, 0.8)$$

$$\hookrightarrow (001001) = B'$$

$$B'.M^T = (1.3, 1.6, 0.9, 1.5, 0.9, 1.0)$$

$$\hookrightarrow (010000) = B_1$$

$$B_2.M = (0.6, 0.5, 0.8, 0.6, 0.5, 0.8)$$

$$\hookrightarrow (001001) = B''$$

$$B''.M^T = (1.3, 1.6, 0.9, 1.5, 0.9, 1.0)$$

$$\hookrightarrow (010000) = B_2$$

(001001)(010000) is the fixed point. The following table gives different limit points and triggering pattern for various input vectors

Input vectors	Limit point
(100000)	(000001),(110000)
(010000)	(001001),(010000)
(001000)	(100000),(000010)
(000100)	(001000),(000100)
(000010)	(100000),(000010)
(000001)	(010000),(000001)

5. Conclusion

By using Fuzzy Associative Memories , the causes such as Male Dominance, Early marriage, Lack of Security, Domestic works are in ON state and the effects includes Lack of economic growth, Poverty, low participation in Labour market, Violence against women, Lack of human rights are in ON state.

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