

# A Study On Facts, Causes And Consequences Of Divorce Using Fuzzy Cognitive Maps

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## Abstract

The objective of this paper is to find out the important factor causing divorce. The rise in divorce rates has become a key phenomenon underlying significant changes in family structure. The most common reasons people give for their divorce are infidelity, communication breakdown, physical-emotional-psychological abuse, marital financial issues, incompatibility, religious & cultural strains, addiction and differences in expectations & priorities. To study this problem, these eight important factors have been analyzed. Fuzzy Cognitive Map (FCM) is an effective method which analyses the data by directed graphs and connection matrices. Now we use this model to study the factors for divorce.

**Keywords:** factors for divorce, FCM, Infidelity

## 1.Introduction

This paper has four sections. In the first section, we discuss the methods of applications of FCM connection matrix. In section two, we describe the most common factors for divorce. The section three deals with the procedure to find out the most important factor for divorce by using FCM connection matrix. In final section, we derive conclusions and give suggestions based on our study.

At first, a political scientist Axelrod (1976) introduced cognitive maps for representing social scientific knowledge and describing the methods that are used for decision making in social and political systems. Then Kosko (1986, 1992) enhanced the power of cognitive maps considering fuzzy values for the concepts of the cognitive map and fuzzy degrees of interrelationships between concepts. After this pioneering work, Fuzzy Cognitive Maps attracted the attention of scientists from many fields and have been used in a variety of different scientific problems. For the first time in the year 1998 matrix theory was developed

by W.B.Vasantha and V.Indira to study the passenger transportation problem.

### 1.1 The method of application of FCM connection matrix

Fuzzy Cognitive Map (FCM) methodology is a symbolic representation for the description and modeling of complex system. Fuzzy Cognitive Maps describe different aspects in the behavior of a complex system in terms of concepts; each concept represents a state or a characteristic of the system and these concepts interact with each other showing the dynamics of the system. FCMs illustrate the whole system by a graph showing the cause and effect along concepts, and are a simple way to describe the system's model and behavior in a symbolic manner, exploiting the accumulated knowledge of the system. A Fuzzy Cognitive Map integrates the accumulated experience and knowledge on the operation of the system, as a result of the method by which it is constructed, i.e., using human experts that know the operation of

system and its behavior in different circumstances.

An FCM is a directed graph with concepts as nodes and causalities as edges. It represents causal relationship between concepts. When the nodes of the FCM are fuzzy sets then they are called as fuzzy nodes. FCMs with edge weights or causalities from the set  $\{-1, 0, 1\}$  are called simple FCMs. Let  $C_1, C_2, \dots, C_n$  be the nodes of an FCM. Suppose the directed graph is drawn using edge weight  $e_{ij} \in \{0, 1, -1\}$ . The matrix  $E$  is defined by  $E = (e_{ij})$  where  $e_{ij}$  is the weight of the directed edge  $C_i C_j$ .  $E$  is called the adjacency matrix of the FCM, also known as the connection matrix of the FCM. Let  $C_1 C_2, C_2 C_3, C_3 C_4, \dots, C_i C_j$  be the edges of the FCM ( $i \neq j$ ). Then the edges form a directed cycle. An FCM is said to be cyclic if it possesses a directed cycle. An FCM is said to be acyclic if it does not possess any directed cycle. An FCM with cycles is said to have a feedback.

If  $A = (a_1, a_2, \dots, a_n)$  where  $a_i \in \{0, 1\}$ , then  $A$  is called the instantaneous state vector and it denotes the on-off position of the node at an instant.  $a_i = 0$  if  $a_i$  is off and  $a_i = 1$  if  $a_i$  is on for  $i = 1, 2, \dots, n$ . If the FCM settles down with a 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.  $A = (a_1, \dots, a_n)$  is a vector which is passed into a dynamical system  $E$ . Then  $AE = (a'_1, \dots, a'_n)$  after thresholding and updating the vector suppose we get  $(b_1, \dots, b_n)$  we denote that by  $(a'_1, a'_2, \dots, a'_n) \rightarrow (b_1, b_2, \dots, b_n)$ . Thus the  $s \rightarrow |'$  means the resultant vector  $h_i \rightarrow n$  thresholded and updated. The edges  $e_{ij}$  take values in the fuzzy causal interval  $[-1, 1]$ .  $e_{ij} = 0$  indicates no causality,  $e_{ij} > 0$  indicates causal increase i.e.  $C_j$  increases as  $C_i$  increases (or  $C_j$  decreases as  $C_i$  decreases).  $e_{ij} < 0$  indicates causal decrease or negative causality i.e.  $C_j$  decreases as  $C_i$  increases (and/or  $C_j$  increases as  $C_i$  decreases). Simple FCMs have edge values in  $\{-1, 0, 1\}$ . Then if causality occurs, it occurs to a maximal positive or negative degree.

## 2. Most Common Factors of Divorce

Marriage is the very beautiful gift, which God has given to human beings. It gives pleasure, security, peace, and family. In life, there is happiness and worries, which men/women have to face and try to solve problems. The base of the family is made on the marriage; if the marriage is strong, the family

will be happy otherwise the whole family will suffer. In a marriage, compromise should be from both sides. Relation of husband and wife makes life beautiful and loveable, but unfortunately, most of the couples these days fail to understand its beauty and charm. They mostly quarrel with each other and create misunderstandings, and end of this can be in the separation or divorce.

Divorce is the final termination of a marriage, canceling the legal duties and responsibilities of marriage and dissolving the bonds of marriage between husband and wife. Divorce is one of the hardest things a family can go through. This has forced people to think that it is becoming a global trend. The family structure is disintegrating worldwide and spreading like an epidemic. All over the world, the divorce rate among couples is increasing at an alarming rate. Many studies and researches have come forward to discuss this social phenomenon. Most of these studies try to focus on the common causes of divorce.

For our study, we have interviewed 100 married couples in different ages. In the collected data, we mainly concentrate on the eight most common factors causing divorce, which are described below:

### (i) Infidelity

Mutual trust is the base of most of the relationships. Relationships do break up when either of the partners deceive to the other. Infidelity is the important reason for divorce. When partners become unfaithful to one another the relationship will end up and divorce become the solution to enjoy legal freedom.

### (ii) Communication Breakdown

Lack of communication creates lot of gaps among couples. Such gaps lead to lot of misunderstandings between them. Communication problem is not because they can't express their feelings to one another. The 'ego' stops them to be open up to one other. If they don't speak for a longer time that stops two ways communication, then there is a danger of ending their relationship.

### (iii) Physical, Emotional or Psychological Abuse

Any abuse brings lot of pain in all the relationships. Marriage is the bond which is completely made up of mutual dependencies and expectations. Physical abuse, including bullying, manhandling, or violence is quite



The corresponding FCM connection matrix is represented by E.

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

Consider the first node  $C_1 = 1$ . We hold or clamp  $C_1$  on the temporal associative memories recall process. Threshold signal functions synchronously update each concept after each pass, through the connection matrix E. We start with the infidelity

$A_1 = (1 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0)$ . The arrow indicates the threshold operation.

Now  $A_1 = (1 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0)$

$A_1 E = (0 \ 1 \ 0 \ 0 \ 1 \ 0 \ 0 \ 0)$   
 $\hookrightarrow (1 \ 1 \ 0 \ 0 \ 1 \ 0 \ 0 \ 0) = A_2$

$A_2 E = (1 \ 2 \ 2 \ 0 \ 2 \ 1 \ 0 \ 0)$   
 $\hookrightarrow (1 \ 1 \ 1 \ 0 \ 1 \ 1 \ 0 \ 0) = A_3$

$A_3 E = (1 \ 4 \ 3 \ 0 \ 4 \ 1 \ 0 \ 1)$   
 $\hookrightarrow (1 \ 1 \ 1 \ 0 \ 1 \ 1 \ 0 \ 1) = A_4$

$A_4 E = (1 \ 5 \ 4 \ 1 \ 5 \ 1 \ 0 \ 1)$   
 $\hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 0 \ 1) = A_5$

$A_5 E = (1 \ 6 \ 5 \ 1 \ 6 \ 1 \ 0 \ 2)$   
 $\hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 0 \ 1) = A_6$   
 $= A_5$

We observe that infidelity influences all other attributes except addiction, as  $(1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 0 \ 1)$  is a limit cycle.

## 4. Conclusion

In this section, we give the conclusions based on the above analysis and interviews.

From the above fuzzy matrix analysis, by making Infidelity state ON, we observe that all other states except addiction becomes ON in the limit cycle. So infidelity becomes the most important factor causing divorce.

When two people get married, they usually aren't thinking that the marriage will end in divorce. But then hard times arise and sometimes they find themselves thinking either casually or seriously about divorce. But most people haven't really thought carefully about their philosophy of divorce. The rate of divorce is higher among educated families, although such laws had been made which totally support women seeking divorce and the whole procedure has been made easier. Sometimes the situation becomes worse due to lack of compromise from both sides and egotistical attitude. Lack of tolerance and compromise among couples plays a vital role in increase in rate of divorce. Whatever the causes of divorce, its effects present the same issues all over the world. Divorce affects the society adversely. Living in an abandoned situation feels like crushed to ground at times. Children suffer from loneliness, deprivations, and heartaches. Living life without mother in the house or father figure in the family can cause serious problems in all ages of children but particularly in adolescence. The complete social system go all in vain, physical and psychological abuse, poor performance in academic life, drop out are few of the examples of negative effects of divorce.

To succeed in marriage, life partners need to take effort in developing the 7-C positive qualities - cherishing Compatibility, Complimenting & respecting each other, Cultivating patience, Communicating regularly, Caring & trusting each other, Contentment with selflessness, loving un-Conditionally. If the married couples possess all these 7-C qualities, they can overcome any issues in their life and can avoid the worst scenario of divorce.

*As with most good things, a long and satisfying marriage takes time and effort - on the part of both spouses. Your reward is happiness of the highest order.*

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