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A Study of Fuzzy analysis for people age problems

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Abstract - Fuzzy logic is a powerful tool that can be used to solve real-world problems where data isn't set and exact. It can be used as a very important platform for making decisions and other things that use artificial intelligence. A person can see how Fuzzy logic is used in a lot of different fields. Fuzzy logic principles play a big part because there are many levels of ambiguity and uncertainty when it comes to figuring out what a person is sick with. The best and most accurate way to classify disease entities is to use language words, which are often vague and imprecise. When a doctor has a lot of experience, he usually prefers to talk about it in terms that are more normal for him and for the patient than to try to put his knowledge into rigid rules that have simple premises, in general. Words like "severe pain," for example, are hard to write down and measure. Our research focuses on looking at how fuzzy models can help us solve problems for older people. People can use fuzzy logic principles to help them get estimates of what they know, which can then help them figure out what is going on. The goal of this study is to use fuzzy logic principles to look at teenagers' psychology in light of the Indian situation.Elders have to deal with things like financial uncertainty, depression, instability, physical weakness, social isolation, less strength, and more, to name a few. Abuse: The elderly are forced to do household chores and live in dungeon-like quarters by their daughters. Their land is taken over by their children, they are left alone, and they are forced to leave their homes and leave their land to their children. Rapid urbanisation and transition, the breakup of a traditional family structure, a high level of schooling, job changes, and the move of young people to cities and abroad, as well as a lack of housing space and a generational difference, are all reasons for people to not look after the old.

Keywords - Fuzzy Analysis, People Age Problems, fuzzy logic principles, young people

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INTRODUCTION

In a process model of adolescent risky decision making, we use fuzzy trace theory to combine behavioural and neuroscientific evidence. This model emphasises gist and verbatim thinking, reward sensitivity, and cognitive control, among other things. Gist thinking, which improves with age, helps people see danger and avoid taking risks that aren't healthy. Adolescents, who think verbatim and look at the expected value of risk, are more likely to take unhealthy risks when the reward is high. Signal in the nucleus acumens of the brain is linked to the size of the reward, which is more active in adolescents than in adults when reward tasks are over. During risky design, personality traits and motivational factors, such as reward sensitivity and cognitive control, work together with gist and verbatim mental processes to make the process more or less risky. Reward sensitivity increases the perceived size of a reward, which works with the verbatim calculation of approximate expected value to make people more willing to take risks. However, over time, gist-based thinking replaces magnitude-sensitive verbatim thinking, and gist helps to remind us of values that keep us from taking risks, which helps us keep our minds in check. Preformed cortex improves cognitive control by making it easier to choose from a range of options and to stop from making a decision. This is in line with fuzzy trace theory and other neurobiological models. People's brains change as they grow up, which is in line with fuzzy trace theory: "Less is more" is an anatomical theme that shows how grey matter is cut down during adolescence. This theme is also found in fuzzy trace theory, which sums up behavioural findings. There is less and more high-quality information adolescents process as they get older, which is reflected in their brains becoming more efficient and connected.

Those who study decision making have been interested in risk taking for a long time. This is one of the most well-known topics in neuroscience (see, e.g., Jacobs &Klaczynski, 2005; Vartanian, Mandel & Duncan, 2011). The typical risk-taker is an adolescent, which has led to a lot of research on the adolescent brain. Even though some adults enjoy taking risks, adolescents and young adults are at their highest risk-taking point in their lives. This includes things like binge drinking, reckless driving, or violent crime (Reyna & Rivers, 2008). Adolescents also start to do things like smoke that are bad for their health and death later in life. The adolescent brain shows interesting paradoxes with a socially significant squeal. It's old enough to know better in principle, but too young to use judgement or self-control. Many of the process models that explain and predict adolescent risk taking are still being built, and very few of them include information about the adolescent brain, which is very important.

The parts of the model come from fuzzy trace theory, which is a theory about how memory, judgement, and decision-making change over time and how these things change over time in different parts of the brain. A lot of neuroscientific evidence backs up this theory. For example, Freeman and Beer (2010) found that people are different when it comes to how much they want to feel. They also found that people are different when it comes to how much they want to stop doing something (Le., self-control; Somerville, Jones, & Casey, 2010; Van Leijenhorst, Moor, et al., 2010). As a result of this integrated account, sensation seeking and self-control aren't enough to explain why adolescents take risks, even though they are very important. Research shows that there are other things that make people take different risks (e.g., Reyna et al., 2011). As a result, we give a more detailed explanation of how decision options are thought of in the minds of the people who make them. We also talk about how social and moral values are retrieved from people's minds, and how those values are used in real-world situations. First, we introduce fuzzy trace theory, and then we show how the theory predicts changes in brain anatomy and connectivity that are true for people as they learn. These changes are the foundation for the functional changes that have been found in how people process rewards. There are then discussions of valuation, which is a mental process that takes into account both the reward and the chance of getting that reward. Next, we talk about how emotions play a role in risk processing. We say that while emotional impulses can make people want to take risks, aspects of emotions that are used in gist-based intuition can also help people avoid taking risks.

FUZZY TRACE THEORY

Studies show that people store multiple, parallel representations of the same information in their memories. These representations range in precision from verbatim (a mental picture of the actual stimulus) to gist (a general idea of what the stimulus is) (a mental representation of the basic meaning of the stimulus; see the summary by Reyna & Brainerd). Verbatim representations are very detailed, but they don't have any meaning. They show the surface form of information, like exact numbers and precise words. Instead, Gist representations are high level in terms of meaning extraction, but they don't have the precision and detail that verbatim representations do, so they don't work as well. Gist-based thinking makes it easier to think about things in terms of groups. These groups can then be linked to values and preferences. Fuzzy trace theory was based on research on gestalt theory and on psycholinguistic research on how people understand words. However, gist representations have also been shown to work in other ways, like through music, pictures, graphs, numbers, and events.Fuzzy trace theory is different from standard dual process models in that it doesn't think that gist’s come from literal traces. Instead, they are both encoded and retrieved at the same time. Gist and verbatim representations aren't so much separate categories as points on a continuum that connect them. Quantitative differences (e.g., how much difference there is between two amounts of money) are at the top of the hierarchy. Ordinal differences (like how much money there is between two amounts) and nominal or categorical differences (like how much money there is between two types of things) are next (e.g., some money or no money; Reyna & Brainerd, 1991). There are many factors that affect how much gist is found, but the most important ones are the task and how far the person who finds it has come. Task requirements affect other factors in decision making, such as reward sensitivity and inhibition, which are both stable individual differences, but they also change as a person gets older. Reward sensitivity can make a reward seem bigger than it really is. People can be more or less sensitive to different types of rewards (e.g., some people have a sweet tooth but are indifferent to alcohol). Verbatim processing, on the other hand, encourages people to take risks by allowing them to focus more on the trade-off between risk and reward and by giving more weight to how sensitive they are to reward sensitivity. Both gist-based processing and trait inhibition (self-control), which helps people control their impulses and avoid risk-taking, can help people make better decisions. Fuzzy trace theory, on the other hand, thinks of inhibition as a third process that isn't linked to gist and verbatim processing. Fuzzy trace theory predicts that changes in brain structure and connectivity will happen. We now describe these changes in brain structure and connectivity.

FUZZY COGNITIVE MAPS

First, BortKosko came up with the idea for FCM in 1986. As part of this paper, he came up with a fuzzy causal algebra that could be used to control the spread of causality on FCMs. This paper talks about how to show and use the FCM matrix and how to do math with it. Many scientists, engineers, and other people who study things like this model like it. It was used by Pathinathan et al. to look at the problems of school dropouts in 2005. Use fuzzy cognitive maps to figure out how social factors affect homelessness in 2013. Vijay K Mago did this in 2013. In this paper, the study shows how effective it is to use FCM to show and simulate the actions and interactions that happen in the social, personal, and structural factors that lead to homelessness. They use the FCM to figure out which factors have the biggest impact in a complicated system. In this case, the factors are affordable/appropriate housing, access to social support services for those with addictions or mental illnesses, family support for those with children, positive community support, and rental subsidies.

COMBINED EFFECT TIME DEPENDENT DATA MATRIX (CETD MATRIX)

Matrix theory was invented for the first time in 1998 by W. B.Vasantha and V. Indira to help them figure out how to get people from one place to another. For this problem, they came up with four new matrices called Initial Raw Data, Average Time Dependent Data Matrix, Refined Time Dependent Data Matrix, and Combined Effect Time Dependent Data Matrix (CETD Matrix) to help them figure out what was going on with the data. It used the same method in 2003 to study migrants who had HIV/AIDS. Age groups of 21-30, 31-35, and 36-45 were then split into three groups: The study said that "The age group 31-35 was the most affected." There were then four groups: 20-25, 26-30, 31-35, 36-47. For = 0.2, 31-35 and 26-30 were the most at risk. For = 0.7, = 1 very high-risk age group was 31 - 35, and the next group was 26 - 30. There is no difference between the age groups 20-25 and 36-47, which means that people don't get HIV/AIDS in these two age groups. Next, it was broken into six groups: 20-23, 24-30, 31-34, 35-37, 38-40, 41-47. This group was 24-30 and 31-34 for = 0.2 in this case.

In 2007, Devadoss A.V. used CETD matrix techniques to study the social and psychological problems that rag pickers face.

In 2012, S.Narayanamoorthy used the CETD model to figure out the maximum age group of silk weavers who were forced to work as slaves. The age group was broken up into eight groups: 11-16, 17-20, 21-30, 31-36, 37-40, 41-50, 51-60, 61-70, and = 0.1, 0.15, 0.2, 0.3. Fuzzy matrix analysis showed that the maximum age group of silk weavers who become bonded labourers hasn't changed even though the value of a parameter went from 0 to 1 in the analysis. The math says that most silk weavers become bonded labourers when they are between the ages of 31 and 36, then 37 and 40. The combined Effect Time Dependent data matrix also agrees with the same conclusion that we came to. Analysis also shows that people in their late 20s and 30s become bonded labourers because they are poor, silk weaving has become more modern, and they don't know how to do any other work. Even people who are 61 to 70 aren't healthy enough to weave silk for more than 8 hours a day. Because of this, they aren't bound together.

This is how A. Victor Devadoss and M. Clement Joe Anand looked at the problem of women who have Computer Vision Syndrome in 2013. They used the CETD method to look into the problem (CVS). It was done in this paper to divide the age group into 10-18, 19-24, 25-32, 33-40, 41-46, 47-52, 53-58 by taking = 0.5, 0.35, 0.55, 0.75. It was found that the peak time for CVS was between 29 and 41, and the peak age for women who got it were 36. There was a big reason for this: People were not using their computers the right way.

COMBINED OVERLAP BLOCK FUZZY COGNITIVE MAPS

In 2010, P. Thiruppathi and his team used Combined Overlap Block Fuzzy Cognitive Maps to find a way to stop suicides, and they found the answer. A study in this paper found that when the concept "Lack of counsellors to help people out of depression" was in the "ON" state, other concepts like poverty and unmanageable living costs (Economic crisis), more working hours with a low salary, debt traps and torture from creditors, government indifference, and stress due to mental, sexual, and physical torture in the workplace became ON as well. Also When there aren't enough counsellors to help people get out of depression, there will be poverty and unmanageable living costs (economic crisis), more working hours with a low salary, debt traps and torture from usurers, government indifferences, and stress from mental, sexual, and physical torture in the workplaces. This is called a "OFF state." Because there aren't enough counsellors to help people who are depressed, this is the main reason why people kill themselves. Counselors can help people live a stress-free life, preventing them from taking their own lives.

Use Combined Overlap Block Fuzzy Cognitive Maps to look into the pesticide Endosulfan in 2012. Smitha.M.V. and K. Sivakamasundari used this method in 2012. When good bio-magnification is on, the other ideas, such as more food production, the need for pest control, cheap prices, and the easy availability of Endosulfan, also come up. Endosulfan is used on farms because people don't know how it affects them, there aren't any alternatives, the government doesn't care about farmers using it, and there aren't any strict penalties for farmers who use it. The idea of population growth is turned off. Then, they found that Endosulfan was a good bio-magnificent, which means that if it is used on a farm, it will work for a long time to come. So, good Bio-magnification is the main reason to use Endosulfan in agriculture, which has the most dangerous side effects for humans.

FUZZY COGNITIVE MAPS (FCMs)

This model is 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 casual relations between classes.

Definition 1

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

Definition 2

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

Definition 3

FCMs with edge weights or causalities from the set {−1,0,1} are called simple FCMs.

Definition 4

Edges ei j have values that fall in the fuzzy range [1,1]. ei j = 0 means there were no accidents. ei j > 0 means that Cj increases as Ci increases (or Cj decreases as Ci decreases). If ei j 0 means that Cj decreases as Ci increases, this is called causal decrease (or Cj increases as Ci decreases). As a general rule, FCMs with simple edges have values like 1, 0, 1. Then, if causalities happen, they happen to the maximum positive or negative extent. There is a relationship between two concepts if one increases or decreases and the other does not. If there is no relationship, the value 0 is given, and there is no relationship. People give the value 1 when one thing causes another thing to change. Thus, FCMs are talked about in this way. Think about the concepts C1,...,Cn in the FCM. There is a chance that the directed graph is drawn with edge weight. In the matrix, E, the weight of each directed edge is written as ei j, and this is the value of the matrix. An FCM matrix that shows how many things are near each other is called a "distance matrix." It's also called a "connection matrix." You should know that all matrices that are part of an FCM are always square matrices that have zeros in the middle.

Definition 5

Let C1,...,Cn be the nodes of an FCM. Let A = (a1,...,an), where ai∈ {0,1}. A is called the instantaneous state vector and it denotes the ON-OFF position of the node at an instant.

$$a_i = 0 \text{ if } a_i \text{ is OFF},$$

$$a_i = 1 \text{ if } a_i \text{ is ON, where } i = 1, 2, \ldots, n.$$

Definition 6

Let C1,...,Cn be the nodes of an FCM. Let $\overrightarrow{C_1C_2}, \overrightarrow{C_2C_3}, \ldots, \overrightarrow{C_iC_j}$ 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.

Definition 7

An FCM with cycles is said to have a feedback.

Definition 8

When there is a feedback in an FCM, i.e., when the causal relations flow through a cycle in a revolutionary way, the FCM is called a dynamical system.

Definition 9

Let $\overrightarrow{C_1C_2}, \overrightarrow{C_2C_3}, \ldots, \overrightarrow{C_iC_j}$ be a cycle. When Ci is switched on and if the causality flows through the edges of a cycle and if it again causes Ci , we say that the dynamical system goes round and round. This is true for any node Ci , for i = 1,...,n. The equilibrium state for this dynamical system is called the hidden pattern.

Definition 10

It is called a fixed point when the equilibrium state of a dynamical system is the same for all the possible states. Think about an FCM with C1,...,Cn as the nodes. In this example, let's turn on C1 to start the dynamical system off. With C1 and Cn on, let's say that the FCM settles down. This means that the state vector stays the same, which is what we want to do (1,0,0,... , 0, 1). Fixed point: This state vector is called a state vector (1,0,0,...). This is the state vector that is called the fixed point.

Definition 11

If the FCM settles down with a state vector repeating in the form A1 → A2 → ... → Ai → A1, then this equilibrium is called limit cycle.

Definition 12

Let C1,...,Cn be the nodes of an FCM, with feedback. Let E be the associated adjacency matrix. Let us find the hidden pattern when C1 is switched on. When an input is given as the vector A1 = (1,0,0,...,0), the data should pass through the relation matrix E. This is done by multiplying A1 by the matrix E. Let A1E = (a1,...,an) with the threshold operation that is by replacing ai by 1 if ai> k and ai by 0 if ai< k (k is a suitable positive integer). We update the resulting concept, the concept C1 is included in the updated vector by making the first coordinate as 1 in the resulting vector. Suppose A1E → A2 then consider A2E and repeat the same procedure. This procedure is repeated till we get a limit cycle or a fixed point.

EXTENDED BIDIRECTIONAL ASSOCIATIVE MEMORY (EBAM)

A discrete two-layer EBAM with threshold signal functions, arbitrary thresholds and inputs, an arbitrary but a constant synaptic connection matrix V and discrete time-steps k are defined by the following equations:

$$X_i^{k+1} = \sum_{j=1}^{p} S_j(y_j^k)V_{ij} + I_i \qquad (1)$$

$$Y_j^{k+1} = \sum_{i=1}^{n} S_i(x_i^k)V_{ij} + J_j \qquad (2)$$

BAM state changes always lead to the same place. There are changes that happen at the same time and changes that happen later. This is true for both of them. Fx, Fy, and M, which stand for "Fx, Fy, M," are stable as long as all of the inputs reach equilibrium at the same point. Bidirectional stability is a balance that shifts over time, but it stays the same. It moves back and forth in a two-way fixed point. The figure shows how to make A and B both binary n- and p-vectors, which are both in 0,1 n and 0,1 p, as shown. If you want, you can start with A. In this case, the BAM makes sure that both sides can get to a bidirectional fixed point. People: Ai and Bj

$$S_i(X_i^k) = \begin{cases} 1, & \text{if } x_i^k > 0 \\ \text{state unchange}, & \text{if } x_i^k = 0 \\ -1, & \text{if } x_i^k < 0 \end{cases} \qquad (3)$$

$$S_j(Y_j^k) = \begin{cases} 1, & \text{if } y_j^k > 0 \\ \text{state unchange}, & \text{if } y_j^k = 0 \\ -1, & \text{if } y_j^k < 0 \end{cases} \qquad (4)$$

At any time, different neurons can "decide" whether to compare their activation to their threshold, which is the point at which they should stop. There are three groups of neurons called Fx neurons, and there are three groups of neurons called Fy neurons. At any given time, one of these groups can decide to change state. In the equations above, each neuron can decide for itself if it wants to check the threshold conditions for these conditions. Each time a neuron fires, it creates a random variable that can be ON (+1) or OFF (-1). This random variable can stay the same or change to ON or OFF (-1). The network is thought to be deterministic, and state changes are thought to happen at the same time. This means that an entire field of neurons is updated at the same time. As long as the two neurons aren't in sync, only one neuron can make the decision to change its state at a time. When the subsets represent the whole fields Fx and Fy, the state changes at the same time. In a real-life situation, the entries in the constant synaptic matrix of memory matrix54 V depend on how the person who is investigating feels. People give the memory matrix a weight based on how they feel about it.

CONCLUSION

The three new models called Trapezoidal Fuzzy Cognitive Maps (TpFCM), Induced Trapezoidal Fuzzy Cognitive Maps (ITpFCM) and Three estimate Fuzzy TOPSIS (TEFTOPSIS)have been introduced in this thesis. Along with these new models many existing fuzzy models have also been used to analyze the problems of Adolescent age people. Initially Fuzzy Cognitive Maps (FCM) was used to analyze the problems of Adolescent age people. From this analysis out of 10 attributes, the attributes C2, C4, C6, C8, C9 and C10 are found to be the major problems of the elders. That is Lack of emotional support, Depression, Isolation, Lack of economic support, Being abandoned, Lack of reason to live; are the major problems of the elderly people. Secondly Induced Fuzzy Cognitive Maps (IFCM) was also used to analyze the problems of Adolescent age people. The analysis points out that out of 8 attributes, the attributes C1, C2,C5and C6 are the major problems of the elders. The major problems are therefore being Neglected, Treating as burden (children and grandchildren are treating Adolescent age people as burden), Being abandoned and Lack of reason for live. The triggering pattern is also found for each attribute in ON state from this model. The important thing is to keep them occupied with any of the above said options or anything that suits their respective lifestyle. Children and grandchildren of Adolescent people might try to spend more time with their parent or grandparent. If they are busy with their day-to-day life, they can spend at least an hour per day with the Adolescent age people. They can plan their weekend activities by including their parent's wishes too. Children need to pay utmost attention and try to fulfill their parent's desires. For this children should be taught the importance of fostering good relationship in the family. They should be taught that every individual will become old and require love and affection from the younger generation. Family values need to be given importance while bringing up children. This can help children and grandchildren understand their parents in a better way and make them realize the importance of parents and grandparents in their life.

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