A STUDY ON TRIGGER FOR AVERSION TO LEARN SUBJECTS
BY STUDENTS USING INDUCED FUZZY COGNITIVE MAPS (IFCMS)

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ABSTRACT

In this article we have analyze the factors for the aversion by the students in learning subjects given by the teachers using induced fuzzy cognitive map. We have determined major factors to learn the subjects through the fuzzy cognitive map.

Keywords: IFCMs, triggering patterns, fixed point, reason.

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1. INTRODUCTION

Occasionally, you can lose interest in studies, if it seems like there is too much to do, if you don't like a subject, or if you just find school boring. As an alternative of thinking of education as a task, and something you just have to do, why not make the primary (and most important) years of your life more enjoyable? If you focus on creating the right manner and developing some good habits, you can stay fascinated in school and achieve something. Identify what interests you naturally. Even as you may not be the major fan of every subject, you most likely are interested in at least a few. If you can identify the things that you like learning about, then this can help you become more interested in school in general. When you are naturally drawn to do something (like study a favorite subject), it is called intrinsic motivation, and finding this can increase your success at school consider which classes you pay the most concentration in, which ones you seem to do the best in, which ones you don't mind studying for, etc. This can point out which subjects you are naturally interested in.

Fuzzy Cognitive Maps (FCMs) are digraphs that capture the cause/effect relationship in a system. Nodes of the graph stand for the concepts representing the key factors and attributes of the modeling system, such as inputs, variable states, components factors, events, actions of any system. Signed weighted arcs describe the casual relationships, which exists among concepts and interconnect them, with a degree of causality. The constructed graph clearly shows how concepts influence each other and how much the degree of influence is. Cognitive Maps (CMs) were proposed for decision making by Axelrod [16] for the first time. Using two basic types of elements; concepts and casual relationship, the cognitive map can be viewed as a simplified mathematical model of a belief system. FCMs were proposed with the extension of the fuzzified casual relationships. Kosko [4], introduced FCMs as fuzzy graph structures for representing casual reasoning. When the nodes of the FCM are fuzzy sets then they are called fuzzy nodes. FCMs with edge weights or causalities from the set $\{-1, 0, 1\}$ are called simple FCMs. Consider the nodes/concepts P_1, P_2, P_3, …,P_n of the FCM. Suppose the directed graph is drawn using edge weight eij from $\{-1, 0, 1\}$.

Definition 1.1: The matrix M be defined by $M = (e_{ij})$ where e_{ij} is the weight of the directed edge $P_i P_j$. M is called the adjacency matrix of the FCM, also known as connection matrix. The directed edge e_{ij} from the casual concept P_i to concept P_j measures how much P_i causes P_j. The edge e_{ij} takes values in the real interval $[−1, 1]$. $e_{ij} = 0$ indicates no causality. $e_{ij} > 0$ indicates casual increase / positive causality. $e_{ij} < 0$ indicates casual decrease / negative causality. Simple FCMs provide quick first-hand information to an expert's stated casual knowledge. Let P_1, P_2, P_3, …,P_n be the nodes of FCM.

Let $A = (a_1, a_2, …, a_n)$ is called a state vector where either $a_i = 0$ or 1. If $a_i = 0$, the concept ai in the OFF state and if $a_i = 1$, the concept a_i in the ON state, for i = 1, 2, …, n. Let $P_1P_2, P_2P_3,…, P_i P_j$. be the edges of the FCM ($i \neq j$). Then the edges form a directed cycle.

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Definition 1.2: An FCM is said to be cyclic if it possesses a directed cycle. An FCM with cycles is said to have a feedback, when there is a feedback in an FCM, i.e., when the casual relations flow through a cycle in a revolutionary way, the FCM is called a dynamical system. The equilibrium state for the dynamical system is called the hidden pattern. If the equilibrium state of a dynamical state is a unique state vector, it is called a fixed point or limit cycle. Inference from the hidden pattern summarizes the joint effects of all interacting fuzzy knowledge.

2. ALGORITHMIC APPROACH IN IFCM

Even though IFCM is an advancement of FCM it follows the foundation of FCM, it has a slight modification only in Algorithmic approaches. To derive an optimistic solution to the problem with an unsupervised data, the following steps to be followed:

Step-1: For the given model (problem), collect the unsupervised data that is in determinant Factors called nodes.

Step-2: According to the expert opinion, draw the directed graph.

Step-3: Obtain the connection matrix, M, from the directed graph (FCM). Here the number of rows in the given matrix = number of steps to be performed.

Step-4: Consider the state vector $S(X_1)$ by setting c1 in ON position that is assigning the first component of the vector to be 1 and the rest of the components as 0. Find $S(X_1) \times M$. The state vector is updated and threshold at each stage.

Step-5: Threshold value is calculated by assigning 1 for the values > 0 and 0 for the values < 1. The symbol '↪' represents the threshold value for the product of the result.

Step-6: Now each component in the C_1 vector is taken separately and product of the given Matrix is calculated. The vector which has maximum number of one's is found. The vector with maximum number of one's which occurs first is considered as C_2.

Step-7: When the same threshold value occurs twice. The value is considered as the fixed Point. The iteration gets terminated.

Step-8: Consider the state vector C_1 by setting C_2 in ON state that is assigning the second component of the vector to be 1 and the rest of the components as 0.Precede the calculations discussed in Steps 4 to 6.

Step-9: Continue Step 9 for all the state vectors and find hidden pattern.

We take the following attributes the various causes for the dislike by the students in learning all subjects. They are listed as follows:
  C1- Memory loss
  C2- Attention loss
  C3- Lack of sufficient knowledge in basics
  C4- Lack of sufficient application skills
  C5- Lack of interest in unitizing sufficient time
  C6- Lack of confidence
  C7- Health problem
  C8- Lack of sufficient practice
  C9- Peer group pressure
  C10-Lack of logical reasoning power &Analytical skill

C1. Memory loss
Memory plays a significant role among the students in learning subject. They find hard to remember all the basic rules, steps and formulae in storing, recalling and reproducing in their assessment. Memory loss may be due to their person health condition, sleep deficiency, indulging in ingestion other distractions etc.

C2. Attention Loss
Students with attention shortage disorder have particular problem like they not pass to remain listening carefully while learning. They appear to be 'dreamy' and pay no concentration. They without difficulty get diverted, lose their absorption and miss to listen how the problem is solved. Thus they have poor listening skills and miss the key points.

C3. Lack of sufficient knowledge
For student, pleased knowledge is significantly important to the improvement in learning the subject. Thorough understanding in content makes the student to think, reason out and apply in the asked problem. Lack of sufficient knowledge makes the student to skip out the model problem and thus creates fear among them. While Studying, XI and XII portions are not covered properly in many of the schools. Though, they score high marks in XII, they lack knowledge of the fundamentals that they should have learnt in XI.

C4. Lack of sufficient application skill
On knowing the pleased knowledge does not tell that the students are knowledgeable in subject. Their application skill proves their pleased knowledge in learning subject.. If the student do not understand the content well then they are not good at employing steps to solve the problem. Thus they lose their self-reliance level. The problem may appear even if the teacher fails to teach the application part of the theory he teaches.

C5. Lack of interest in utilizing time
As the proverb says , time is valuable and Time and Tide waits for no man students who do not value the worth of time, face many troubles. They not succeed to pay concentration in class, identification the concepts and in analyzing the problems. Due to the power of media and peer- group pressure they spoil in various corrupt and unwanted activities and waste their time. They finally lament for the time lost.

C6. Lack of confidence
Confidence plays a very important role not only for the students but for each and every person to face the unpredicted problems occurs in the world. Students who lack confidence level, experience trepidation and try to escape from learning, recalling and applying them to solve the problem. The confidence level can be activated by giving continuous coaching, friendly interaction with the students and paying concentration to them.

C7. Health Problems
Most of the students lack in recollection power, paying attention to the class, lack of interest in subject due to deficits in their health condition. There are students who spoil their healthy life style by taking illegal activities. As a result they lose their concentration in studies. Family background also acting a major role in affecting both physical and mental fitness of the students.

C8. Lack of sufficient practice
Students who fail to carry out often experience failure in some subject .They just think that having the substance knowledge is just enough and face their assessment without enthusiastic. A small modification in question format will pose a big trouble to such a students. Naturally they fail to answer the question even if it is a simple one. "Practices make a man perfect". Only while practicing, significant, sympathetic, recalling the concepts occurs. The worth of utilizing the time in practice results in good performance.

C9. Peer-group pressure
Society consists of many relationships. Friends play the vital role in teen –age period. Peer-group pressure distracts the entity both in good as well as in bad way. It is up to the individual who decides the way to choose. Most of the students keep arrears in some subject due to their peer group pressure who involve in wrong behavior. which make them to consider the subject as not interest and fail to be present in the class. Instead they enjoy those hours in canteen, beach or cinema, etc. Student at this age get affected a lot by peer-group pressure.

C10. Lack of logical and learning
It involves the students to think and observe their learning. Students should be aggravated from the beginning to justify their answers like why such steps take place and what is involved in carrying those steps. Lack of such criteria makes the student to learn by heart the steps which they don't understand. Thus they lack in application skill and lose confidence to attend any unfamiliar problem. For this the teacher should reinforce the students with different illustrations while teaching.

3. ANALYSIS OF THE PROBLEM

Using the linguistic questionnaire and the expert's opinion we have taken from the experienced teachers following ten concepts $\{C_1, C_2, ..., C_n\}$ as nodes.
  C1- Memory loss
  C2- Attention loss
  C3- Lack of sufficient knowledge in basics
  C4- Lack of sufficient application skills
  C5- Lack of interest in unitizing sufficient time
  C6- Lack of confidence
  C7- Health problem

C8- Lack of sufficient practice
C9- Peer group pressure
C10-Lack of logical reasoning power &Analytical skill

Now we proceed on to analyze the problems using IFCM. Let us consider the ten concepts $\{C_1, C_2, ..., C_n\}$

$$A = \begin{array}{c} \\ C1 \\ C2 \\ C3 \\ C4 \\ C5 \\ C6 \\ C7 \\ C8 \\ C9 \\ C10 \end{array} \begin{array}{cccccccccc} C1 & C2 & C3 & C4 & C5 & C6 & C7 & C8 & C9 & C10 \\ \begin{bmatrix} 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \end{array}$$

3.1 Analysis using IFCMS

(i) Let the initial input vector be

$C_5 = \{0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\}$.

$C_5\ A = \{0\ 0\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\} = C_5{}'$

$\{0\ 0\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\}\ A = \{0\ 0\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0\} = C_6$

$C_6 = \{0\ 0\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0\}$

$C_6\ A = \{0\ 0\ 0\ 1\ 0\ 0\ 0\ 1\ 0\ 0\} = C_6{}'$

$\{0\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 0\}A = \{0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 1\} = C7$

$\{0\ 0\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\}A = \{0\ 0\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0\}$

$C_7 = \{0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 1\}$

$C_7\ A = \{0\ 0\ 0\ 2\ 0\ 0\ 0\ 0\ 0\ 0\} \rightarrow \{0\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 0\} = C_7{}'$

$\{0\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 0\}A = \{0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 1\} = C_8$

$\{0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 1\}$ is the fixed point and triggering pattern is C5→C8→C4→C4.The following table gives the triggering patterns when other attributes are kept in ON state consecutively.

3.2 Induced patterns for A by IFCMS

STEP NUMBER	ATTRIBUTES ON STATE	TREGGERING PATTERN
1.	$C_1 = \{1\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\}$.	C1→C3→C6
2.	$C_2 = \{0\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\}$.	C2→C10→C6
3.	$C_3 = \{0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 0\}$.	C3→C4→C4
4.	$C_4 = \{0\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 0\}$.	C4→C6→C6
5.	$C_5 = \{0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\}$.	C5→C8→C4→C4
6.	$C_6 = \{0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0\}$.	C6→C4→C4
7.	$C_7 = \{0\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\}$.	C7→C1→C1
8.	$C_8 = \{0\ 0\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\}$.	C8→C3→C6
9.	$C_9 = \{0\ 0\ 0\ 0\ 0\ 0\ 0\ 1\ 0\}$.	C9→C2→C4→C4
10.	$C_{10} = \{0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 1\}$.	C10→C4→C4

4. CONCLUSION

In this section, the major findings were summarized using IFCMs and interviews data. While analyzing with IFCMs, it was observed that when lack of interest is taken as the ON state, the resultant vector is {0 0 0 0 0 1 0 0 0 1} While analyzing with IFCMs we observe that lack of confidence and lack of logical reasoning power and analytical skill are major reason to feel about to critical things to study for all subject. So students increase our interest level for learning the subject. First of all students like all subject then start the learning. Who one follow in this way they face success for our education and our life.

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