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To Analyze Stress in Education Using Bam Model

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Abstract - In this paper we find how stress makes an impact in imparting knowledge using Bidirectional associative memories. Since no statistical data to this effect can be collected, we using a linguistic questionnaire interviewed 50 persons, from the group of educationalists, NGOs, youth, teachers etc. and using these interviews constructed the FRM model, relating the effect of stress on the physical, mental and emotional balance while preparing the student to gain knowledge . We use BAM models to study, analyze this problem of stress management among the teachers to shape up our young minds in education.

Keywords-BAM, Stress, Education.

I. INTRODUCTION

We have interviewed 50 persons from Chennai using linguistic questionnaire. Later this questionnaire was converted into Fuzzy data. Using expert's opinion, we obtain the 7x8 synaptic connection matrices in the scale [5,-5] and denote it by M_1.
This paper has four sections.

$$\dot{x}_i = g_i(x, y, \ldots)$$
$$\dot{y}_j = h_j(x, y, \ldots)$$

- We recall the definition and properties connected with Bi-directional Associative Memories (BAM)
- Description of the problem.
- We adapts BAM to this problem and analyze the problem
- We drive conclusions and make some suggestions.

$$x_i^{k+1} = \sum_j^p S_j(y_j^k)m_{ij} + I_i$$
$$y_j^{k+1} = \sum_i^n S_i(y_i^k)m_{ij} + I_j$$

Where $m_{ij} \in M$. S_i and S_j are the signal functions. they represent binary or pipolar threshold functions. For arbitrary real-valued thresholds $U = (U_1, \ldots\ldots\ldots, U_n)$ for F_x neurons and $V = (V_1, \ldots\ldots\ldots, V_p)$ for F_y neurons, the threshold binary signal functions corresponds neurons

A. Bidirectional Associative Memories.(BAM)

a) Neuron Fields
Group neurons form a field. Neural networks contain many fields of neurons. F_x denotes a neuron field which contains n neurons and F_y denotes a neuron field which contains p neurons.

b) Neuronal Dynamical Systems
The neuronal dynamical system is described by a system of first order differential equations that govern the time evaluation of the neuronal activations or membrane potentials.

Where x_i and y_j denote respectively the activation time function of the i^{th} neuron in F_x and the j^{th} neuron in F_y. The over dot denotes time differentiation, g_i and h_j are functions of X, Y etc.,

Where $X(t) = (x_1(t), \ldots\ldots\ldots, x_n(t))$ and $Y(t) = (y_1(t), \ldots\ldots\ldots, y_n(t))$

Define the state of the neuronal dynamical system at time t. Additive bivalent Models describe asynchronous and stochastic behavior. At each moment each neuron can randomly decide whether to change state, or whether to omit a new signal given its current activation.
The BAM is a non- adaptive, additive, bivalent neural network.

c) Bivalent Additive BAM
In neural literature, the discrete version of the earlier equations are often referred to as the Bidirectional Associative Memories or BAM s. A discrete additive BAM with threshold signal functions, arbitrary thresholds and inputs, an arbitrary but a constant synaptic connection matrix M and discrete time steps K are defined by the equations.

d) Synaptic connection Matrices:
Let us suppose that the field F_x with n neurons is synaptic ally connected to the field F_y with p neurons. Let m_{ij} be a synapse where the axon from the i^{th} neuron in F terminates, m_{ij} can be positive, negative or zero. The synaptic matrix M is a $n \times p$ matrix of real numbers whose entries are the synaptic efficacies m_{ij} The matrix M describes the forward projections from the neuronal field F_x to the neuronal field F_y . Similarly, a $p \times n$ synaptic matrix N describe the backward projections F_y to F_x.

e) Unidirectional Networks
These kinds of networks occur when a neuron synoptically interconnects to itself. The matrix N is $n \times n$ square matrix.

f) Bidirectional Networks.
A network is said to be a bidirectional network if
$M = N^T$ and $N = M^T$

g) Bidirectional Associative Memories
When the activation dynamics of the neuronal fields F_x and F_y lead to the overall stable behavior, the bi-directional networks are called as Bi-directional Associative Memories or BAM.A unidirectional network also defines a BAM if M is symmetric ie M = M.
In the next section, we proceed on to give more details about this BAM.

h) Additive Activation Models
An additive activation model is defined by a system of n + p coupled first-order differential equations that interconnects the fields F_x and F_y through the constant synaptic matrices M and

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N described earlier.$S_i(x_i)$ and $S_j(y_j)$ denote respectively the signal function of the i^{th} neuron in the field F_x and the signal function of the j^{th} neuron in the field F_y . Discrete additive activation models correspond to neurons with threshold signal functions. The neurons can assume only two values ON and OFF. On represents the signal value + 1 and OFF represents 0 or -1 (-1 when the representation is bipolar)The bipolar version of these equations yield the signal value -1 when $x_i<U_i$ or $y_j< Vj$.The bivalent signal functions allows us to model complex asynchronous state-change patterns.

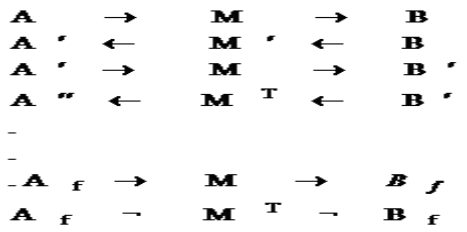
At any moment different neurons can decided whether to compare their activation to their threshold. A each moment any of the 2^n subsets of F_x neurons or the 2^p subsets of the F_y neurons can decide to change state. Each neuron may randomly decide whether to check the threshold conditions in the equations given above.
At each moment each neuron defines a random variable that can assume the value On (+1) or OFF (0 or -1).

The network is often assumed to be deterministic and state changes are synchronous ie an entire field of neurons is updated at a time. In case of simple asynchrony only one neuron makes a state change decision at a time. When the subsets represents the entire fields F_x and F_y synchronous state change results.In a real life problem the entries of the constant synaptic matrix M depends upon the investigator's feelings. The synaptic matrix is given a weight age according to their feelings. If x F_x and y F_y the forward projections from F_x to F_y is defined by the matrix M.$\{ P(x_I, x_j)\} = M, 1<I<n, 1<j<p$.

The backward projections is defined by the Matrix $M^{T.}$
$\{ F(y_j,x_I)\} = (m_{ij}) = M^T, 1< I < n, I<j<p.$

i) Bidirectional Stability.
All BAM state changes lead a fixed-point stability. This property holds for synchronous as well as asynchronous state changes.A BAM system (F_x, F_y, M) is bi directionally stable if all inputs converge to fixed pint equilibrium. Bi directional stability is a dynamic equilibrium. The same signal information flows back and forth in a bi directional fixed point.Let us suppose that A denotes a binary n-vector and B denotes a binary p-vector. Let A be initial input to the BAM system.

Then the BAM equilibrates a bi directional fixed point (Ai, Bj) as where A', A",.. and B', B" .. represents intermediate or transient signal state vectors between A and A_f , B and B_f. respectivelyThe fixed point of a bi directional system is time dependent. The fixed point for the initial input vectors can be attained at different times which is illustrated later. Based on the synaptic matrix M which is developed by the investigators feelings, the time at which bi directional stability is attained also varies accordingly.



II. DESCRIPTION OF THE PROBLEM

Education in its general sense is a form of learning in which the knowledge, skills, and habits of a group of people are transferred from one generation to the next through teaching, training, or research. Education frequently takes place under the guidance of others, but may also be autodidactic.Any experience that has a formative effect on the way one thinks, feels, or acts may be considered educational.Stress is a state of mental or emotional strain or tension resulting from adverse or demanding circumstances.We generally use the word "stress" when we feel that everything seems to have become too much - we are overloaded and wonder whether we really can cope with the pressures placed upon us. Anything that poses a challenge or a threat to our well-being is a stress.Stress is when you feel overwhelmed, to much going on in your life and you feel out of control. It is when you feel pressured and feeling like you wants to escape or run away from.

A. Tyes Of Stress

a) Time stress
You experience time stress when you worry about time, or the lack thereof. You worry about the number of things that you have to do, and you fear that you'll fail to achieve something important. You might feel trapped, unhappy, or even hopeless.

b) Anticipatory stress
Anticipatory stress describes stress that you experience concerning the future. Sometimes this stress can be focused on a specific event, such as the upcoming exams. However, anticipatory stress can also be vague and undefined, such as an overall sense of dread about the future, or a worry that "something will go wrong."

c) Encounter stress
Encounter stress revolves around people. You experience encounter stress when you worry about interacting with a certain person or group of people – you may not like them, or you might think that they're unpredictable.

d) Episodic Stress
Episodic Stress is the type of stress that develops when continuous disorganization,chaos, & crisis is a way of life for the individual. Episodic stress can also ensue when an individual constantly worries. These individuals tend to be pessimistic, which causes them to be anxious & sometimes depressed.

e) Physical stress
Physical stress is suffering that is endured by the body as a result of a stressful situation. This form of stress is usually associated with symptoms such as headaches and fatigue. Physical stress is the response to environmental pressures and demands.

f) Situational stress
You experience situational stress when you're in a scary situation that you have no control over. This could be an emergency. More commonly, however, it's a situation that involves conflict, or a loss of status or acceptance in the eyes of your group. For instance, getting laid off or making a major mistake in front of your team are examples of events that can cause situational stress.

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g) Emotional stress

Emotional and psychological trauma is the result of extraordinarily stressful events that shatter your sense of security, making you feel helpless and vulnerable in a dangerous world. Traumatic experiences often involve a threat to life or safety, but any situation that leaves you feeling overwhelmed and alone can be traumatic, even if it doesn't involve physical harm. It's not the objective facts that determine whether an event is traumatic, but your *subjectiveemotional experience* of the event. The more frightened and helpless you feel, the more likely you are to be traumatized.Hence to study and analyze this problem we have constructed a linguistic questionnaire and using this linguistic questionnaire we have interviewed 50 persons. This linguistic questionnaire was used to obtain the attributes and using these attributes and the opinion of the experts we have used BAM to analyze the problem.

III. BAM MODEL TO STUDY ABOUT THE STRESS IN EDUCATION

Now using the linguistic questionnaire and the expert's opinion following attributeswith how stress management is useful in education. Thus the different types of stress are taken as the domain space and the types of education as the range space of the BAM. In choosing the attributes there is no hard and fast rule. It is left to the choice of any researcher to include or exclude any of the attributes.Later this data was transformed into a Bidirectional Associative Memories (BAM) Model. Using expert's opinion with seven attributes related to the stress, are given by the expert and eight attributes related with types of education. (It is important to note that the number of attributes associated can vary from expert to expert).

A. Attributes Related to the stress as given by an expert.

S_1 -Time stress.
S_2 -Physicalstress
S_3 -Encounter stress
S_4 -Episodic Stress
S_5 - Anticipatory stress
S_6 - Situational stress
S_7 -Emotional stress

B. Attributes Related with the types of education as given by the expert.

P_1 -Technical education
P_2 -Secondary education
P_3 -Higher secondary education
P_4 -Distance education
P_5 -Primary education
P_6 -Vocational education
P_7 -Adult education
P_8 -Professional education

$$\dot{x}_i = -A_i x_i + \sum_j^p s_j(y_j^k) m_{ji} + I_i$$

$$\dot{y}_j = -A_j y_j + \sum_i^n s_i(y_i^k) m_{ij} + I_j$$

Using the expert's opinion we obtain the synaptic 7x8 connection matrix, which we denote by M1. Which is taken in the scale [5,-5]? Now using the expert's opinion who is a educationalist for over a decade, we take the values between [-5, 5].

C. Bam Model Using The Experts Opinion

Taking the neuronal field Fx as the attributes connected with the types of media and the neuronal field Fy as the causes the led or forced them to cause stress in educating. The 7x8 matrix M_1 represents the forward synaptic projections from the neuronal field Fx to the neuronal field Fy. The 8x7 matrix M_1 represents the backward projections from Fy to Fx. Now taking S_1, S_2,…, S_7 along the rows and P_1, P_2, … , P_8 along the columns, we get the synaptic connection matrix M_1 as Follows:

P_1 P_2 P_3 P_4 P_5 P_6 P_7 P_8

$$M_1 = \begin{matrix} S_1 \\ S_2 \\ S_3 \\ S_4 \\ S_5 \\ S_6 \\ S_7 \end{matrix} \begin{bmatrix} 4 & -2 & 0 & -3 & -1 & 0 & 0 & 3 \\ 3 & 4 & 2 & 0 & 0 & 1 & 0 & 2 \\ 2 & 2 & 4 & 0 & -1 & 0 & 0 & -2 \\ 3 & -1 & 0 & 0 & -2 & 0 & 1 & 2 \\ -1 & 3 & 0 & 2 & -2 & 1 & 0 & 1 \\ 0 & -2 & 0 & 3 & 0 & 2 & -1 & 1 \\ 4 & 3 & 2 & 0 & -1 & 0 & 0 & -1 \end{bmatrix}$$

Conider the initial input vector (4 -3 2 0 0 -1 3) given by
$S(X_k)$ = (1 0 0 0 0 0 1)
From the activation equation
$S(X_k)\, M_1$ = (8 1 2 -3 -2 0 0 2) = Y_{k+1}The binary signal vector
$S(Y_{k+1})$ = (1 1 1 0 0 0 0 1)
$S(Y_{k+1})\, M_1^T$= (5 11 6 4 3 – 1 8) = X_{k+2}.
$S(X_{k+2})$ = (1 1 1 1 1 0 1)
$S(X_{k+2})\, M_1$ = (16 9 8 -1 -7 2 1 5) = Y_{k+3}.
$S(Y_{k+3})$ = (1 1 1 0 0 1 1 1)
$S(Y_{k+3})M_1^T$ = (5 12 6 5 4 0 8)= X_{k+4}.
$S(X_{k+4})$ = (1 1 1 1 1 0 1)
$S(X_{k+4})\, M_1$ = (16 9 8 -1 -7 2 1 5) = Y_{k+5}.
$S(Y_{k+5})$ = (1 1 1 0 0 1 1 1)
Thus $S(X_{k+4})$ = (1 1 1 1 1 0 1).

The binary pair { (1 1 1 1 1 0 1) , (1 1 1 0 0 1 1 1) } represents a fixed point of a BAM model. After the 5th unit of time we see in the resultant vector all nodes have come to the ON state except to S_6 and P_4 and P_5 which prove that it is immaterial whether there is Complete access to position of power. The node Media No concentration in class.remain in the OFF state. All other nodes are intricately sensitive and are associated with it so they become ON.
Consider the new signal vector Y_k = (-3 -2 3 -1 0 -2 2 -3)
Now we get resultant by the following procedure
$S(X_k)$ = (0 0 1 0 0 0 1 0)
$S(Y_k)\, M_1^T$ = (0 2 4 1 0 -1 2) = X_{k+1}
$S(X_{k+1})$ = (0 1 1 1 0 0 1)
$S(X_{k+1})\, M_1$ = (12 8 8 0 -4 1 1 1) = Y_{k+2}
$S(Y_{k+2})$ = (1 1 1 0 0 1 1 1)
$S(Y_{k+2})\, M_1^T$ = (5 12 6 5 4 0 8) = X_{k+3}
$S(X_{k+3})$ = (1 1 1 1 1 0 1)
$S(X_{k+3})\, M_1$ = (15 7 8 -1 -7 2 1 5) = Y_{k+4}
$S(Y_{k+4})$ = (1 1 1 0 0 1 1 1)
$S(Y_{k+4})M^T_1$ = (5 12 6 5 4 0 8) = X_{k+5}
$S(X_{k+5})$ = (1 1 1 1 1 0 1)

Thus the fixed point is the binary pair { (1 1 1 0 0 1 1 1) , (1 1 1 1 1 0 1) } hence after the 5th unit of time we see in the resultant vector all nodes come to the ON state except S_4 , S_5 and P_6. which proves episodic stress and anticipatory stress and adult education does not create an impact in the stress management in education.

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IV.CONCLUSION

Parents should spend more quantitative time with their children.Let them to touch and feel which they want.Allow them to use things in their way.Bring them the interest to shake their body instead of being idle. Parents should not stop children from what they are doing and let them learn on their own so that they will know what to do and what not to do in their way. Teachers should make their classes fun and enjoyable for their students so that it make the student to be more attentive in class. Special attention should be given to the children who are weak in their studies as well as in their extra curriculum. Parent and teacher should know that marks are not the only criteria to be achieved by the children in education. Marks are only the indicator of hard work put by a student.Teachers and parents should encourage the children to learn more outside book so it might help the children to break their stress and also it helps them to know more about the outside world.

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