Artificial Emotional Intelligence to enrich Man-Machine Interactions

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ABSTRACT: Artificial Emotional Intelligence is a newly growing subfield of artificial intelligence that deals with recognition of human emotions and representation of human like emotion by machines. This paper intends to explain the interaction of human beings with machines and the method by which it can be enriched by adding artificial emotional intelligence to machines. In addition to it, the paper explains the implementation of artificial emotional intelligence in machine along with the flow chart and implementation algorithm. The paper also focuses on working procedure of emotionally sensitive machines and how they can help user to increase productivity of user and keeping him emotionally stable.

KEYWORDS: AEI (Artificial Emotional Intelligence), varying personality, emotional sensitivity

I. INTRODUCTION

Artificial Emotional Intelligence is a newly growing subfield of artificial intelligence that deals with recognition of human emotions and representation of human like emotion by machines. In the implementation of tasks using emotional intelligence, the key element is that the machine should be able to specifically identify the human feelings and emotions. So, when the term of man-machine interactions arises, the efficient recognition of human emotion by machine becomes the fundamental requirement of the process. Decoding the recognized emotions and acting according to it is the next basic requirement of the process. Using AEI humans can not only interact with machines in a friendlier manner but they can also be more focused and productive. AEI for man machine interactions provides better ways of controlling machines.

II. PRE REQUISITE CONCEPTS

Humans are the most intelligent living organisms on the planet. They have found a numerous ways for interacting with each other. The type and the mode of interaction is dependent upon various factors such as - type of information, distance between them people the emotional attachment. For example, a bank manager and his costumer interacts in a completely formal manner where as two friends interact quiet informally with each other. So there arise a question that: what factors drives the interactions to be formal or the informal? The answer to this question is that, when a bank manager and costumer are interacting, the interaction is mainly focused for the banking related tasks. So in this case there is a very small degree of emotional attachment between them as well as the type of information is restricted to a specific set of banking related tasks. But, in the next example, the informal interaction between the two friends is a result of a certain amount of emotional attachment and a wide set of information sharing i.e. in this case the set of information to be shared is not confined to a specific topic. The information of limitless topics can be shared. Now, suppose that two friends are standing far from each other. Earlier they might be using speech as a mode of interaction but now they might use gestures to interact from each other, because the distance between them is now increased.

The following statement can represent the human to human interaction in a detailed manner:

Every person is not same for all persons but he can be same for a specific set of people.

This statement is applicable on each and every person present in our surrounding. To support the above statement, only the understanding of self-awareness is required and that too in a limited manner. We all know, that we behave differently with different people. Or, to be more specific, we behave differently with different categories of people. For example, your behaviour with your friend differs with your behaviour with teacher. Similarly your behaviour with your spouse will differ with your behaviour with your friends. If we again consider the first example and look into it, then

we may find that a student may be mischievous in front of his friends but he may be sincere in front of his teachers. The portrait of his personality is different in front of different sets of people. I call it as *varying personality*. Every human is able to vary his personality on the basis of current situation and his emotional state. In this way everyone portrays a different personality in front of other person. The type of personality to be portrayed depends on the next person or the group of people to which the next person belongs.

With the above explanations I am able to conclude that every human have different personalities for various set of people. In a very similar way, humans have various personalities towards objects they use. Certainly, to some extent each human is emotionally attached to the things he use. In some way or the other, this statement is completely true. Based on this emotional attachment of a person with the objects, a person possess a different personality towards that object. For example, the person may be soft hearted towards his cell phone but he is definitely hard hearted for his punching bag. This is clearly observable because he will definitely use his cell phone in a soft manner but he will hit his punching bag with full strength as if he wants to destroy it. This kind of behaviour of humans towards objects gives an indication that humans are emotionally sensitive towards their objects. Any action on favourite object of any person triggers an expression on that person's face. For example if I break my friend's favourite watch then he might get angry on me or he might get sad for the loss of watch. This proves that, being a human we want things to be ours. So it can be concluded that people are emotionally attached to their objects because these objects possess the capability to change the emotional state of humans.

The above concept of emotional attachment of humans with its objects is the foundation for enhancing man machine interactions. If we reverse map this concept towards machines then we will obtain such machines that are emotionally attached to its user. The era in which we live today, this reverse mapping may sound a bit weird but it is definitely possible.

III. MAN-MACHINE INTERACTION

Till now, we have discussed how humans interact with other humans and objects and we have found how humans are emotionally attached to their objects. Now we will discuss how humans interact with machines. When we listen the term machine, our mind creates an image of *something* in our mind. This *something* is generated by our brain as a result of knowledge gained so far. But one thing remains common to our senses. This is, whenever we listen the word machine, our mind is not able to judge that which machine we are referring to. So in our mind, the profile of a word machine is created as something unknown. Since, it is something unknown, so its attributes are undefined and hence we have no idea what it actually is. Due to this lack of information about the attributes, our mind does not get emotionally attached to that unknown object. But as soon as the attributes are specified, we create a profile for that object in our mind. On the basis of this profile we either like it, or dislike it or love it. A simple example to illustrate it is: Suppose a person is a car driver and he likes his work. Now whenever he listens the word car he will frame a profile of it in his mind. This profile is generated by his mind on the basis of its previous knowledge. And in this profile, his mind applies general attributes of a car such as- four wheels, steering, and doors. But his mind is still lacking information of certain attributes such as top speed, brand name, safety features and looks so the driver will have no feeling for this car. But as soon as he gain this information, his mind updates the profile of that car which was created earlier. And now, when the mind of driver have a satisfactory amount of knowledge required for that car, so he may like or dislike or love it on the basis of this information.

IV. IMPLEMENTATION OF AEI IN MAN-MACHINE INTERACTION

To enrich the man machine interaction, it is necessary that the machine is also emotionally intelligent as man. We, know that a machine is said to be emotionally intelligent if it possess the ability to since and represent emotions. For man machine interactions, the most important medium of interaction in most of the cases is speech. Beside text, speech is the best possible method to represent emotions. Speech can not only represent emotions but it can also be used to detect emotions. The detection of emotions can be done by using the properties of sounds and music. The sound has some fundamental attributes without which it cannot be treated as a sound signal. For example each sound has some frequency, treble, bass, pitch etc. properties. By examining these properties a machine is able to distinguish between different kinds of sounds. Which means that if we say same instructions to a machine in different emotional states then these attributes of our voice will differ. Once the machine decodes the instructions spoked by the user, it must then

begin to decode the emotional state of user. The final action taken by the machine depends on instruction given by the user as well as the emotional state of the user. The next part is to provide the output which machine will definitely provide. But the most important part of man machine interaction is to provide acknowledgements at multiple stages. We always observe that machines provides emotionally insensitive acknowledgements.

The following example will distinguish between emotionally sensitive and emotionally sensitive acknowledgement. Suppose a user inputs a command to process a data and he want the results fast. And he says machine to do it fast otherwise it will cause him a big loss. On listening to this, the emotionally insensitive machine will continue to perform the task which it is doing in a regular way. Also there is no acknowledgement to user during the process. It will possibly only represent the status of process. But an emotionally sensitive machine will understand that user really need result fast. So to achieve this, it will reschedule its tasks in such a way that user's process gets maximum priority, maximum resources, maximum CPU time and the other process gets a reduction in priority, time and CPU cycles. In addition to it the machine also provide an acknowledgement by giving a message that tells user that he must not worry, his work has been allotted a top priority and the work will be completed soon.

Here, the *emotionally sensitive machines* refers to the machines possessing emotional intelligence while the *emotionally insensitive machines* refers to the machines lacking emotional intelligence. The acknowledgement messages such as one generated in above example will help to enrich man-machine interactions because now the user know that his machine is actually working according to his needs. The application of emotional intelligence for man machine interactions is limitless. The machines also keeps a track of user's emotional state which helps it to take actions that can comfort user and increase his productivity.

V. BLOCK DIAGRAM FOR AEI IMPLEMENTATION ON MACHINES
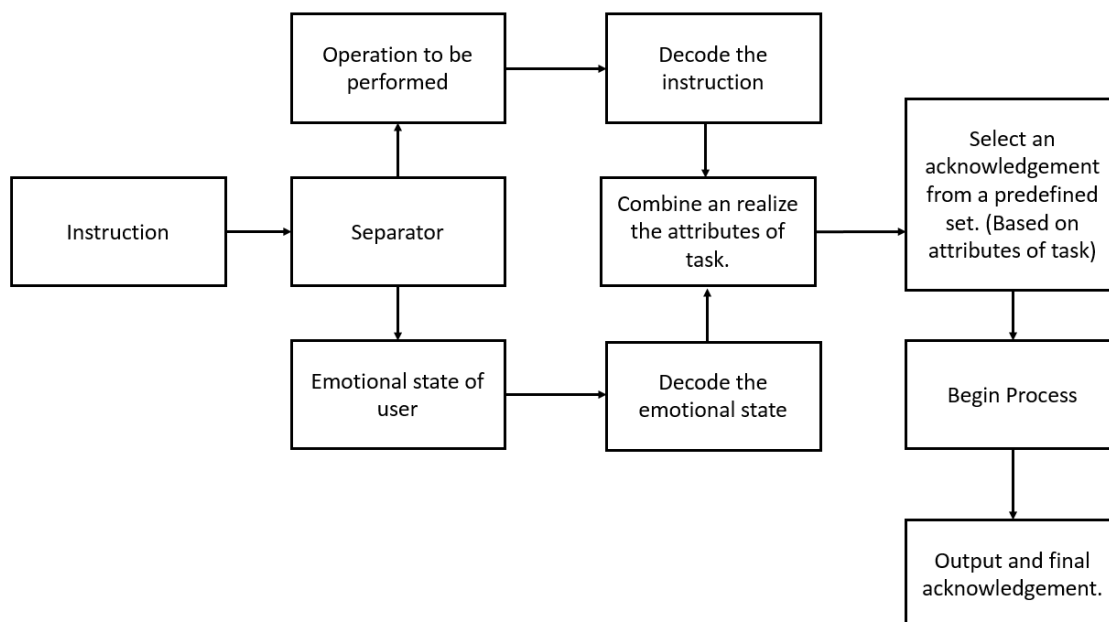
VI. ALGORITHM FOR AEI IMPLEMENTATION ON MACHINES

1. Get inputs.
2. Break the inputs into instructions and store the instructions in an array called instruction array.
3. While element exist in instruction array perform steps 4 to 11.
4. Separate instruction in two parts (i) the operation to be performed and (ii) emotional state of user.
5. Decode the operation.
6. Decode the emotional state.

7. Combine the result of step 5 and step 6 to get the attributes of task.
8. Select acknowledgement from a predefined set (based on attributes of task).
9. Begin the process of instruction.
10. Store the output in output array.
11. Delete the processed instruction from instruction array.
12. Acknowledge user about instruction processing completion.

VII. CONCLUSION AND FUTURE WORK

On the basis of above work regarding human to human interactions and human to machine interaction I am able to devise a block diagram and an algorithm that can be useful to implement emotional intelligence in machines. In addition to it, my study is capable of identifying the some of the applications and benefits of using AEI in machines for increasing the productivity of people. The future work involves the implementation of devised algorithm and practically testing it on machines in working environment.

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BIOGRAPHY

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