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A Review on Emotional Intelligence for Artificial Intelligence

Prof. A. A. Dande, Payal S. Arora, Chetan G. Mawle
Computer Science and Engineering, Anuradha Engineering College, Sant Gadgebaba Amravati, Chikhli, India

ABSTRACT

The Emotional Intelligence has turned up as an important platform for research in Artificial Intelligence. Learning determinants are very galvanic for embodies of emotional aspects in Artificial Intelligence. Emotions have an earthshaking role in intelligent behavior and have impact on decision making power of human. This paper emphasis on Emotion Detection, Expressing Emotions, Embodiment, Machines with Emotional Intelligence, Emotional Intelligence, and different forms of learning, emotions in robotics and Artificial Intelligence. The question of how is easily understood by the machine but the question of why is what Emotional Intelligence tries to make it understand. Emotional Intelligence tries to make machine understand the human perspective of the reason behind the emotion displayed.

Keywords : Emotional Intelligence, Artificial Intelligence, Emotion Detection.

I. INTRODUCTION

Emotions are everything we sense, see, hear, smell, taste, and touch. The five core emotions are fear, anger, happiness, sadness, and shame. The ability of agents to understand the emotion is known as emotional Intelligence. Emotional Intelligence is categorized into two parts first is personal competence, consisting of self-awareness and self-management and the other is social competence, consisting of social awareness and relationship management. Many learning agents in the field of Artificial Intelligence are working towards the artificial agents having emotions embedded into it. In this paper, I am going to present the movement of Artificial Intelligence moving towards Emotional Intelligence.

Emotions and Intelligence are coordinate aspects and therefore emotions must be given an importance while designing a true intelligent agent. Emotional Intelligence deals with the several aspects such as modelling , recognition and control of human emotions. The Emotional Intelligence considers one's ability to observe , understand , manage and express emotions of themselves as well as others at the same time simultaneously.

II. LITERATURE REVIEW

In the recent past, neuroscience and psychology research findings about emotions are increasingly attracting the attention of many researchers in Computer Science and Artificial Intelligence (AI) areas[1]. These areas are especially interested on new scientific beliefs that emotions play an important role in human cognitive processes and about its importance for problem eliminating competence and decision-making. Even if, since 1872 Darwin's evolutionary theories indicated that emotions are evolved phenomena with important survival functions

that have helped us solve certain challenges during our evolution, only recently emotion association with impracticality idea and non-logical behavior in human beings was examined. The discourse started in early twenties when propounded two theorems of incompleteness and claimed the inevitable and inherent limitations of artificial intelligence. One such limitation that amazed the world was detected by the famous logician in 1931 in his two Incompleteness Theorems. In the past, for many years the main belief was emotions are an abominable product of the human rational mind, and thus the less emotional a person was, the more intelligent and reasonable he would be. One of the first researchers who went against this belief was who proposed that the rationality was closely connected with emotions. Damasio presented his main investigations in his book "Descartes_ Error, Emotion, Reason and the Human Brain" Human being is emotional and emotions thus control our everyday behavior and as an influence emotions affect our work. Goleman in his book "Working with Emotional Intelligence" quoted several psychological studies carried out by big companies to their employees to show the importance of a person's emotional quotient (EQ). The IQ of a person can be used to determine a person's cognitive capabilities for a given job but the EQ is also required to predict whether this person will succeed or fail in that job. Different studies showed that the IQ alone cannot explain the ability of a person in 25% of the cases, more detailed inquiry showed a relation even worse 10%. Therefore, abilities measured in terms of IQ, accuracy, efficiency, power and speed is not of sole importance.

III. ARCHITECTURE

Many researchers in the artificial intelligence and the human computer interaction have started taking emotions quite seriously only in the late 1990s. Picard gave a framework for building machines with the emotional intelligence. Parallely, many other researchers in this area have built machines that can reason about emotions, and also detect, handle, understand and express emotions. Efforts in building the emotionally intelligent entities continued to be concentrated on the following areas:

- ✓ Empowering machine to detect emotions
- ✓ Enabling machine to express emotions
- ✓ Embodying machine in a virtual or physical way.

The application of the emotional intelligence in real domains led to an important field of research called multi-agent systems (MAS) in order to exploit logical methods for providing a rigorous blueprint of how emotions should be implemented in an artificial agent.

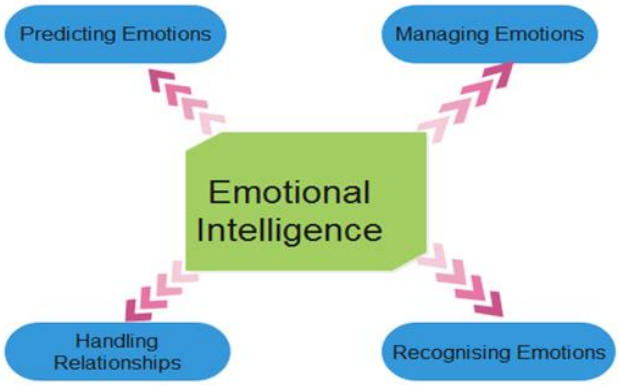

Figure 1 : Domains of Emotional Intelligence

Recent research work in emotional intelligence for artificial intelligence has been focused on enabling software agents to:

- ✓ Detect emotions via verbal, non-verbal, and textual cues
- ✓ Express emotions through speech and gestures
- ✓ Recent active research in AI has addressed modeling and communication of emotional contents leading to the areas technological challenge is to build machines capable of the following:
- ✓ Reasoning about emotions
- ✓ Predicting and understanding human emotions

- ✓ Processing emotions while reasoning and interacting with a human user

Models of Emotions

Prior to understanding efforts in this space, one must have an understanding of the various models of emotion that are incorporated into systems. The choice of model is completely dependent on the task at hand; namely what dimensions of emotion can be gleaned from the available input signal, what model lends itself best to internal reasoning within a system, and what type of emotional expression the system aims to accomplish. The simplest model is one of valence (positive or negative) and intensity, where sentiment is represented as a single score between -1 and +1, where -1 denotes the most intense negativity and +1 corresponds to the most intense positive score. A slightly more complex model adds the dimension of dominance (a scale from submissive to dominant). In this model, the intensity dimension is called "arousal" (a scale from calm to excited). This more complex model is commonly known as the VAD model, which stands for valence, arousal, and dominance (or PAD where valence is replaced by the synonym "pleasure"). This model is commonly used in measuring emotional reactions in humans as these dimensions lend themselves well to this task. A more commonly known model is Ekman's six emotions model – happiness, sadness, anger, fear, surprise and disgust. This six dimensional model is intended to characterize emotional facial expressions and is typically used in systems that intend to express emotion in interaction with users. A mapping between the VAD and Ekman models exists in order to facilitate building systems that both detect and express emotion. For example, a low valence, high arousal, and low dominance VAD score maps to fear in the Ekman model, whereas low valence, high arousal and high dominance maps to anger.

Detecting Emotions

There are many modern research systems that can be used to exemplify this concept in a classroom setting, including systems that detect emotion in speech, in facial expressions and gestures, in bodily cues, and in text. While there is a wealth of examples of projects in this space, AI course, typically introduce the notion of detecting emotion by presenting own work in this space, detecting emotion in text.

The system mainly known as RTS (Reasoning Through Search), uses a machine learning access for the task of distributing a given piece of text within the valence/intensity model of emotion. Other comparable systems have been assembled based on the other models of emotions.however, this system was finite to the ostensibly simple task of ranking a selection of text on the extent from -1 to +1 (extremely negative to extremely positive). The system is trained on 106,000 movie and product reviews, where star ratings (from 1 to 5) served as truth data.Given the task at hand, a completely statistical approach performs below par because of the discrepancy between the emotional overtone of some words between domains/contexts.

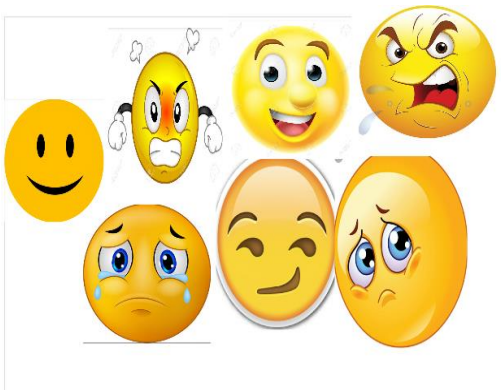

Figure 2 : Emotion detection through facial expression.

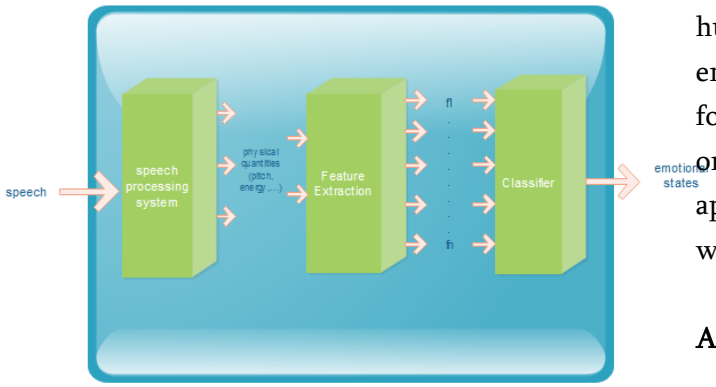

Figure 3 : Emotion detection through speech.

Figure 4 : Emotion detection through text

Expressing emotions :

Emotional expression within computer systems is commonly focused on applications engaging speech and/or facial expressions/gestures. Again, a overabundance of work exists in this space, all of which would engage students in a classroom setting, including systems that experiment to automate gestures and expressions for an epitome, and those that boost emotional expression through computer generated speech.

Embodiment:

Finally, the embodiment of a system facilitates a more personal connection between machine and user. People often attribute other human characteristics to a system when it perceives it as somewhat human/animal looking. This not only results in emotional connections, but it makes users more forgiving when the system makes a mistake. Many online systems in e-commerce, tutoring and training applications have recently begun embodiment as a way to engage/connect with users.

Areas of Emotional Intelligence:

The four areas of Emotional Intelligence, as identified by Mayer and Salovey, are as follows:

✓ Identifying Emotions:

The ability to recognize one's own feelings and the feelings of those around them.

✓ Using Emotions:

The ability to access an emotion and reason with it (use it to assist thought and decisions).

✓ Understanding Emotions:

Emotional knowledge; the ability to identify and comprehend what Mayer and Salovey term "emotional chains" that is transition of one emotion to another.

✓ Managing Emotions:

The ability to self-regulate emotion s and manage them in others.

IV. ADVANTAGES AND LIMITATIONS

Advantages:

Following are the Advantages of Emotional Intelligence:

✓ Understanding human situations and
✓ emotuions.
✓ Takes risks instead of human.
✓ Available 24x7
✓ Helping in respective jobs.
✓ Digital assistance.
✓ Faster Decisions.

Disadvantages :

There are few limitations of Emotional Intelligence:

- ✓ High costs of creation.
- ✓ Making humans lazy.

V. CONCLUSION

Although emotion has been researched for decades, it's still far away from being accurately recognized or expressed by machines. Computer scientists are using deep learning to utilize data, but cognitive scientist and neuroscientists haven't found a common and useful model to to deal with emotion. There is still a long way to go to achieve emotional intelligence before we figure out what emotion is.

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