International Journal of Computer Applications Technology and Research
Volume 6–Issue 2, 91-96, 2017, ISSN:-2319–8656

Emotions in Humans and Intelligent systems

(In terms of 'Classical Indian Philosophy' and Marvin Minsky's 'The Emotion Machine')

G. Gnaneswari
Asst. Professor, New Horizon College,
Research Scholar (Jain University),
Bangalore, India

M.V. Vijayakumar,
Professor and PG Coordinator,
Dr. Ambedkar Institute of Technology
Bangalore, India

Abstract:

Today 'Emotional Intelligence' has become a popular field of research. This paper compares and contracts the cross cultural philosophies with cognition in today's digital world Artificial Intelligence. In this paper we discuss about what Indian philosophy has to say about human beings and their emotion which is completely different from what is believed to be the right thing in today's psychology. That is because beliefs change with time. The belief of our ancestors is not what we believe today. And with these changing times if we have to build a machine with human intelligence that can understand emotions then it is a challenge. This makes the study quite interesting.

Keywords cognition, conversational agent, emotion, cognitive architecture, speech processing, behaviour, belief, philosophy.

1. INTRODUCTION:

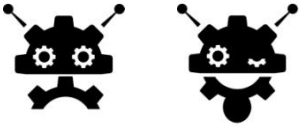
There is a Common belief that 'emotions are the one thing that will differentiate humans from machines', so people who do not emote are criticized to be behaving like robots. The reason for human behaviour, can be due to the environment, the state of mind, the state of body and his/her belief/approach towards life. This will change from birth as he grows and experiences new things.

On the other hand, machines or robots are usually used only for automation. We hear people say 'But nothing made of mechanical stuff could ever have genuine feelings like love.' They are not expected to have emotions for that kind of a job. But things are changing today; service industry wants to know all about the customer. In places like social networks he/she is been closely watched/tracked in order to predict his/her behaviour. So we may need robots with cognition as that of a human.

So generally it is believed that humans can be humans only when they have emotions, and machines will not have emotions. So these are the

two beliefs that will be discussed in this paper keeping in mind the eras they belong to. Thus in this paper we will discuss about What Indian philosophy has to say about human emotions? , What cognitive scientists have to say about emotions in machines?, And how similar/dissimilar are the answer to both the questions?

It also says that liberation from emotions and realisation of true self are the key to the vedantha philosophy.



2. INDIAN PHILOSOPHY:

Indian Philosophy talks how human should get rid of emotions to reach the almighty. But in today's world, human beings without any emotions are criticized as robots.

In Indian classical philosophy, term used for cognition is 'gnana' which is a mental phenomenon. The various emotions in Sanskrit are vedanā (feeling), bhāva (feeling), rāga (love, attraction), dveṣa (hatred), harṣa (joy), bhaya (fear) and śoka (sorrow). [1]

Many Indian philosophers regard 'emotion' is an obstacle to rational thinking and acquiring right knowledge.

For instance, 'Nayaya-vaisesila' philosophy involves a strict division into cognition and mental phenomena like feelings. It also treats emotions and dosas (defects) or upadha (impurities) which is the result of mithyajnana (ignorance). Thus according to Nayaya-vaisesila ' final liberation is the ultimate aim and final liberation means the end of cognition.'

The 'vedanta' philosophy refers to mental qualities, such as manas (mind),buddhi (intellect), vijñāna (cognition) or citta (consciousness).

Both these philosophies distinguishes emotion and feelings. But Sāṃkhya philosophy account to puruṣa (consciousness) and prakṛti ("reflection", "activity" ,"inertia" etc.,). [1] It says that in order to experience a conscious intellect with cognition, emotion is an obstacle. The goal remains attaining pure contentless consciousness.

Interestingly, Patañjali Yoga philosophy claims that "the mind is 'coloured' by all of the objects it knows, including cognitions and emotions" which is very close to the western philosophy. [1] Western philosophy preaches the idea having cognition that free of emotions.

Thus most Indian philosophies wanted to get rid of 'emotions' which prevent liberation. Even 'cognition' is not accepted or eradicated completely; only the concept of vijñāna (knowledge part of cognition) was accepted.

In the so called modern philosophies such as the "ISHA" basses its programme known as the "Inner Engineering" on "Anaithukkum Assai Padu" meaning desire (emotion) everything.

Contrary to all the above beliefs, the psychologists of today talk on the need for emotion and cognition in humans. In psychology, emotions are attached to cognitive and biological changes taking place inside the human. They say emoting and expressing oneself will save you from loneliness and depression.

3. MARVIN MINSKY'S EMOTION MACHINE:

Here is what Dr. Marvin Minsky says in his book 'The Emotion Machine" about why and how can machines have emotions. The main difference between human and machine is that humans evolve in every way intellectually, emotionally etc., Minsky argues how can cognitions such as emotion, commonsense, consciousness can be programmed to a robot. He says that 'none of those popular psychology words refers to any single, definite process instead of those words attempts to describe the effects of large networks of processes inside our brain'. There cannot be anything that is only pure logic and rational because in humans cognition is affected by assumptions, values and purpose.

4. SPECTRUM OF EMOTIONS USED IN BUILDING A CONVERSATIONAL AGENT:

A speech contains information such message, speaker details, language specific intricate details, emotion etc. In a conversation, Agent 1's dialogue contains all these details; if Agent 2 has considered all these element except his emotions while replying, then reply will be robotic. Thus reading the emotions from a conversation becomes pertinent. This paper talks about the need for the study of emotions in developing a Cognitive Conversational Agent. One of the key tasks in building a Cognitive agent is to understand the emotions of the Agent1 inorder to efficiently reply to Agent 2. Since emotions cannot be simply pinpointed a spectrum representation of emotion is essential for the study of emotions.

Study of emotions is becomes a must in the process of building an emotional conversational agent. Researchers have come up with various analytical methods to understand emotions from speech. Today Conversational agents are not about just conversing with human with proper syntax and semantics. Pragmatics has become a significant part of this particular study since the other parts are already been taken care.

Though many research work has been done on emotions in speech; this study uses the following methods: (i) 15 sentences pertaining to different emotions (ii) The speech signal is sampled at 16 kHz, and represented as16 bit numbers (iii) LSTM / RNN / HMM is used for sampling (iv) Audio is represented by spectral features like Mel-frequency cepstral coefficients (MFCC) and linear prediction cepstral coefficients (LPCC) (v) Training and

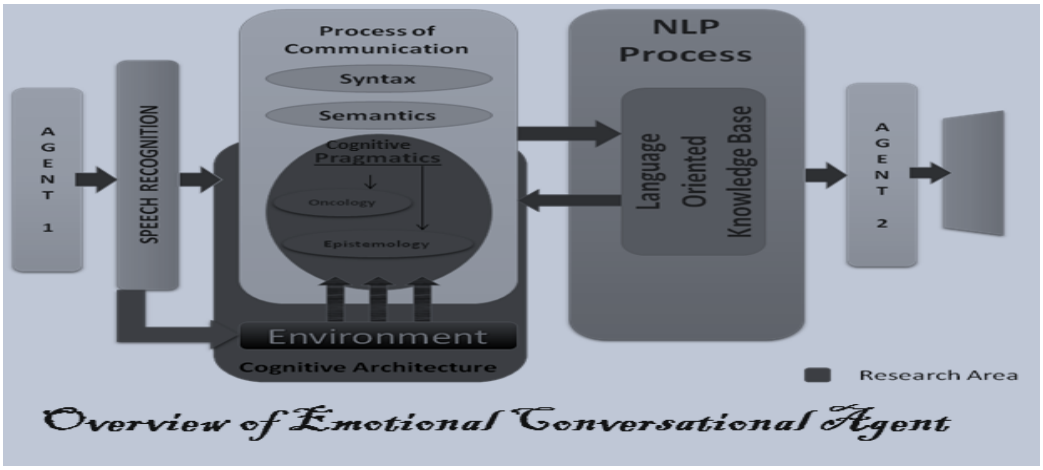
Testing code written using Matlab DSP.

For example in the following research, each experiment, the highest recognition accuracy achieved, its variance, the inputs features and clustering parameters used, is listed in Table.[2]

Thus there is possibility of measuring humans emotions.[3] These can be used by agents as input and make it capable of decision making.

All Speakers						
Experiment	Features	Distance Measure	Centroid	Iterations	Recognition Accuracy	Variance
despair-elation	MFCC	L1 norm	UDC	100	75.76%	1.74%
happy-sadness	MFCC	L1 norm	UDC	1	77.91%	14.34%
interest-boredom	Pitch	L1 norm	UDC	100	71.21%	2.48%
shame-pride	MFCC	L1 norm	UDC	1	73.15%	3.23%
hot anger-elation	MFCC	L1 norm	UDC	1	69.70%	10.75%
cold anger-sadness	MFCC	L1 norm	UDC	1	75.66%	3.35%

4. EMOTIONAL CONVERSATIONAL AGENT ARCHITECTURE:



In the above paper a model of the Conversational Agent for communication between two perceptual agents keeping in mind all the various factors that are involved in developing a Conversational Agent is designed. This research paper emphasizes on 'Cognitive Pragmatics' for developing a Conversational Agent based on Cognitive Architecture. [6]

There understanding of the conversation can be based on the content of the speech, facial

expressions of the speaker or by the features extracted from the emotional speech[5]. These three elements comprises of the environment.

Future study:

The study of human mind and its development helps in designing a cognitive architecture for robots. How can an architecture be designed by using Indian philosophy's idea of a working mind and also the psychology behind the human mind. Such cognition studies paves way to building intelligent systems in terms of their thinking and their actions. A very interesting research area building intelligent systems in terms of the way they think and converse. Problems that work is happening now are common sense, consciousness, belief-intention-desire, decision making, goal driven, etc in solving simple and complex problems.

6. CONCLUSION:

Thus it was right when it was believed yesterday that suppressing all the human emotions is a way to reach almighty and those machines will and need not emote. But today beliefs have changed. Psychologists say that it is best to express your emotions and not suppress them. Cognitive scientists have also understood the need for machines with cognition and are working on developing cognitive machine. Only these researches can pave the way towards creating robots which behave just like humans not just physically and mentally but emotionally too. This paper also concludes that conversational agents should be built keeping in mind the emotions.

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