

MIND READING COMPUTERS

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ABSTRACT

Mind reading is a way to detect or infer the other's mental states. The simplest way for mind reading can be done by simply seeing and understanding the facial expression. For example a smile can give us an expression of happiness. But now it may be possible that not only one human can understand other's mental states but also a computer might understand the mental states of a person. This paper describes the ways how a computer might infer the mental state of a person and thus becomes the mind reading computer. This paper emphasize on the ways by which a computer might infer the mental state, one method is by facial expression analysis (FEA) and the second one by using a futuristic headband.

INTRODUCTION

Mind reading computer may be defined as a machine that infers the human being's mental states. The understanding of a human's thoughts is one of the most complex tasks. No one knows what a person would do in the upcoming second by executing his present thoughts or what would a person thought about any other person or what would a person desires and many more. But a mind reading computer could give answer to all these questions.

Mind reading computer infers the thoughts of a human being based on various technologies for example by scanning the facial expressions along with head gestures and by identifying the volume and oxygen level inside the blood which is flowing in the vicinity of the brain. With

exponential development in the technologies we can say that in future we might have number of technologies that will lead into making the flawless mind reading computer.

The ability of mind reading by a computer can provides us many applications in the field of medical, crime and one's life also.

MIND READING & NECESSITY OF MIND READING

Mind reading may be defined as the inferring of the human thoughts, emotions and desires etc. First simplest step of mind reading is by simply understanding the facial expression given by the person as people express their mental states mostly through facial expressions and gestures. No matter whether they are interacting or not. Our mental states shape the decisions that we make, make us react the way we react in a particular situation and thus affect our performance. All over our thoughts are the causes of all the things that are happening. Imagine what happened if we have a computer that can reads mind and after predicting the mental states , if there is any wrong intention possess by any person we can prevent it. And what happened if a wrong intention can be changed into good one by a computer. A computer that can reads and moulds the emotions into the required one, especially in case of a criminal; here no need for a stringent punishment rather a computer is required that can change the mind and hence make the better world than it is now. However, this technology by computer, to change the mind according to a desire is not established now. But in future it might be developed some day. So for all this

mind reading computer is just the basic step. Also consider a situation where we are surrounded with mobile phones, online services and cars and the all these systems can read our minds and react accordingly. It makes life so easy as by just thinking we can order our system to work accordingly. Moreover it becomes a boom for a physically handicapped person because he will be able to drive a car, access online services and mobile phones just by thinking. All we can do is to give a mind reading machine that will be able to read mind by scanning the facial expression.

The mind reading computer system might also be used to monitor and suggest improvements in human-human interaction. The affective computing group at the MIT Media laboratory is developing emotional-social intelligence prosthesis that explores new technologies to improve people's social interactions and communication skills.

Thus mind reading is necessary for all this to make happened.

MIND READING COMPUTER

The team member of University of Cambridge had been working on a model of mind reading in a computer laboratory and has developed mind reading machines that implement a computational model of mind reading to infer mental states of human being from their facial expressions and head gestures.

The machine works by using digital video cameras which analyzes a person's facial expression in real time and infer person's underlying mental state such as thinking, confused, interested, bored, agreeing, disagreeing, happy, sad and angry.

Prior knowledge of how particular mental states are expressed by the facial expressions and head gestures and storing it in the database of the machine and then by

matching to give the mental state. The model represents these at different granularities, storing with face and head movements and representing those in 3D space to form a clear model of which particular mental state is represented by which facial expressions and head gestures. Software from Navention identifies 22 feature points on the face and tracks them in real time. Movement, shape and color are the parameters which are then analyzed to identify gestures like a half closed eyes and open mouth. Combination of these occurring over real time indicates mental states. For example inner raise of eyebrows might indicate thinking.

FACIAL ACTION UNIT ANALYSIS

It is done by facial Action Coding System (FACS) [Ekman, 1978]. It could analysis facial action units by examining pitch up and down, yaw left and right, lip pull, lip pucker, depress and stretch, mouth stretch, jaw drop, lips apart, eyebrow raise inner and outer etc.

HEAD POSE ESTIMATION

It use expression – invariant feature points to estimate pitch (50^0), yaw (50^0) and roll(30^0) for example estimation of head yaw using ratio of left point to right point of eye widths and estimation of head roll using the angle between the two inner eye corners.

Facial actions are identified from feature points comprised of motion, shape and color descriptors. Motion and shape-based analysis are particularly suitable for a real time video system color based analysis is computationally efficient and is invariant to the scale or viewpoint of the

face, especially when combined with feature localization (i.e. limited to regions already defines by feature point tracking).

For lip shape tracking that identifies for example lip corner pull(smile)and lip pucker the polar distance between each of the two mouth corners and the anchor point is computed. The average percentage change in polar distance calculated with respect to an initial frame is used to discern



mouth displays.



Color descriptors can tell that whether the mouth is closed or open by differentiating the teeth and aperture by different color. For example teeth are represented by green color and aperture is represented by red color.

Another way of mind reading could be accomplished by using a futuristic headband which is to be wears over the head.

In this way measurement of volume and oxygen level of the blood around the person's brain is

done, using technology called functional near-infrared spectroscopy (FNIRS).

The futuristic headband sends light in infrared spectrum that penetrates the tissues of the head where it is absorbed by active, blood – filled tissues. The headband then measures the light which was not absorbed, and then making the computer to measure the metabolic activities that the brain is making. The results are often compared to an MRI.

Another way or we can precisely say another technology of mind reading is existed in which electroencephalograph, a device used by medical researchers to pick up electrical currents from various parts of the brain. If we could learn to identify brain waves generated by specific thoughts, emotions or desires, we might be able to teach same skill to the computer.

Note: add your own diagram using paint or ms word

ADVANTAGES AND APPLICATION

Mind reading computer could help paralyze patients, handicapped people, and people have been in comma, people who cannot speak.

For example a prototype mind controlled wheelchair developed from the University of Electro Communications is Japan. This works by mapping brain waves when you think about moving left, right, forward or back and work accordingly.

Mind reading computer can be used in military purposes, sting operations and severe investigations (as in the form of lie detector).Mind reading computer can prevent from terrorism.

Also it can be combined with consoles and used for mind gaming.

DISADVANTAGES

It can be breaches in privacy and can extract important and confidential information through the person which may be about the country. In this way information may be gained by any terrorist or criminal then it can be highly dangerous. Also these mind reading computers cannot be 100% accurate as human mind is much more complex than a computer, after all human had created the computer. But the accuracy could be reached up to 86.4%.

CONCLUSION

This paper describe mind reading computer that infers mental states from facial expressions along with head gestures in real time video. The mental state is recognized by comparing the present real time video with the preinstalled videos which contain different expressions for different mental state (represented by various actions).

The other way of detecting the mental state is to be done with the help of futuristic headband which sends Infrared light into head's tissues which absorbed the light, the amount of light which are not absorbed help in detecting the various mental states.

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