

Mind Reading Computers

Alin Jose
M Sc Computer Science
St .Mary's College
Thrissur

Abstract—Mind reading computer are machines to infer the mental states of a person. The simple way to infer the mental states of a person is to observe him. We can infer his mental states by seeing and understanding the facial expression. Now a days a computer can infer the mental states of a person. A computer uses different ways to infer the mental states. They are facial expression analysis (FEA), using futuristic headband, Eye Language Interpreter, Baron-Cohen's Mind reading system. The ability to read the mind and the language of eyes are the two area for the development of social function and the emotional intelligence in humans. An impairment in the theory of mind (mind blindness) is the primary inhibitor of emotion understanding and social intelligence in individuals with autism. This paper says about the mind reading based on an Eye Language Interpreter, Baron-Cohen's Mindreading System, facial expression analysis (FEA) and by using futuristic headband.

Keywords — Futuristichheadband, facialexpression analysis socially intelligent interfaces,emotional interfaces,theory of mind,eye language,facial feature analysis.

I. INTRODUCTION

Mind reading computers can be defined as a machine that infer the human being's mental states. To understand a human's thoughts are complex one. No one knows what a person do in the upcoming second by calculating his present thoughts or what would a person takes decision about something important. But a mind reading computer can answer to all these questions .Mind reading computer can detect the other person's mental states .By scanning the facial expression along with the head gestures and oxygen level inside the blood which is flowing in the vicinity of the brain.

Eye language also helps us to recognize basic emotions such as happiness, sadness, fear, and disgust as well as complex mental states such as distrust, scheme, admire, interest etc. Mind reading computers helps in various fields such as medical, crime, and one's life also.

The lack of knowledge in the theory of mind (mind blindness) is the primary inhibitor of emotion understanding and social intelligence in people with autism, we propose integrating eye expression analysis and a theory of mind, to implement emotion recognition and prediction in interfaces.

A theory of mind is a representational set of abilities that allows one to mind read .In his book on Mind blindness, Baron-Cohen explains how neurotypicals mind read all the time, effortlessly, and mostly unconsciously and contrasts that with the abilities of individuals with autism. Baron-Cohen says that the primary inhibitor of emotion

understanding and social intelligence in people with autism is the lack of a theory of mind or mind blindness. This inability to read other people's minds continues to affect their social and communicative functions well into adult life.

II. MIND READING COMPUTER

A. FACIAL ACTION UNIT ANALYSIS

This 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.

B. HEAD POSE ESTIMATION

It uses expression -invariant feature points to estimate pitch(50°), yaw(50°) and roll(30°) 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. Average percentage change in polar distance calculated with respect to an initial frame is used to discern mouth display.



Figure 1: Frame Is Used To Discern Mouth Display

Color descriptors can tell that whether the mouth is closed or open by differentiating the teeth and the aperture by different color. For example teeth represented by green color and aperture is represented by red color. Mind reading computers can also be accomplished by using a futuristic headband which is to be worn over the head.

The measurement of volume and oxygen level of blood around the person's brain is done using technology called functional near infrared spectroscopy (FNIRS).

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.

C. EYE LANGUAGE INTERPRETER

Use Baron-Cohen's research on a language of the Eyes to develop an automated eye language interpreter that recognizes eye expressions off image sequence and interprets them as mental states.

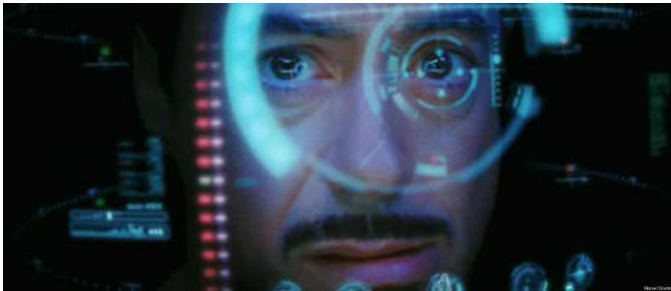


Figure 2: Eye Language Interpreter

D. MINDREADING SYSTEM

Mindreading system which consists of four modular components for our implementation.

The Intentionality Detector (ID) interprets the self-propelled motion of stimuli in terms of primitive volitional mental states of goal or desire. It builds dyadic representations, which specify the relation (desire) between an agent and an object.

Eye-Direction Detector (EDD) detects the presence of eye-like stimuli in the visual field, computers whether the eyes are looking at it or at something else, and interprets gaze direction as a perceptual state.

The Shared Attention Mechanism (SAM) is held to be necessary for the development and protection of joint attention behaviors. SAM like ID toed by importing volitional terms from dyadic representations, into the relation slot of triadic representations, such that a person's goal can be read from their eye-direction.

The theory of Mind Mechanism or (ToMM) is responsible for our everyday ability to make sense of behavior in terms of mental states, and predicts an Agent's behavior on the basis of such states.

III. ADVANTAGES AND APPLICATION

- Mind reading computer can help paralyze patient handicapped people, and people have been in comma, people who cannot speak.
- It can be used in military purposes, sting operation and severe investigation.
- Mind reading computer can prevent from terrorism.
- It can be combined with consoles and used for mind reading.

IV. DISADVANTAGES

- It can breaches in privacy and collect important and confidential information.
- Information can be gained by criminals or terrorist then it can be highly dangerous.
- Mind reading computers cannot be 100% accurate as human mind.

V. CONCLUSION

Mind reading computers are machines used to detect the mental states of a person. And use that to make sense of and predict the behavior. Mind reading computers that infer mental states by observing facial expression along with head gestures in real time video. The present real time video is compared by pre-installed videos which contain different expression for different mental state.

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

A mind reading computer based on an Eye Language Interpreter and Baron-Cohen's Mind reading System is developed for the recognition and prediction of complex mental states of a person. A lack of or impairment in the theory of mind (mind blindness) is the primary inhibitor of emotion understanding and social intelligence in individuals with autism.

The implicit mind reading capabilities will open new possibilities for intelligent and effective interfaces. The upcoming years will uphold the mind reading computers as common to common peoples.

ACKNOWLEDGMENT

I would like to acknowledge the contribution of all the people who have helped in reviewing this paper. I would like to give sincere thanks to Miss .Betsy Binu our head of department for her guidance and support throughout this paper. I would also like to thank our families and friends who supported us in the course of writing this paper. For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation.

REFERENCES

- [1] Baron-Cohen,S.1993.From attention-goal psychology to belief-desire psychology:the development of a theory of mind and its dysfunction.Understanding other minds:perspectives from autism.Baron-Cohen,S.,Tager-Flusberg,H...,and Cohen,D.J. Eds.Oxford University Press.
- [2] Baron-Cohen,S.1994.How to build a baby that can read minds:Cognitive mechanisms in mindreading.Current Psychology of Cognition13(5):513-552.
- [3] R.EL Kaliouby and P.Robinson-Automated Interference of cognitive mental states from Video,Computer laboratory University of Cambridge UK.
- [4] Mindreading and the Cognitive Architecture underlying Altruistic Motivation*by Shaun Nichols.
- [5] Deak,G.,Fasel, I., and Movellan,J.R. 2001.The Emergence of Shared Attention:Using Robots to Test Developmental Theories.First International Workshop on Epigenetic Robotics:Modeling Cognitive Development in Robotic Systems.
- [6] Ekman,P. and Friesen,W.1978.facial Action Coding System:A technique for the measurement of facial movement.Consulting Psychologists Press.
- [7] THEORY OF MIND IN INTELLIGENT USER INTERFACES Rana EL Kaliouby Computer Laboratory,Unversiy of Cambridge Rana.elkaliouby@cl.cam.ac.uk and Peter Robinson Computer Laboratory,University of Cambridge Peter.Robinson@cl.cam.ac.uk
- [8] www.slideshare.net/salavathrenathi/mindreadingcomputer.
- [9] Gallagher,Helen L.and Frith,Christopher D."Functional Imaging of 'Theory of Mind'5."Trends in Cognitive Science,2003,7(2),pp.77-83.
- [10] Dennett,D.1987.The Intentional Stance.MIT Press.
- [11] Baron-Cohen,S. 1995.Mindblindness:an essay on autism and theory of mind .MIT Press.