

## the Appliance of Affective Computing in Man-Machine Dialogue

### Assisting Therapy of Having Autism

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**Abstract**—With the rapid development of the economic in the social environment, more and more children have the affective solitude phenomenon. How to combine affective computing with man-machine dialogue is a significant research problem so that it can cause emotional communion when the computers are used by children. I try to introduce affective computing in the field of human-computer dialogue, identify and extract emotional information through the tested object, give the emotional intervention and, based on the specific research outcome, indicate its feasibility and effectiveness.

**Keywords**—component; Affective computing; Man-machine dialogue; Facial expression

#### I. INTRODUCTION

As China's economy grows stronger, people's living standard improves higher, our focus shifted from the material aspects to the spiritual aspects of life, especially our community, parents, schools, community, nation, pay attention to their psychological health education more and more. The survey shows that people about 1 in 500 suffers from autism, which is a comprehensive mental disorders, related with psychology, neurology, sociology, and many other aspects, but the specific reasons is not clear. Specifically, they were as follows: lack of emotional response to human, seriously affect the social interaction; words and non words intercourse and imagine activity serious decline; stereotyped, repetitive or ritualistic behavior, severely restrict their activities. When they face emotional problems, they will feel confused, and disorder in identifying others emotions, right to express emotion and emotional resonance. For the social phenomenon that young people like to be alone for the current lack of emotional intelligence, the author tries to introduce the concept of affective computing to the field of human-computer dialogue to make the children door of, able to interfere with certain emotions, it helps to open the child's for children by creating an space atmosphere "autistic" in the door when using computers, it will form a good mental health system full of emotion and warmth.<sup>1</sup>

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#### II. THE CHARACTERISTICS AND EMOTIONAL NEEDS OF AUTISM

Autism often have prominent memory, but most of them have difficulties in emotional understanding, lacking of emotional intelligence, especially emotional resonance, do not good at interacting with people. One of the symptoms of autism is like to maintain a fixed life patterns, and need to adapt slowly.

Goleman thought that it is an important indicator of emotional competence in human intelligence. But man are social product, it is not independent, for the perspective of sociology of emotions, it is the result of the interaction of the biological basis of emotions, culture and social structure. Autism who used to immerse themselves in the world, emotional evolutionary point of view, the basic assumption of human emotion itself, through the environment can produce a variety of wake-up forms of emotional expression, so that the people are tightly linked, promoting social solidarity, generating forms of social commitment.

As noted above, it maybe an effective method to help children with autism is that let them together with some of the people who have great emotional intelligence to be together, repeatedly dealing with a variety of situations to help them learn how to understand and respond. However, it often let people feel boring, then patience. But an emotions capable computer, can achieve the basic theory of emotion evaluate, so that the computer can also be organized for a variety of emotional scenes, and can effectively guide users to better understand how autism in social reflect aspects of skilled and be able to identify and respond to human emotions, which can effectively reduce the frustration when people use computers, and even help people understand themselves and others in the emotional world.

#### III. THE FEASIBILITY OF MAN-MACHINE DIALOGUE APPLIED TO AFFECTIVE COMPUTING

##### A. the Research of Affective Computing

Whether the computer has the ability to focus on emotion, it is created firstly by the United States Professor Minsky of MIT University. Minsky thought that computers should have the emotional ability, according to his monograph in 1985 he has announced that the question is not whether intelligent machines have any emotions, but rather how the machine can be intelligent without emotions, and

from then on it began to focus on emotion in the computer field . The affective computing first was mentioned and given the definition, which is from the MIT Media Lab, the U.S. research team led by Professor Picard which is the first began to study. Professor Picard in his published monograph "Affective Computing" firstly gave a definition: affective computing is the calculation about emotions, feelings and affect the emotional aspects .

The current computer is mainly based on logical reasoning systems, such systems have neglected the role of emotional competence. Damasio thinks, in the person's perception of emotional competence, planning, reasoning, learning, memory, decision-making and creative play such an important role. Therefore, in human-computer interaction, people naturally expect the computer with this emotional competence. The current study focuses on affective computing is through a variety of sensors for human emotion caused by the physiological and behavioral characteristics of the signal, the establishment of emotion model, to create a perception, recognition and the ability to understand human emotions and feelings can do for users a smart, sensitive and friendly response to personal computing system. The study currently in facial expression, gesture analysis, speech recognition and expression of emotion has made some progress. Affective computing research will continue to deepen the understanding of people's emotional state, perception of context improve the computer's ability to make computers become more and more "smart" ,and can contact with people natural ,warm and lively intelligence interaction.

#### *B. The characteristics of man-machine dialogue and its lack in emotional*

The characteristics of man-machine dialogue is a form of human-computer interaction. An important feature of man-machine dialogue is the use of immersive human-computer interaction, based on dialogue and continuous learning and the responsible object to select a different simulation situation, targeted to exert increased. Man-machine dialogue based on the environment, understanding of the psychological track conditions change is often overlooked. When learners can not understand and accept the learning content, they will produce anxiety, unpleasant, horrible emotions. Therefore, computer-based environment, tracking the status of emotion is necessary, the rapid development of information technology, makes the man-machine dialogue constantly changing.

#### *C. The combination of affective computing and human-computer dialogue, to help the lack of emotion autistic Feasibility Analysis*

When the learner is not good, we should adjust teaching strategies. Man-machine dialogue based on affective computing model is proposed, the facial expressions of the cognitive and emotional understanding of language was used to construct affective computing module, the emotional condition has been identified and understood. The corresponding emotional rewards and compensation made by a specific emotional state, with the help of autism awareness

of the emotional state through the machine is adjusted to achieve an ideal state of human harmony.

Picard team designed an emotional dialogue system, virtual human "Laura" can communicate with users through text interface experience physical exercise: if exercises complete objectives, Laura will commend him; if exercises not complete objectives, Laura will encourage him. After a period of "coexistence", the majority of users are more motivated to exercise and are willing to continue the communication with Laura. This technology will be used in the treatment of autism, it can make them be interested in learning and desired for flattering. In the role-playing scenario, the computer can help them according to their emotional reactions give the right feedback, so happy for them and sustained efforts to give rewards. Man-machine dialogue should not only high cognitive skills, but also have emotional intelligence, so that the use of man-machine dialogue can perfectly ease the symptoms of autism on. These two in man-machine dialogue to such an environment can achieve interoperability, so that children with autism to live in a conducive and pleasant atmosphere, play a positive role in mitigation.

### IV. THE DESIGN OF RESEARCH

#### *A. Research questions and research purposes*

As science and technology development and social progress, more and more children to feel the lack of emotion, more and more people need emotional comfort. In view of existing situation, the author try to lead emotional computing into the field of human-computer dialogue, through the test object was the extraction and recognition of emotional information, so that when children use the computer to be given a certain degree of emotional comfort, causing emotional exchange, but also to explore the emotional autism can be met to satisfy the new way.

#### *B. Research Principles*

The research is based on Facial Action Coding System(FACS) which is created in 1976 by the famous psychologist Paul Ekman and his research partner W.V.Friesen. The theory describes the corresponding between the different facial muscle actions and expressions which is foundation of emotional identification. They divide into 44 separate but related motor units, and analyze the expression of these motor units and the relationship between people. According to Facial Action Coding System (FACS) experimental results, no other incentives in effect, if not the subjects of their own experiences or made a wrong statement sends the wrong signal to the specific emotional facial expressions from the state (a single emotional state ) mapping accuracy was 88%, the results show that the emotions can be identified from facial expressions.

#### *C. The Mechanism of Specific Studies Designed*

Operation shown in Figure 1, the inner world of autistic subject will be re-establish by such a model. However, the scope of this study is limited to the recognition of facial expressions.

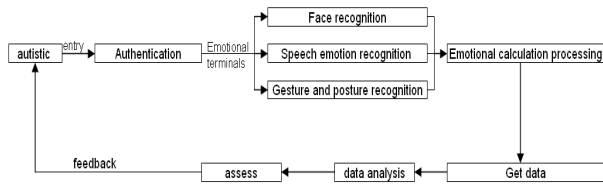


Figure 1. The emotional calculation model of man-machine interactive system

#### D. Study Design

##### 1) Subjects

Lonely in patients with sensitive and high self-esteem, feelings of vulnerability, taking into account a number of reasons, the object of the study subjects did not choose the selection of patients with autism tend to the child, the second is selected in the pubertal development of children, for the reluctant words, withdrawn and introverted high school students to study.

##### 2) the research process and methods

Investigated 56 students out of a high school In a city, half of whom were male. During the phase of achieving expression from the experimental group under the test of dialogue between human and computer ,proposed by the help of Wang Jijun emotional expression recognition based model (ACMBER) to be obtained, when using the computer, just start ACMBER system By taking pictures, collecting data, face detection and location, expression data extraction, classification of facial expression recognition, emotion understanding and emotion regulation during a series of process, who will be able to complete the expression of the measured, to analyze and identify the person transient emotional state, generating a series of data, managing data, understanding and creating emotion regulation strategy finally.

#### E. Results

Based on six basic expressions, Ekman defined: surprise, fear, disgust, anger, joy and grief, within three months of the measured object using a computer when a certain time expression data collected, there has been Figure 2 which shows the results of their test data tends to be more gentle, the data show an upward trend, after a combination of affective computing in human-computer dialogue, impact, to promote their development or have some positive effect.

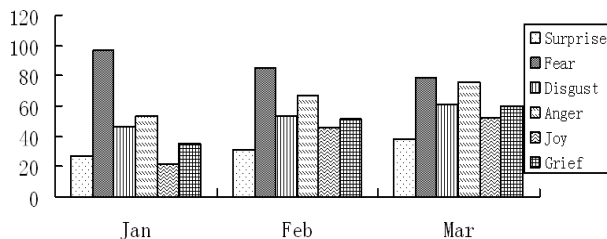


Figure 2. which shows the results of their test data tends

Measured from another point of view, combined with the situation in schools through the richness of facial expression, how many words the degree of concerning about the level of taking activity part in the school team, and the level of participating in collective activities in the school, the degree of interest in a wide range of voluntary exposure to the extent people the degree of willing to accept changes in the degree of investigating their teachers to reflect cognitive ability, behavior, emotional reactions, interpersonal communication, attitudes, changes in levels of these five dimensions, a survey of teachers of their teacher accepted the man-machine dialogue with affective computing child are subtle changes have occurred, they are more willing than before to express their ideas, like to see the students in the distance playing slapstick, his face showing a smile sometimes, even though they did not participate in, psychologically, or place than before changed.

#### F. Of Inadequate

This study is based on the limited conditions and technology, without a lot of tests .As a result whether other factors also have a slight impact besides the influence on students emotional change from affective computing system. Moreover, taking into account the child's self-esteem and personal privacy of the real situation of the study, subjects the object does not be with autism, while some students of the normal introversion, but the results indicate that the test object is gained a certain emotional effect. Although this study has many shortcomings, I believe that the "affective computing of man-machine dialogue system – assist the treatment for autistic persons is pregnant with the feasibility and a certain value.

#### V. CONCLUSION

Man-machine dialogue is still a very tender field which will be used in the field of affective computing research. There are a lot of unknown for us to explore, and it will be a meaningful issue of how apply to their specific research results to practical problems, to help community groups who need emotional comfort , in particular the young generation who are "increasingly lonely". Which the existing technology, it is developed the computer which helps to train the ability of understanding through games and virtual communities so that "lonely" children would not immerse themselves in the world. But it is still difficult in the emotion recognition and modeling stage, as technology evolves, you can combine the theory with practice to achieve true human-computer interaction harmoniously.

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