

# Application of Psychological Analysis of Micro-Expression Recognition in Teaching Evaluation

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## ABSTRACT

In recent years, there are more and more researches on micro expression recognition in body language, which has become an interdisciplinary hot topic in language analysis and psychological analysis. However, most of the previous studies are basic theoretical studies, and the application of micro-expression recognition and psychoanalysis in body language to teaching is still in its infancy. This research summarizes the micro-expression classification and micro-expression recognition technology, and on this basis, comprehensively uses the psychoanalysis technology in teaching. The research results of this article have a certain expansion in the fields of education, teaching methods and psychoanalysis, and also have a theoretical support for the development of artificial intelligence and the design and development of psychoanalysis software.

*Keywords: body language, micro-expression recognition, teaching methods, psychological analysis*

## I. INTRODUCTION

With the rapid development of science and technology in today's era, teaching methods are also undergoing earth-shaking changes. The combination of mobile phone software and artificial intelligence technology to refer to students' body language in the teaching process, especially facial micro-expression recognition and psychological analysis, to help teachers in education and teaching, is becoming the latest research topic in the field of teaching methods. The research content of the text has theoretical support for the future design of facial recognition software that can be used in the field of education. Due to the development of Internet technology, artificial intelligence is becoming more and more powerful. People can use AI to insert corresponding firmware into the camera, so that the camera can collect people's facial expressions and count them as big data. Each facial expression reflects people's different psychology. Send these expression data to the teacher, so that they can more effectively deliver more effective teaching content to the classroom, so that both online and offline teaching can be more efficient, reduce the waste of classroom time, and increase the teaching effect.

## II. THE DEFINITION AND RESEARCH STATUS OF MICRO EXPRESSIONS

Facial micro-expression is the natural expression of the true emotions of human beings unconsciously. The study of human micro-expression can make artificial intelligence robots better understand human emotion

information, so as to better communicate and communicate in human-computer interaction to help people work. Therefore, the research of facial micro-expression has now become a research hotspot in the field of artificial intelligence and pattern recognition, so it becomes very important to seize the opportunity. Theoretically speaking, the change of micro-expression generally does not exceed 0.25s. Research on this 0.25s video stream can convey human emotions better than a single picture. But as an important way to convey emotions, micro-expressions are also highly false.

The premise of using information in this article is to ensure that the information collected is correct. So far, the methods of collecting micro-expression are still diverse. Most researches focus on the spatial characteristics of micro-expression or processing information on the changes of micro-expression in the time dimension. Due to the particularity of micro-expression, the development of its recognition technology still faces challenges such as low recognition rate and insufficient database. At present, the difficulty of micro-expression recognition lies in the constraints of short duration of micro-expression itself, subtle changes, lack of sufficient training samples, etc. However, its application requirements in polygraph detection and psychological prediction are inconsistent with current research results. In order to solve these problems, we adopt a more accurate method, which is to study whether the capture of heart rate changes can optimize the automatic recognition algorithm of micro-expressions by analyzing the matching relationship between heart rate changes and micro-expressions. This

algorithm is based on Euler's video amplification algorithm, which realizes non-contact heart rate extraction, uses Euler's video amplification algorithm to amplify the signal in a specific area of the video, design filters to filter the signal, and finally calculates the real-time heart rate of the video character. This basically guarantees the accuracy of the information source.

When we obtain information, we need to correctly "interpret" it. The ability to "interpret" others is an advantage for ordinary people. However, for personnel in special fields, such as clinicians and safety personnel, identification Micro-expressions help them find potential dangers, so improving the ability of individuals to recognize micro-expressions is of wide use value. The main purpose of this project is to simplify the process of "interpretation" and process the acquired information through a fixed system. The final result is presented to people. People no longer need to spend time thinking about how to "interpret" and how to "interpret". This will greatly shorten the process and time of problem processing and analysis, and will have more accurate results.

Objectively speaking, using computers or artificial intelligence to recognize micro-expressions also has unique advantages. First, no matter how fast the movement is, as long as it is captured by a machine with corresponding instructions, it is impossible to "slide away". They will be transported to a prescribed place for processing. Researchers only need to introduce high-speed cameras to capture micro-expressions. Second, as long as it has an efficient, stable, and feasible operating model, computers or artificial intelligence can handle large-scale micro-expression recognition tasks at low cost and high speed, which obviously exceeds the efficiency of manual micro-expression recognition. Third, through multiple runs, big data feedback can reflect the advantages and disadvantages, which can be adjusted at any time to achieve a better experience.

The recognition of micro-expressions also has a certain social significance. First of all, when you are in interpersonal communication, accurate recognition of micro-expression is helpful to improve people's communication level, it can help people correctly understand the meaning of other people's words and deeds, thereby reducing the contradiction between people and conflicts, and then create a good social communication environment for people; secondly, in cross-cultural communication activities, being able to accurately identify the meaning of micro-expressions can help people correctly understand the meanings other than speech acts in cross-cultural communication, and understand both parties and attitudes, avoid unnecessary misunderstandings and cultural conflicts caused by potential cultural obstacles, thereby promoting the success of cross-cultural communication;

in addition, in the field of diplomacy, accurate identification of micro-expressions can help solve difficult diplomatic problems and provide people with a Harmonious and friendly international communication environment; and in the field of security protection today, micro-expression recognition not only helps people increase their awareness of prevention and early detection of potential dangers, but its more important significance lies in helping security departments prevent or reduce terrorist incidents. The occurrence of social violence has created a peaceful and stable domestic and international communication environment for people.

### **III. RESEARCH METHODS**

This research applies a complete and practical system. First, it is necessary to study the joint detection technology of micro-expression and macro-expression, and correct the detected facial sequence. Then, based on the corrected facial sequence, we should classify and recognize the emotion contained therein, and then establish a system from detection to identification. Regarding our products, the content of the research department is mainly divided into three stages: the macro expression and micro expression detection stage based on long video, the frontal perspective expression image synthesis stage based on the general 3D model registration of the face, and the multi-dynamic local feature fusion. The micro expression recognition stage and the behavior warning based on real-time expression change analysis are embodied in the software language and text output stage.

For the macro-expression and micro-expression detection stage based on long video, in the pre-collection work, we have studied the basic environment and equipment parameters. In order to simulate natural lighting as much as possible, the experiment chooses well-lit daytime and supplements with incandescent lamps. In order to improve the recording level, we specially purchased a GoPro Hero4 industrial camera with a resolution of 1920×480, a frame rate of 90fps, and a "narrow" format. We have also produced short videos with strong emotions. This experiment uses stimulating videos carefully selected by the experimenters. The average duration of these videos is about 2 minutes. These videos have strong themes, including funny, fear, tragic, nausea, anger, surprise and other clips. In the specific collection work, in order to obtain natural micro-expression, we set up a reward and punishment mechanism to give the subjects a certain amount of psychological pressure. The collection tool consists of two computers, a video camera, and a pair of headphones. For video processing, we also have three modes of operation: manual coarse screening, extraction of micro expression sequences, and manual encoding. Among them, manual coding means that after the micro-expression segment is determined, the

segment is cut out, and the video picture is serialized, and then the micro-expression facial muscle movement area is described. Refer to FACS to perform AU encoding on the extracted micro expressions, and mark the start frame, climax frame, and end frame. In order to ensure accuracy, we coded the micro-expression clips separately by two people, and finally checked the consistency and resolved the disputed samples. For the disputed samples, if the motion unit is inconsistent, two people need to watch and reconfirm it. For samples with inconsistent emotional classification, the final conclusion obtained by combining the judgment results of the two people and the subjective report of the subject must be voted.

The second stage is the front-view facial expression image synthesis stage based on the registration of the general three-dimensional face model. We divide the acquisition and preprocessing of face images into several operational parts. One is to obtain static images or dynamic image sequences through image capture tools such as cameras. The second is image preprocessing, that is, normalization of image size and gray level, correction of head posture, image segmentation, etc. The third is 3D face registration. The steps are to obtain texture images, detect feature points, and refine the location of feature points. The expression feature extraction is divided into static image feature extraction and sequence image feature extraction. The former extracts the deformation characteristics of expressions, that is, the principal component analysis method of transient characteristics of expressions. Gabor wavelet methods can be used. The latter one not only extracts each the appearance change feature of a frame also needs to extract the motion feature of the continuous sequence. Optical flow method, feature point tracking method and differential image method can be used. Regarding expression classification, it is divided into: template-based matching method, neural network-based method, and probability model-based method.

The third stage is the micro-expression recognition stage based on the fusion of multiple dynamic local features. Among them, we will study the Haar-Like feature based on integral graph optimization combined with the cascaded AdaBoost classifier method to realize real-time face detection. Face detection is the basis of the facial expression recognition system. After experimental verification, this method has good performance for real-time face detection in dynamic scenes, and can accurately detect faces in the presence of deflection and similar interference. We also need to use restricted local models to complete the location of key facial features, which reduces the computational complexity. It is also an important part to study the application of a geometric feature and a local binary pattern of key regions for expression feature extraction to improve the efficiency of the expression recognition

system. The last part is to verify the performance of this algorithm by developing a real-time expression recognition system.

The fourth stage is to embody the behavior warning based on real-time expression change analysis into the software language and text output stage, which is to convert the program into the original APP (application) that can be used on smartphones, computers, and smart glasses. And the detection process of micro expression analysis Behavioural warnings are converted into language output. The specific steps include: micro-expression detection based on optical flow analysis and filter design, applying the feature learning method driven by deep neural network to micro-expression recognition, and participating in the establishment of a natural induction by developing a prototype system for automatic detection and recognition of micro-expression Micro-emoji database. The feature learning-driven neural network learning algorithm proposed in this paper is applied to the library as a benchmark to write software, with corresponding text output to form an APP, and put it on the market.

#### **IV. THE ADVANTAGES OF MICRO EXPRESSION RECOGNITION RESEARCH IN TEACHING**

The micro-expression facial recognition analysis research has many advantages. As far as the market is concerned, there is no mention of this aspect, which shows that this research has taken the lead in market mining. In the absence of too many competitors, it is easier to grasp the positioning and stand firm. Secondly, the business prospects of this research are very broad. In this era of rapid development of information technology, mobile apps, computer software, surveillance camera modules, and constantly improving AI intelligent robots, etc., can all be the objects of the project's commercial development. App can be used not only in education and teaching, but also in homeland security, judicial and criminal investigation, clinical medicine shopping malls, etc. When applied to different fields, it plays different roles. This also reflects the research of micro expression recognition adaptability and versatility.

At present, the recognition technology of facial expressions in my country and some developed countries has received a lot of attention, and the research gradually becomes mature. Because the research results in this field can be applied to all aspects of life, but for micro-expression recognition, these algorithms and models are far from being successfully adapted, so it is necessary to reset the algorithms and models.

*A. It is conducive to individualized learning of students*

In recent years, China's education reform has gradually emphasized the individualization and overall development of students. The overall development of students' personality is the ultimate goal of talent training, and every student is an excellent individual. Understand students' behavioral characteristics, learning starting point, learning style, interpersonal communication and other aspects, and guide students to develop in many aspects. In traditional teaching, score evaluation seriously hinders the development of students. Teaching evaluation should be a multi-dimensional and process-oriented evaluation. The key element to evaluate the success of education is how much knowledge a student has learned in learning activities. By recording the learning state of students, marking the changes in learners' facial expressions, and automatically identifying learners' emotional states, each student is provided with personalized emotional support, and it also provides references for teacher development. Therefore, students based on micro-expression recognition the concentration analysis system helps students individualize their learning and improve the quality of education.

*B. Facilitating teachers to adjust teaching*

In the teaching process, a better classroom effect not only requires teachers to understand their own teaching models and teaching methods, but also requires a thorough understanding of each student's knowledge understanding, combining teaching theories and own teaching practices to find a teaching model suitable for the students in the class, Coping strategies and teaching skills, etc.

Professor Meng Zhaolan found that when students are in a state of happiness and interest, his intelligence can be actively developed and learning efficiency improved. When students are in confusion, irritability, disgust and other negative emotions, their intelligence development decreases and their learning efficiency is low. A large number of studies have shown that positive emotions can positively promote cognition and memory processes, while negative emotions can hinder cognition and memory processes. Therefore, pay attention to the emotional changes of students in education, so that students try to maintain positive emotions in the learning process, which will help improve the teaching effect. In classroom teaching and distance education, a variety of reasons prevent teachers from fully taking into account the changes in students' emotional state. The monitoring system records the student's learning status, automatically recognizes the learner's emotional changes, and detects whether the student is in an emotional state such as frustration, interest, or boredom, so as to adjust the teaching progress in time according to the different status of the student to ease the student's Bad learning mood enables

students to understand the content taught by teachers and improve teaching efficiency.

*C. It is conducive to teacher evaluation*

To a certain extent, the quality of education affects the overall quality of a country's citizens and the country's comprehensive scientific and technological strength. High-quality teachers determine the quality of teaching, and good teacher quality requires strict evaluation mechanism monitoring. Evaluation is not only an exquisite and orderly way to manage teachers and students, but also a way to keep teaching content consistent with training goals, ensure teaching effects, and maximize the quality of education. A management system without evaluation is an unscientific and unsound system, lacking a feedback and handling system for problems. Without a more scientific evaluation mechanism, it is impossible to find teaching problems and hinder the development of teachers' teaching ability.

With the development of educational concepts and information technology, traditional teaching methods, teaching equipment, and evaluation methods have been unable to meet the needs of current education. In teaching activities, due to the particularity and differences of individual students, the means of teaching evaluation cannot be carried out in an arbitrary evaluation manner, which easily extinguishes the enthusiasm and creativity of students and teachers. In recent years, the methods of evaluating teachers' teaching quality have improved. The evaluation methods have been assessed from many aspects, but they still cannot directly reflect the teaching level of teachers. Traditional teaching evaluation lacks procedural evaluation indicators, focusing on result evaluation methods, emphasizing rankings and grades. Evaluation is mainly to promote the improvement of teachers' teaching skills through comprehensive evaluation of teachers. The facial expressions of students can directly reflect the interest of the teacher's teaching content and the teacher's teaching skills. If the students in the classroom teach the teacher The content is not interested, and the teacher does not guide the students in time, which directly reflects the weak ability of the teacher. The feedback of the teaching process also provides an effective reference for teachers to improve, and timely discovers mistakes in the teaching process and actively corrects them. This kind of evaluation can more quickly, accurately and effectively reflect the learning status of students and the teaching quality of teachers.

*D. It is conducive to improving the level of education informatization 2.0*

"Education Informatization 2.0 Action Plan" is the country's plan for the realization of intelligent education in the future. The main content of Education

Informatization 2.0 is: through educational informatization means to achieve teaching applications to cover all teachers, learning applications to cover all school-age students, digital campus The construction covers all schools; the informatization level and the information literacy of teachers and students are generally improved; the platform to realize "Internet + education". Informatization 2.0 not only requires the transformation of educational theories and educational models, but also promotes the reconstruction of education structure. Informatization 2.0 is the only way for the development of educational intelligence and an inevitable choice for educational development. Educational Information 2.0 requires the reconstruction of the classroom environment, the creation of students as the main body, the real-time tracking and analysis of students in virtual and real spaces, and the realization of a scientific and multi-dimensional evaluation mechanism. Traditional classrooms do not have intelligent equipment and ignore students. The process of evaluation, focusing on the result evaluation of students, inhibits the motivation of students to learn. Therefore, it is particularly important to form a diversified evaluation method to achieve the goal of Information 2.0. Emphasize the cultivation of students' comprehensive qualities, so that students have strong information literacy, innovation and creativity, critical thinking, problem-solving skills, good communication skills, teamwork skills, etc. The evaluation system should fully integrate data mining, learning analysis, Content analysis and other technologies and data storage technologies generate a developmental evaluation system, so as to achieve the diversification of evaluation methods and realize education informatization 2.0.

## **V. RESEARCH ON OTHER APPLICATIONS OF MICRO EXPRESSIONS**

The research on micro-expression recognition is of far-reaching significance and has a practical effect on the development of artificial intelligence and the promotion of big data technology. The research results of micro-expression recognition can be applied in at least the following aspects:

- In business negotiations, if we want to move the direction of the negotiation toward the expected direction, in addition to using some negotiation skills and communication strategies, we must also be able to accurately and timely detect the changes in the other party's micro-expressions, and then master the negotiation process when taking the initiative, see through the bottom line of the other party, and finally successfully achieve the goal we set.
- In international trade, careful observation of micro-expressions can help us reach a good

trade agreement with various countries, especially in trade exchanges. Through accurate capture of micro-expressions, we can generally conclude that the other party: The satisfaction of our products, the raw materials needed by each other, the prospects of trade between the two countries, and thus achieve a win-win trade.

- In terms of interpersonal communication, no matter at any time, anywhere, there are scenes of communicating with others and foreigners, and if you want to gain more friendships and have good interpersonal relationships, you must To a large extent depends on the recognition of other people's facial expressions. By recognizing the micro-expressions of others, we can better bring others closer, we can think in another way, compare our hearts to our hearts, and communicate better and effectively. On the contrary, if you misrecognize the micro-expressions of others, there is a high probability that you will express the wrong intentions, express the wrong feelings, and cause tension in the interpersonal relationship.
- In legal consultation, we may encounter some difficult cases, such as rape cases, that the consultants keep secret. If the legal aid consulting work is not so meticulous, the consulting work will often fall into a dilemma: the consulting party is inconvenient to express or ashamed to speak, and the consulting party cannot provide accurate solutions. For some cases, time cannot be delayed for a moment. If it is like this, it will undoubtedly lead to delays in the case and affect the interests of both parties. On the contrary, if the consulted party can accurately capture the change of the consuler's micro-expression, then there is a great possibility that the case can be handled properly and the effect of solving the problem can be achieved.
- In torture interrogation, due to the unequal status of the two parties during the interrogation, the dignified interrogation environment, the pressure imposed by legal regulations, etc., these objective factors will continuously amplify the inner anxiety and anxiety of the criminal suspect. In this case, the criminal suspect tends to focus too much on the control of speech, while ignoring the defense of his body movements and facial expressions. It is precisely these weak defenses that make the criminal suspect the most Real emotional and physiological changes are exposed. These real emotional and physiological changes are the key to successful interrogation by investigators. Compared with work experience, micro-

expressions can better help those who have no work experience and no direction for interrogation at this time. The investigators of the suspects get the true thoughts of the suspect, and then achieve the effect of quickly solving the case.

- In terms of educational science, as students, starting from elementary school, junior high school and even university, we may encounter situations where we don't understand certain knowledge points in class from time to time. We can use the changes in students' micro-expressions between different knowledge points. Set up and add remedial classes to specifically solve these popular and universal problems, so as to solve the worries of students, eliminate the worries of parents, and better serve students.
- In terms of entertainment supervision, take the most popular entertainment apps at the moment: Douyin and Kuaishou as examples. The micro-expressions that people show when they scan short videos reflect their likes and dislikes in this video. The relevant departments can pass The front camera captures the micro-expressions, and then aggregates them into the big data in the background to provide customers with more detailed recommendations for short video viewing, increasing popularity and economic benefits.

## VI. CONCLUSION

In classroom teaching, teachers pay attention to the emotional changes and learning status of each student to adjust teaching and effectively improve teaching quality. However, the current classroom has problems such as insufficient teachers' energy and delayed teaching feedback, which affect the improvement of teaching quality and hinder the development of students to a certain extent. In recent years, with the rapid development and wide application of information technology, new technologies such as image processing and artificial intelligence have brought new ideas and methods to the study of improving teaching quality. This thesis aims to use deep learning-based automatic face detection, positioning and micro-expression recognition technology to study the division, evaluation and concentration analysis of students' classroom status, and to design and develop a micro-expression recognition-based analysis of students' classroom concentration. The system automatically tracks, monitors, analyzes and evaluates the concentration of students in the teaching process. The main research contents in this field are as follows:

- By analyzing the expression state of students in the happy dimension, combining the intensity of

arousal and valence, To achieve an effective method of classifying state, and based on behavior theory, developmental teacher teaching evaluation theory, and multiple intelligence theory, design a multi-dimensional class state evaluation system to achieve the division of class concentration and its rationality Verified.

- Realize classroom micro-expression recognition through action unit, valence and wake-up space.
- Design and develop a Web visualization system for students' classroom concentration analysis based on micro-expression recognition. The system can present students' concentration in a personalized and visual form, which is convenient for teachers to analyze and manage students.
- Use classroom video as input to verify the evaluation effect of the system in both the concentration of all students in the whole class and the concentration of all students in the time period, and compare with the scores of excellent teachers.

Research on micro-expression recognition in body language can achieve considerable benefits in our study, life, and work. As far as the current situation is concerned, the application of micro-expression facial recognition technology to the field of psychological analysis will become a new revolution in teaching methods in the teaching field. The research results in this field can be combined with mobile phone software design. The feasibility and numerous business opportunities will certainly have good development prospects.

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