Real-Time Communication System Powered by AI for Specially Abled

ABSTRACT

- The main purpose of this research is to enhance the communication of the disabled community.
- The authors of this chapter propose an enhanced interpersonal-human interaction for people with special needs, especially those with physical and communication disabilities.

INTRODUCTION

- Communication is a social process of exchanging information from one entity to another in verbal and non-verbal form.
- It defines our existence and it is an important instrument that connects people together.

FACIAL EXPRESSION

- Facial expressions recognition is an ability to recognize people by their facial characteristic and differentiate it with one another.
- Human is born with the ability to recognize other people easily by identifying their facial features such as shape, appearance, skin texture and skin complexion.
- Other than that, humans also have the ability to express, interpret and differentiate facial expressions.\

REAL TIME FACIAL DETECTION ALGORITHM

- In face detection stage, we adopted Viola-Jones Face Detection algorithm (2004) and the Haar Cascade for human face searching.
- In the first few testing, we found that this algorithm could successfully and accurately detect faces in still images but when we tried it on real time video capturing, this algorithm seem to be less intelligent.

FACIAL FEATURE EXTRACTION ALGORITHM

- In our model, we chose global features extraction as it does not consume so much computation time and power when performing facial expression recognition.
- We added a few image processing processes while performing feature extraction process to further increase the chances of recognition.

FACIAL EXPRESSION AND RECOGNITION AND CLASSIFICATION

- In this final stage, we executed the automated facial expression recognition in real time with the entire enhanced Viola-Jones face detection algorithm.
- The real time captured image went through similar processes as in the training stage to obtain the histogram equalized image and it will be used to compare with the stored template images through template matching process.

EVALUATION

- Testings were carried out on the face detection, recognition accuracy, response speed of our model, and real time field testing.
- For face detection module, we tested on an individual under different settings such as indoor environment, outdoor environment, day time as well as night time.

FINDINGS

- When training the user expression, users have to be consistent with their ex-pression as our model is using pattern recognition or template matching method to perform facial expression recognition. This means that our model only returns the nearest expression matched.

FUTURE WORKS AND IMPROVEMENT

- Further exploration is required to improve the face detection mechanism taking this into consideration to give a wider angle of flexibility.
- There are rooms for improvements to increase the facial expression recognition rates.
- We are delving into ways to improve the quality of the face detection result as it will have a direct impact on the expression recognition process.

CONCLUSION

- Unfortunately there is a small group of people with physical and communication disabilities since birth.
- To assist these people in their communication needs, we propose an improved real time behaviour monitoring application for the disabled by employing a real time facial expression recognition system and Short Messaging System (SMS) to send notification to the third party for monitoring purposes.