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Human Emotion Recognition System

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INTRODUCTION

It would be beneficial if the machines are able to understand human emotions, enabling communication to take another step forward. There are several ways in which this emotion recognition can happen and primarily the focus is on speech and facial-based emotion recognition. There are also many techniques to achieve these facial and speech-based emotion recognitions including deep learning and classical machine learning algorithms. Humans obviously prefer natural ways of communication with machines using the languages that we developed over the years. Besides language that we speak, the indirect natural communication between humans are emotions which form a logical means of messaging emotion recognition can be captured through different mechanisms such as speech, facial expression, body gesture, etc. Facial expressions communicate a lot without any voice. Facial expressions are caused by movement of facial muscles in various positions resulting in various emotions and mood. Facial expressions are key to conveying feelings, attitude, intentions, etc. and these are pivotal in recognizing the emotions. Emotion recognition through facial expression is becoming popular due its various applications like robotics. Though deep learning approach is another viable alternative, non-neural network-based techniques like HOG and KNN require less compute and yet provide reasonable efficiencies in determining the human emotions.

OBJECTIVES

- To develop a facial expression recognition system.
- To experiment machine learning algorithm in computer vision fields.
- To detect emotion thus facilitating Intelligent Human-Computer Interaction

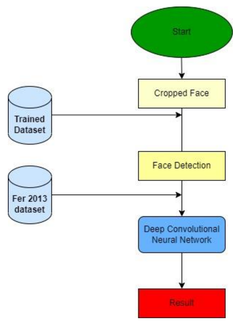

Fig 1.1

METHOD

Methodology includes the steps to be followed to achieve the objective of the project during the project development. The facial expression recognition system is trained using supervised learning approach in which it takes images of different facial expressions. The system includes the training and testing phase followed by image acquisition, face detection, image preprocessing, feature extraction and classification. Face detection and feature extraction are carried out from face images and then classified into six classes belonging to six basic expressions which are outlined below Images used for facial expression recognition are static images or image sequences. Images of face can be captured using camera. Face Detection is useful in detection of facial image.

The image of face after pre-processing is then used for extracting the important features. The inherent problems related to image classification include the scale, pose, translation and variations in illumination level .The important features are extracted using LBP algorithm. SVM is widely used in various pattern recognition tasks. SVM is a state-of-the-art machine learning approach based on the modern statistical learning theory

The first step in building an emotion detection system is to collect data. The dataset is collected from kaggle website named FER2013 dataset. The dataset of images is converted in jpeg/png file format for further processing of training set. This may involve video feeds from individuals who are exhibiting different emotions. The data should be diverse and representative of the population that the system is intended to serve. The data consists of 48x48 pixel grayscale images of faces. The faces have been automatically registered so that the face is more or less centred and occupies about the same amount of space in each image.

The task is to categorize each face based on the emotion shown in the facial expression into one of seven categories (0=Angry, 1=Disgust, 2=Fear, 3=Happy, 4=Sad, 5=Surprise, 6=Neutral). The training set consists of 28,709 examples and the public test set consists of 3,589 examples

Feature Extraction: Next, features must be extracted from the pre-processed data. For speech data, features such as pitch, intensity, and spectral shape may be extracted. For facial expression data, features such as eyebrow movement, lip curvature, and eye openness may be extracted

RESULTS

Deployment: Once the model has been trained and evaluated, it can be deployed in a real-world application. This may involve integrating the model into a larger system, such as a mental health diagnosis tool or a customer service chatbot, and ensuring that the system is robust, reliable, and ethical. Ongoing monitoring and refinement may be necessary to ensure that the system continues to perform effectively over time.

The website can be easily accessible for anyone whether it is a college student or not and does not require very high specifications can be operational on a browser on desktop or a smartphone.

It has been suggested that emotion-oriented DL approaches can be designed and fused with IoT sensors. In this case, it is predicted that this will increase FER's performance to the same level as human beings, which will be very helpful in healthcare, investigation, security and surveillance.

Advances in machine learning and computer vision have enabled the creation of algorithms capable of accurately identifying and analyzing human emotions from facial expressions The integration of emotion detection systems into various technologies such as social robots, virtual assistants, and smartphones can enhance human-machine interactions and provide personalized experiences for users. However, ethical concerns such as privacy and bias in the data used for training these systems must be carefully addressed to ensure that they do not harm individuals or perpetuate societal inequalities.

CONCLUSION

Additionally, different datasets related to FER are elaborated for the new researchers in this area. FER performance has increased due to the combination of DL approaches. In this modern age, the production of sensible machines is very significant, recognizing the facial emotions of different individuals and performing actions accordingly. It has been suggested that emotion-oriented DL approaches can be designed and fused with IoT sensors. In this case, it is predicted that this will increase FER's performance to the same level as human beings, which will be very helpful in healthcare, investigation, security and surveillance. In conclusion,

REFERENCE

1. Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. Journal of Personality and Social Psychology, 17(2), 124-129.
2. Mollahosseini, A., Hasani, B., & Mahoor, M. H. (2017). AffectNet: A database for facial expression, valence, and arousal computing in the wild. IEEE Transactions on Affective Computing, 10(1), 18-31.
3. Zhang, X., Yin, L., Cohn, J. F., & Canavan, S. (2018). Facial expression recognition: A survey. IEEE Transactions on Affective Computing, 9(3), 321-341.
4. Scherer, K. R., Schuller, B., & Bänziger, T. (2013). Emotion in voice and music: A multi-modal approach to affective neurocomputing. Frontiers in Psychology, 4, 1-9.
5. Eyben, F., Weninger, F., Gross, F., & Schuller, B. (2010). Recent developments in opensmile, the Munich open-source multimedia feature extractor. In Proceedings of the 18th ACM International Conference on Multimedia, 835-838.

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