FACIAL EXPRESSION RECOGNITION USING DEEP LEARNING

Project synopsis submitted to
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In

COMPUTER SCIENCE AND ENGINEERING

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FACIAL EXPRESSION RECOGNITION USING DEEP LEARNING

Problem definition:

Build a model to detect and classify various facial expressions from images and videos using deep learning for facial expression recognition. Variations in expressions and individual differences are major challenges. This problem can be solved by training deep learning models using large datasets of labeled facial images or videos.

Objective of project :

The main objective of this project is to design an automated system for detecting facial expressions. The system must be able to accurately and efficiently identify different facial emotions from images and videos. Applications for facial expression detection can be seen in human-computer interface, security and healthcare, as well as social robotics and emotion detection.

The system will be able to process facial expressions such as joy, sadness, anger, surprise, disgust and fear. The system will be robust to changes in lighting conditions, pose, occlusion and individual differences. To achieve this, deep learning models can be trained using large datasets with tagged facial images or videos, which can be augmented using techniques such as data augmentation for increased data diversity.

Automated systems must be able to process facial images or video in real time and provide accurate results. It should be user-friendly and easy to integrate into existing systems or applications.

Creating a model that detects and categorizes various facial expressions from images and videos for facial expression identification using deep learning. Variations in expressions and individual differences are the main challenges. A deep learning model can be trained to solve this issue utilizing a large dataset of labeled facial images or videos.

Proposed Plan of Work:

- Literature review: Conducting an overview of the already proposed or existing algorithms which are used for facial expression detection, and also studying and finding their restrictions/limitations. Also to study existing research papers and take them as a baseline to develop the model and to increase the accuracy of the developed model.

- Data set collection – To collect the public as well as experimental available datasets of different types of facial expressions.

- To develop algorithms: To train as well as develop the deep learning-based algorithms with the help of the collected data sets, and also to evaluate their accuracy.

- To optimize algorithms: After developing and training the algorithm, the next step is

to optimize them based on the results in order to enhance the accuracy of the model.

- Implementation: To detect, test and validate the optimized algorithm for a real-time facial expression.

Methodology:

The proposed methodology involves:

Collect dataset: The 1st step involves the collection of datasets that are already available publicly for facial expressions recognition. Some proposed datasets are FER2013 (containing grayscale images) or creating our own dataset by capturing the images of different people with different types of expressions.

Pre-process dataset: After the collection of the dataset, the next step is to pre-process it, which involves cropping images in order to focus on the face, fixing the size i.e. resizing them, and finally converting them to RGB or grayscale.

Train a model: To train the model using the datasets after pre-processing and using Convolutional Neural Networks (CNN), which is a deep learning algorithm to train it.

Test the model: After successful training of the model, we can test it on different types of datasets in order to check its performance or accuracy. Use of metrics such as precision and accuracy to measure the model's performance.

Deploy the model: Finally, after all the steps mentioned above, we will deploy the model to make predictions on new images or video streams. Also, the use of libraries such as OpenCV or TensorFlow can be done in order to integrate the model into our application or website.

Technology:

The project will use machine learning algorithms and tools such as

- Python
- TensorFlow
- Keras.
- OpenCV
- Matplotlib

Functional Specifications [Deliverables]:

- Comprehensive literature review of existing fall detection algorithms and their

limitations.

- Public and experimental datasets of facial expressions.

- Preprocessed dataset with relevant features extracted.

- Deep learning algorithms developed and trained on the preprocessed data.

- Optimized fall detection algorithm with improved accuracy and reliability.

- Real-time Automated Facial Expression Recognition System implemented and tested.

- Application or website in which this system is integrated.

Project Scope:

Here are some potential areas of development:

This technology can be used in hospitals and hotels. In hotels we can detect customer satisfaction. In the hospital we can check for pain and comfort.

In **hospitals**, this system can detect a patient's pain, with the help of this doctor can monitor the patient's condition. If we integrate the EMR system with the facial expression recognition system then doctors can get alert before any life threatening situations.

In **hotels**,the system can detect satisfaction or dissatisfaction using facial expression recognition. This will help hotel managers to get feedback. The system can also be implemented for real-time service, this can give alerts to managers about customers' mood.

Overall, the goal of this project is to create a robust and efficient automated system for facial expression recognition that can be used in hospitals and hotels to improve patient care and customer satisfaction.

The system should be user-friendly and easily integrated into existing **school systems** or applications. The system should be able to process facial images or videos in real time and provide accurate and reliable results. The system can also be used to monitor and track student engagement over time, providing insights into long-term trends and patterns.

The system can also be used to detect student emotions and provide timely interventions to prevent or address emotional distress. This can include connecting students with mental health resources or providing targeted support for students who are struggling.

In summary, the future scope for real-time facial expressions detection is quite promising, with the potential for applications in hospitals, schools, and hotels for customer satisfaction.

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