

Facial Recognition with Expression Detection System

CSE445, Section-03

Group-05

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Introduction

The "Facial Recognition with Expression Detection System" project focuses on building a machine learning-based model to detect human faces and recognize facial expressions. The system is designed for applications in security, sentiment analysis, and interactive systems. This report provides an update on recent progress, challenges, and next works.

Progress

Model Selection

We read multiple research papers and analyzed different models such as VGG-Face and ResNet50. Based on our available resources, ResNet50 was selected due to its balance between efficiency and accuracy, making it ideal for real-time facial expression detection.

Data Collection

Our group has four members. Each of us have been tasked with collecting photos of expressions of three different individuals, making a total of 12 individuals in the dataset. The dataset consists of five classes: Angry, Happy, Surprised and Neutral. We used OpenCV and the cvZone library to create a script that helps capture and preprocess the images efficiently.

Dataset Collection Script

A Python script was created for real-time image collection and face detection using OpenCV. Here's how the script works:

- The webcam is activated to capture live footage.
- Detects faces and extracts bounding boxes using the CvZone FaceDetector module.
- Saves cropped and resized images (224x224) into predefined folders based on expressions.
- Implements a manual image-saving feature with keyboard shortcuts (s to save, f to stop saving, ESC to exit).

Challenges

- Dataset Limitation: Without going through a trial and error process, it's difficult to estimate how much data we actually need to successfully train our model.
- Hardware Constraints: Training the models requires a lot of computer power, which slows down real-time performance.
- Real-Time Processing Delays: We also need to make it faster so that the system can detect faces and understand expressions without any delay.

Future Tasks

- Expand Dataset: Continue collecting expression images with equal balance across all classes.
- Implement Deployment Strategy: Develop a user-friendly interface for real-world applications.

Conclusion

We have successfully collected data, chosen a model, and processed the images. Even though we faced some challenges with hardware and resources, the project is moving forward as planned. Next, we will start training the model using the dataset we've gathered and work on getting the system ready for use.