Emotions Detection using Arduino nano BLE Sensor

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0.1 Motivation

Emotion recognition plays a crucial role in human-computer interaction, enabling devices to understand and respond to users' emotional states. The motivation behind this project is to develop a system that can accurately classify three primary emotions (angry, happy, and neutral) using a Nano BLE sensor.

0.2 Problem Statement

Existing emotion recognition systems often rely on complex setups and high computational resources, limiting their practicality for deployment on resource-constrained devices. Additionally, real-time inference and response are essential for applications requiring immediate feedback based on users' emotions.

0.3 Methodology

The project follows a systematic approach, as outlined below:

1. **Data Collection**: Utilize the OmniVision OV7670 camera module to capture facial images representing different emotions.

2. **Model Training**: Train a deep learning model using TensorFlow Lite to classify emotions based on the captured images.

3. **Model Optimization**: Optimize the trained model for deployment on resource-constrained devices such as the Nano BLE sensor.

4. **Integration**: Integrate the optimized model with the Nano BLE sensor platform to enable real-time inference.

5. **Visualization**: Develop a mechanism where the Nano BLE sensor displays colored lights corresponding to the detected emotion.

0.4 Solution

The proposed solution involves the development of a lightweight emotion classification model using TensorFlow Lite, optimized for deployment on the Nano BLE sensor. The model will be trained on a dataset of facial images representing angry, happy, and neutral expressions. Upon integration with the Nano BLE sensor, the system will perform real-time inference on captured images and display corresponding colored lights to indicate the detected emotion. This intuitive interface provides users with immediate feedback based on their emotional states, enhancing the overall user experience.

We have achieved good accuracy with less number of data points.

0.5 Architecture and Workflow

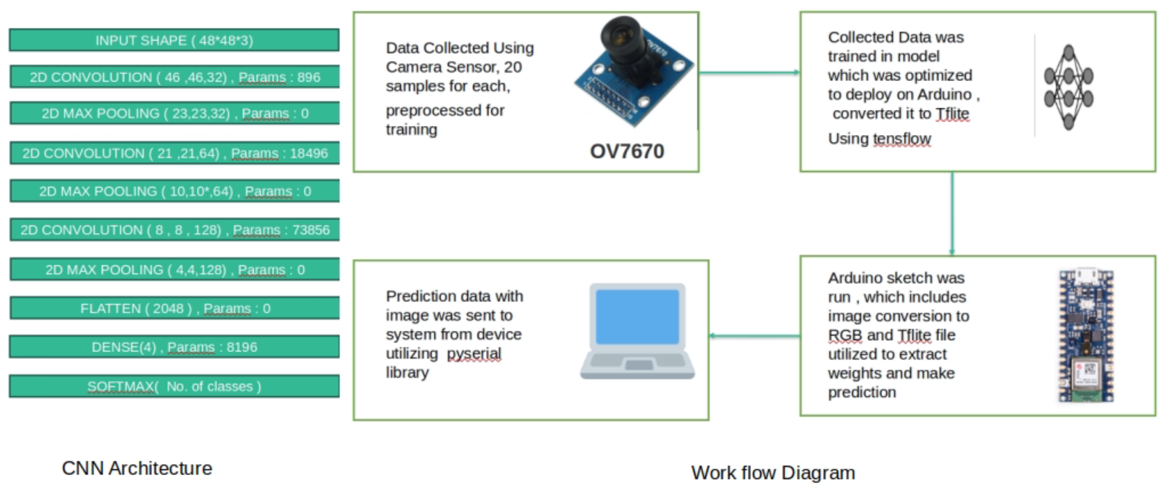

Figure 1: System Architecture Diagram

0.6 Contribution

- Shiva Chandhra
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