Project 2 Report

a. Explanation of how the problem was approached

The main objective was to recognize hand gestures from a set of gesture videos. The process was divided into three main tasks: generating penultimate layer features for training data, generating penultimate layer features for test data, and recognizing gestures using cosine similarity. Each video's middle frame was extracted using OpenCV, and the handshape features were generated using a pre-trained CNN model (provided through the HandShapeFeatureExtractor class). This ensured that each gesture was represented by a single meaningful feature vector.

b. Solution for the problem

1. **Training Feature Extraction:** Extracted middle frames from all training gesture videos. Each frame was processed using the HandShapeFeatureExtractor to generate the penultimate layer feature vector. These vectors were saved as *train_vectors.npy*.

2. **Test Feature Extraction:** Applied the same procedure to the test dataset to obtain *test_vectors.npy*.

3. **Gesture Recognition:** Used cosine similarity to compare test vectors with training vectors. The gesture corresponding to the most similar training vector was identified as the predicted gesture. Predicted labels were mapped according to the gesture name and stored in *Results.csv*.

The system successfully automates gesture recognition using CNN-based feature extraction and similarity-based classification in Python.