Hand Gesture Recognition

CS 386 : Term Project
Final Evaluation

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Problem Statement

- ➔ Real-time hand gesture recognition.
- ➔ Input from the Video Capture of the computer webcam.
- ➔ Predict the following gestures:
  - Swiping Left
  - Swiping Right
  - Thumbs Up
  - No Gesture

About the Dataset

The 20BN - Jester Dataset (https://20bn.com/datasets/jester)

Collection of labeled video clips that show humans performing pre-defined hand gestures in front of a laptop camera or webcam.

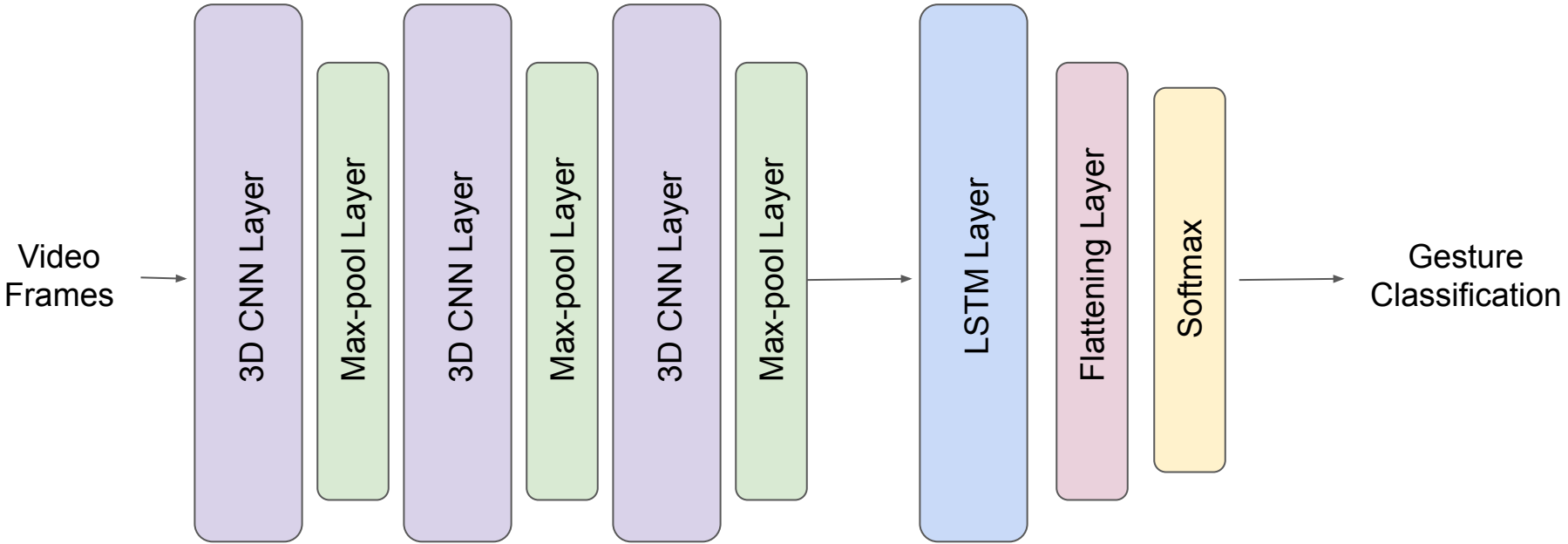
Total number of videos	148,092
Training Set	118,562
Validation Set	14,787
Test Set	14,743
Labels	27

Data Preprocessing

1. Subsetting the data - 4 out of 27 classes.
2. Data Augmentation.
3. Taking fixed number of frames per video.
4. Greyscaling, resizing the images.
5. Split into test and train.

The Model

Activation Function	ReLU
Loss Function	Sparse Categorical Cross-Entropy
Optimizer	ADAM



Progress till Interim Evaluation

- ➔ Dataset extraction
- ➔ Model definition
- ➔ Data preprocessing
- ➔ Model Training

Progress after Interim Evaluation

- ➔ Testing the model
- ➔ Experimental Results
- ➔ Linking with real-time video capture

Results

1) Testing Accuracy

   Before data augmentation

   After data augmentation

2) Dynamic recognition - Demo

Accuracy results (without augmentation)

```
In [16]: accuracy_score(y_test, y_pred)
Out[16]: 0.78

In [17]: precision_score(y_test, y_pred, average='macro')
Out[17]: 0.8072639437856829

In [18]: recall_score(y_test, y_pred, average='macro')
Out[18]: 0.7730571003171955

In [19]: f1_score(y_test, y_pred, average='macro')
Out[19]: 0.7658840069075374
```

Contribution of team members

We have read the research papers and resources we have found individually but wrote the code together over video calls.

References -

1) https://research.nvidia.com/sites/default/files/pubs/2015-06_Hand-Gesture-Recognition/CVPRW2015-3DCNN.pdf
2) https://www.youtube.com/playlist?list=PLxefhmF0pcPl2TAconficZ7kASFpR7hbL
3) https://github.com/udacity/CVND---Gesture-Recognition

Thank You!