WE3 Project

American Sign Language Converter

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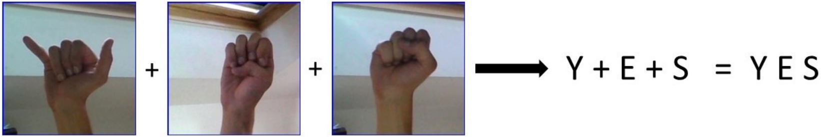
Overview

To build a sign language translator, which can take communication in American Sign Language and translate it into written text.

Objective



Our overall objective was to be able to construct words by joining together the individual letters by signing them and converting them into text.

Tech Stack

- Dataset and Model
    - Google Colab
    - Open CV
    - TensorFlow
    - Keras
- Web Application
    - HTML
    - CSS
    - Flask

Description

- Preprocessed the data set using OpenCV

Figure: Raw image

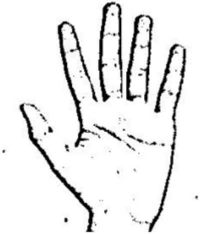
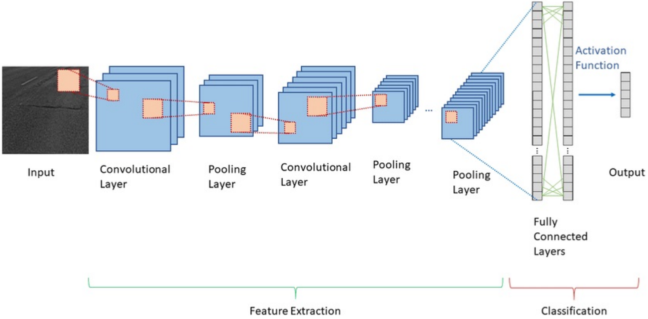
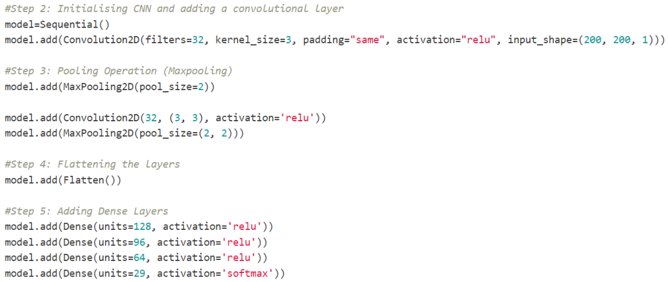


Figure: Preprocessed image

Model


Input
Convolutional Layer
Pooling Layer
Convolutional Layer
Pooling Layer
...
Pooling Layer
Fully Connected Layers
Activation Function
Output
Feature Extraction
Classification

Model



```
#Step 2: Initialising CNN and adding a convolutional layer
model=Sequential()
model.add(Convolution2D(filters=32, kernel_size=3, padding="same", activation="relu", input_shape=(200, 200, 1)))

#Step 3: Pooling Operation (Maxpooling)
model.add(MaxPooling2D(pool_size=2))

model.add(Convolution2D(32, (3, 3), activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))

#Step 4: Flattening the layers
model.add(Flatten())

#Step 5: Adding Dense Layers
model.add(Dense(units=128, activation='relu'))
model.add(Dense(units=96, activation='relu'))
model.add(Dense(units=64, activation='relu'))
model.add(Dense(units=29, activation='softmax'))
```

Figure: Here is a snippet of our code. It shows how we built our model. We have added the convolution, pooling and fully connected layers using functions from the Keras library.

Description

- This processed image is then passed to the CNN model for prediction
- If the same alphabet is predicted for ten frames, it is added to the word
- For alphabets that look similar, such as D and R, the image is passed through another model
- This model classifies similar looking symbols
- In case no sign is being shown, 'nothing' is printed on the screen

Website

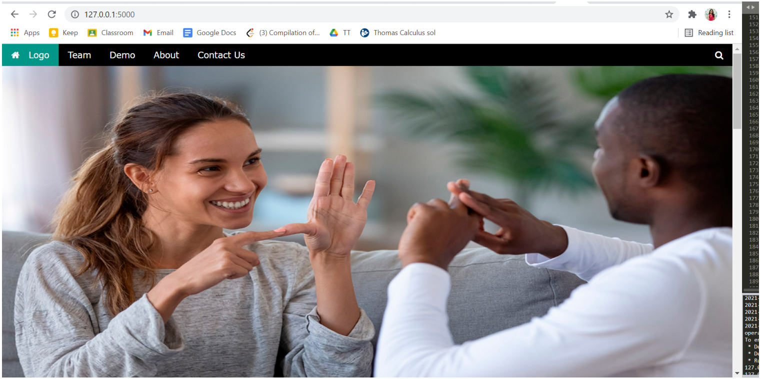
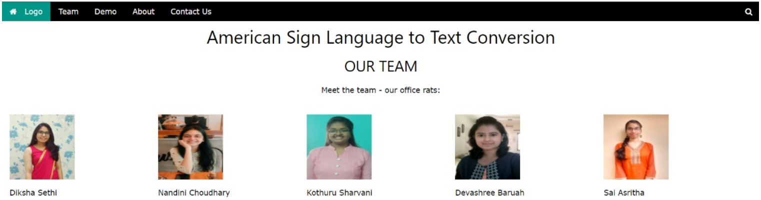


Figure: Homepage

Website



American Sign Language to Text Conversion

OUR TEAM

Meet the team - our office rats:

Diksha Sethi

Nandini Choudhary

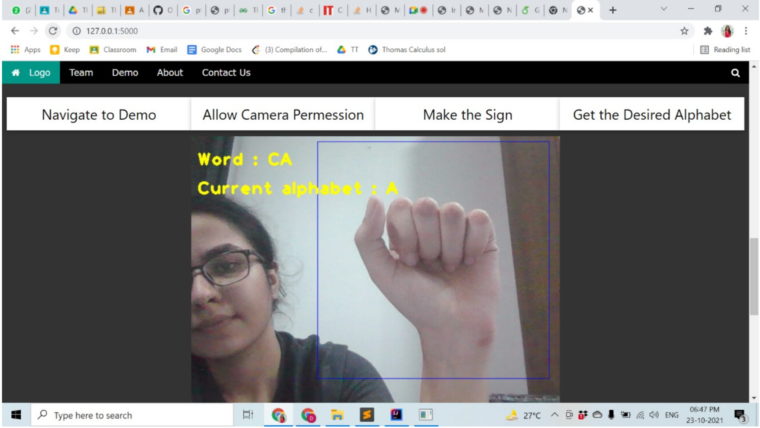
Kothuru Sharvani

Devashree Baruah

Sai Asritha

Figure: Meet the team!

Website



Word : CA

Current alphabet : A

Figure: Using the ASL Converter

Demo

Lets try saying 'hello' using our ASL Converter!

Learnings

- Gained knowledge about machine learning, deep learning and CNNs
- Learned about various Open-CV functions for image processing and video input
- Developing a website using HTML and CSS
- Learned how to deploy the model into a web app using Flask

Challenges

- Took a lot of time to tweak our model and get a good accuracy
- Unable to get the correct output because of similar looking gestures. For example the model couldn't distinguish between R and I
- Works accurately infront of a plain background

Future Extensions

- Achieving higher accuracy of prediction
- Extending the model to double handed gestures