Hindi Handwriting Recognition using Convnets - Project Report

This project is developed in two phases - 1st phase is training a model and 2nd phase is testing a model by giving some images from the real world and the trained model has to identify the correct alphabet.

Prerequisites:

- ❏ Knowledge on deep networks.
- ❏ Convolutional Neural Network.
- ❏ Basic intuition about tensorflow.
- ❏ Basics of Keras.
- ❏ Image Processing Basics.

Design:

- ❏ Model class.
- ❏ Application class.

We will give some data to model class , and that model class will give an output in the form of an **h5** file.

“””””” An HDF5 file is a container for two kinds of objects: **datasets**, which are array-like collections of data, and **groups**, which are folder-like containers that hold datasets and other groups. “”””

The application class takes the h5 file as input , and this application class uses some image processing techniques and gives the actual output.

Requirements:

- **Numpy** - NumPy contains a multi-dimensional array and matrix data structures. It can be utilised to perform a number of mathematical operations on arrays such as trigonometric, statistical, and algebraic routines.
- **Matplotlib** - Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy.
- **Cv2** - OpenCV is a cross-platform library using which we can develop real-time computer vision applications. It mainly focuses on image processing, video capture and analysis including features like face detection and object detection.
- **Keras** - It is capable of running on top of TensorFlow. Designed to enable fast experimentation with deep neural networks, it focuses on being user-friendly, modular, and extensible.

Code Requirements:

You can install Conda for python which resolves all the dependencies for machine learning.

Techniques used:

I have used convolutional neural networks.
I am using Tensorflow as the framework and Keras API for providing a high level of abstraction.

Some additional points:

1) You can go for additional conv layers.
2) Add regularization to prevent overfitting.
3) You can add additional images to the training set for increasing the accuracy.

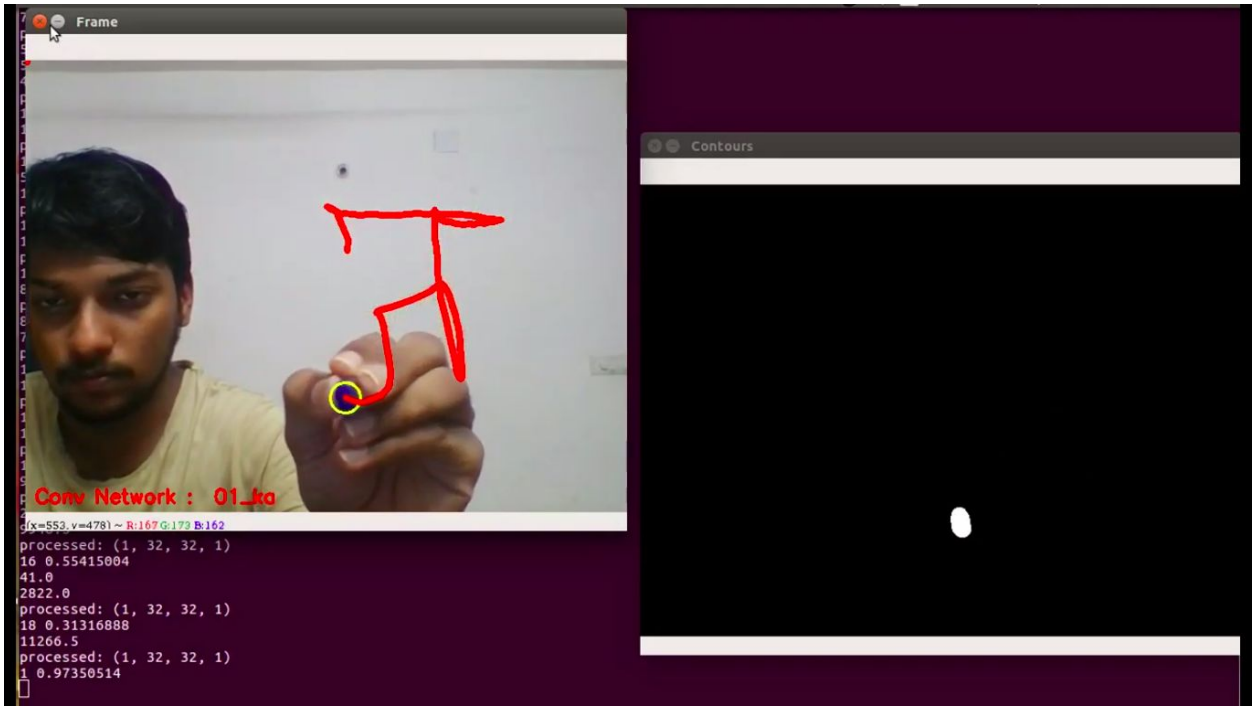
Python Implementation:

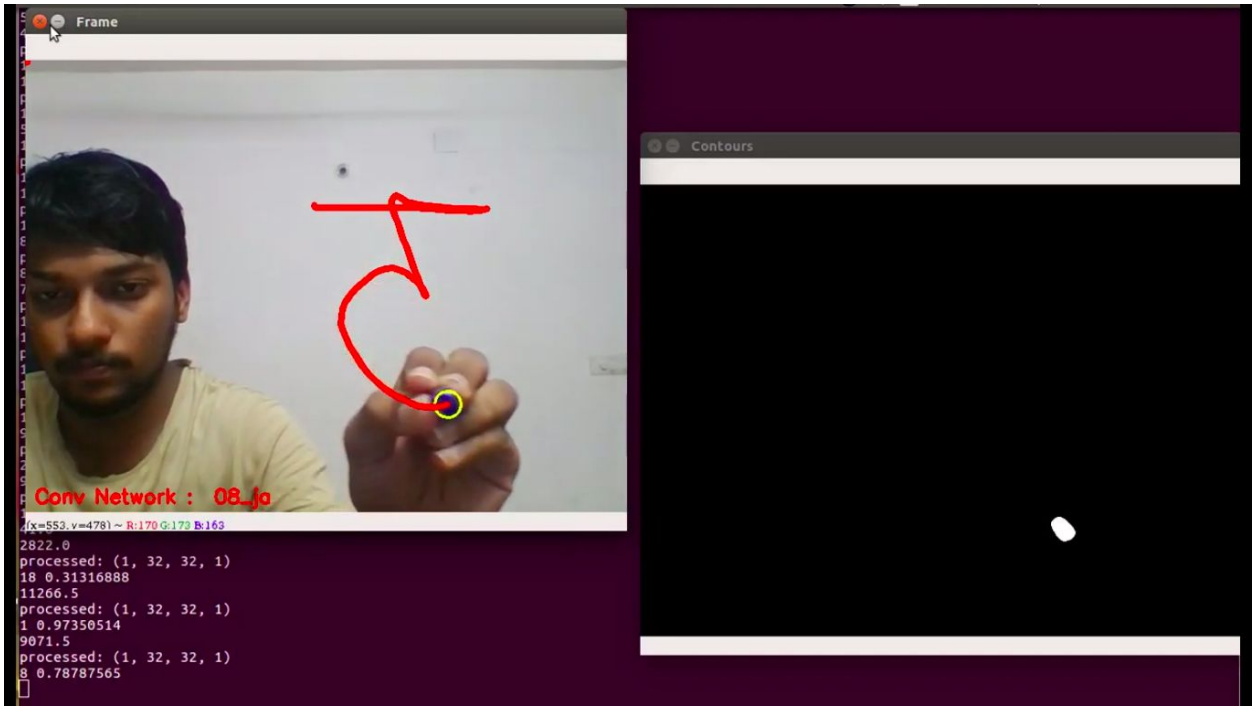
1) Dataset- DHCD (Devnagari Character Dataset)
2) Images of size 32 X 32
4) Convolutional Network Support added.

Execute **Hindi_Letter.py** python program file to train the model using hindi characters.
Train Accuracy ~ 95%
To run the code, type `**python Hindi_Letters.py**`

Execute **Dev-Rec.py** python program file to test the model and this code successfully recognizes the hindi characters.
Test Accuracy ~ 92%
To run the code, type `**python Dev-Rec.py**`

Output snippets:




Frame
Contours
Conv Network : 08_ja
2822.0
processed: (1, 32, 32, 1)
18 0.31316888
11266.5
processed: (1, 32, 32, 1)
1 0.97350514
9071.5
processed: (1, 32, 32, 1)
8 0.78787565

THANKS ! ! !