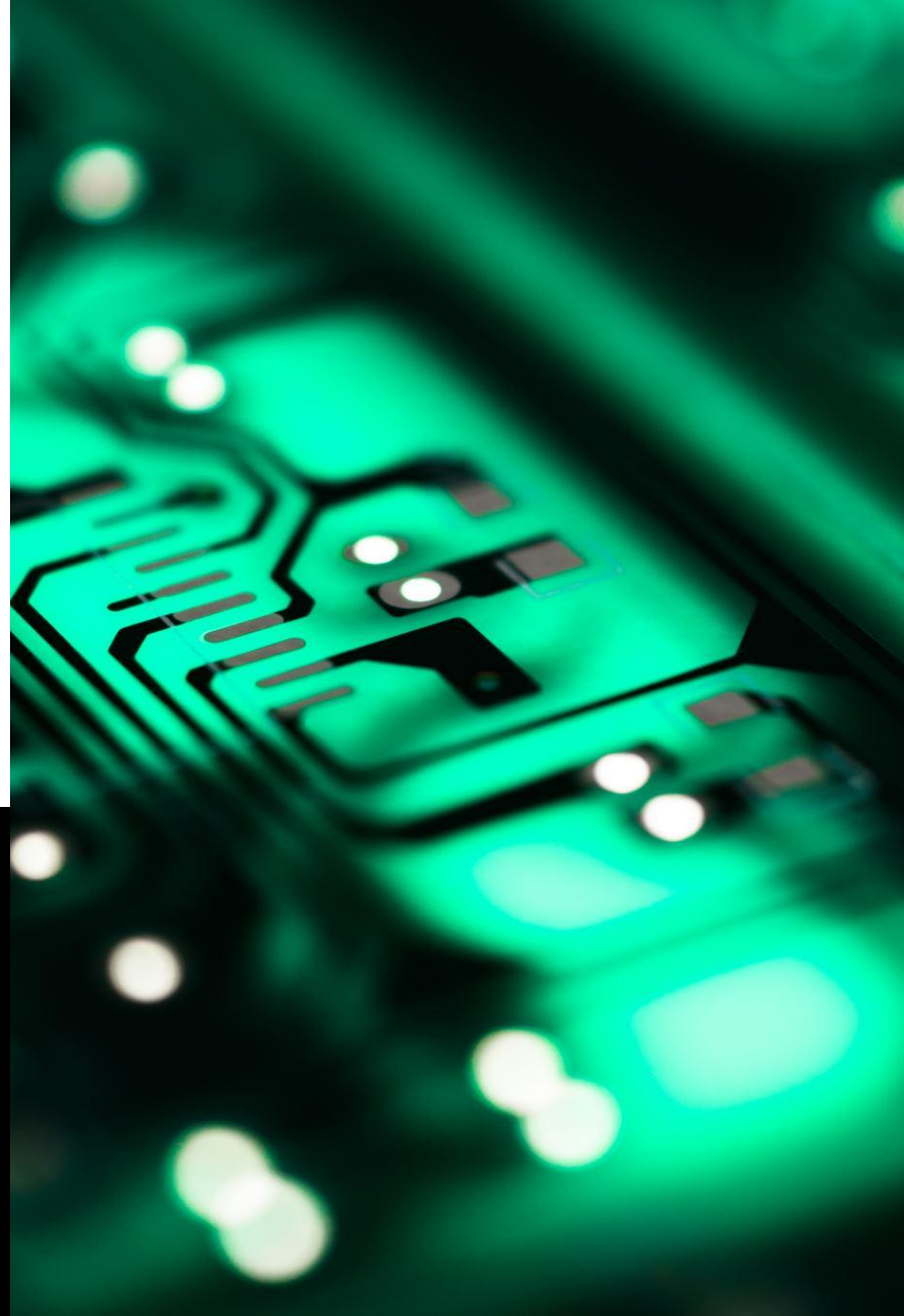
ALPHABET RECOGNITION USING CONVLUTIONAL NEURAL NETWORKS



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ABSTRACT

- Alphabet recognition has been one of the active and challenging research areas in the field of image processing and pattern recognition. The attempt is made to recognise handwritten characters of English alphabets using convolutional neural network (CNN). We have 26 classes of dataset in that each class contain 300 images of that certain class. For training CNN, we process 90% of our data to train the neural network. The trained CNN model is used for classification and recognition.
- In the running world, there is growing demand for the software systems to recognize characters in computer system when information is scanned through paper documents as we know that we have number of newspapers and books which are in printed format related to different subjects. These days there is a huge demand in “storing the information available in these paper documents in to a computer storage disk and then later reusing this information by searching process”.

EXISTING SYSTEM

- In the running world there is a growing demand for the users to convert the printed documents in to electronic documents for maintaining the security of their data.
- Hence the basic alphabet recognition system was invented to convert the data available on papers in to computer process able documents, So that the documents can be editable and reusable.
- The existing system/the previous system of alphabet recognition on a grid infrastructure is just alphabet recognition without grid functionality. That is the existing system deals with the homogeneous character recognition or character recognition of single languages.

DRAWBACK OF EXISTING SYSTEM

- The drawback in the early alphabet recognition systems is that they only have the capability to convert and recognize only the documents of English or a specific language only. That is, the older alphabet recognition system is uni-lingual.
- and existing system deals with the homogeneous alphabet recognition only

PROPOSED SYSTEM

- Our proposed system is alphabet recognition on a grid infrastructure which is an alphabet recognition system that supports recognition of the alphabets of multiple languages.
- This feature is what we call grid infrastructure which eliminates the problem of heterogeneous character recognition and supports multiple functionalities to be performed on the document.
- The multiple functionalities include editing and searching too whereas the existing system supports only editing of the document.
- In this context, Grid infrastructure means the infrastructure that supports group of specific set of languages. Thus, alphabet recognition on a grid infrastructure is multi-lingual.

ADVANTAGES OF PROPOSED SYSTEM

- The benefit of proposed system that overcomes the drawback of the existing system is that it supports multiple functionalities such as editing and searching.
- It also adds benefit by providing heterogeneous characters recognition.

SOFTWARE REQUIREMENTS

	Windows
MATLAB V.13 (R2013a)	Windows7

- **PYTHON (new version)**
- **ANACONDA PLATFORM (SPYDER)**

HARDWARE REQUIREMENTS

	Windows		
Processor	**RAM**	**DISK Space**	**Graphics adapter**
Intel I3	2GB	1 GB for MATLAB only, 5 GB for a typical installation	A 32-bit or 64-bit OpenGL capable graphics adapter is strongly recommended

LITERATURE SURVEY

Handwritten Character Recognition using Neural Network

- Objective of this paper is to recognize the characters in a given scanned documents and study the effects of changing the Models of ANN.
- Today Neural Networks are mostly used for Pattern Recognition task.
- The paper describes the behaviors of different Models of Neural Network used in Alphabet recognition.
- Alphabet recognition is widespread use of Neural Network.
- We have considered parameters like numbers of Hidden Layer, size of Hidden Layer and epochs.
- We have used Multilayer Feed Forward network with Back propagation. In Preprocessing we have applied some basic algorithms for segmentation of characters, normalizing of characters and De-skewing.
- We have used different Models of Neural Network and applied the test set on each to find the accuracy of the respective Neural Network.

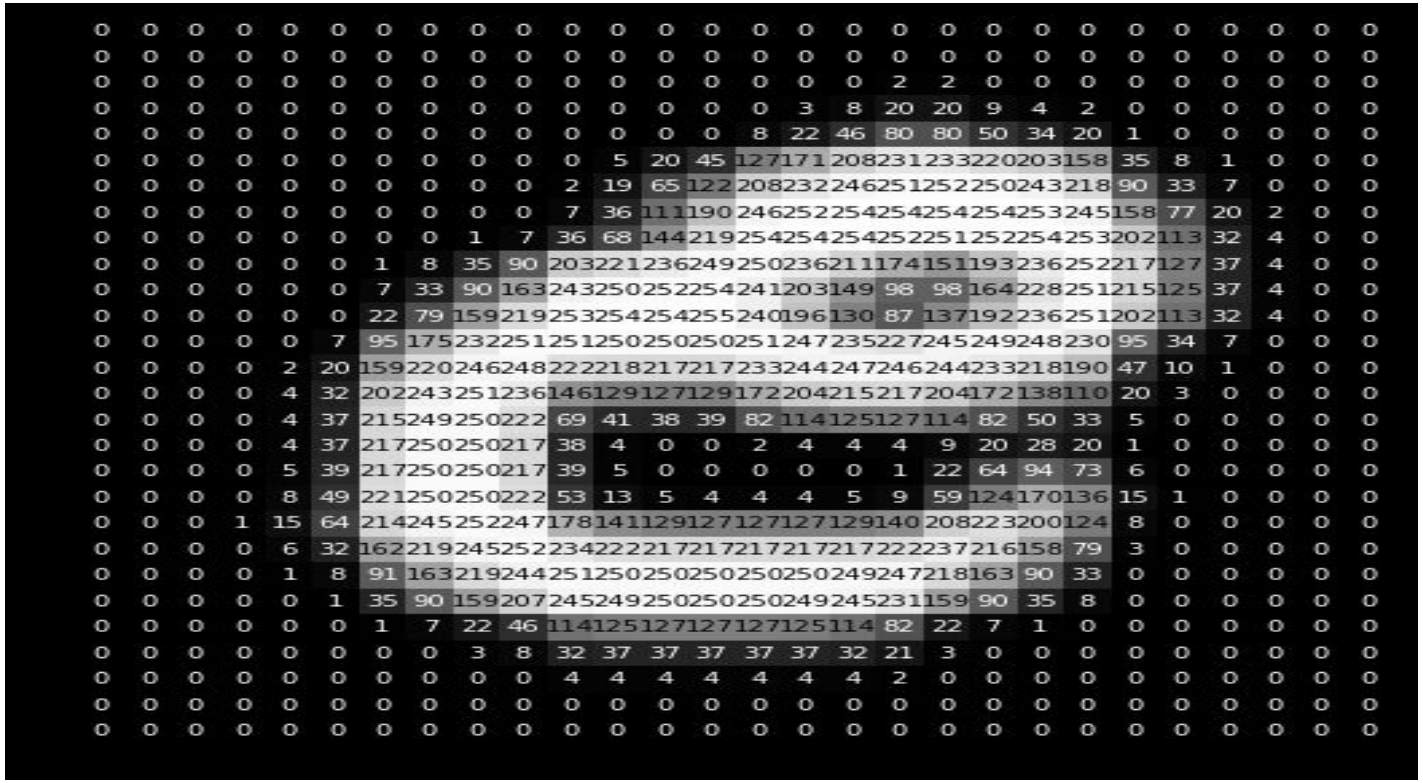
LITERATURE SURVEY

Handwritten Character Recognition Using Gradient Features

- Feature extraction is an integral part of any recognition system. The aim of feature extraction is to describe the pattern by means of minimum number of features that are effective in discriminating pattern classes.
- The gradient measures the magnitude and direction of the greatest change in intensity in a small neighborhood of each pixel. (In what follows, "gradient" refers to both the gradient magnitude and direct ion). Gradients are computed by means of the Sobel operator.
- In this paper an effort is made towards recognition of English Characters and obtained recognition accuracy of 94%.
- Due to its logical simplicity, ease of use and high recognition rate, Gradient Features should be used for recognition purposes.

LITERATURE SURVEY

Handwritten Character Recognition Using Gradient Features

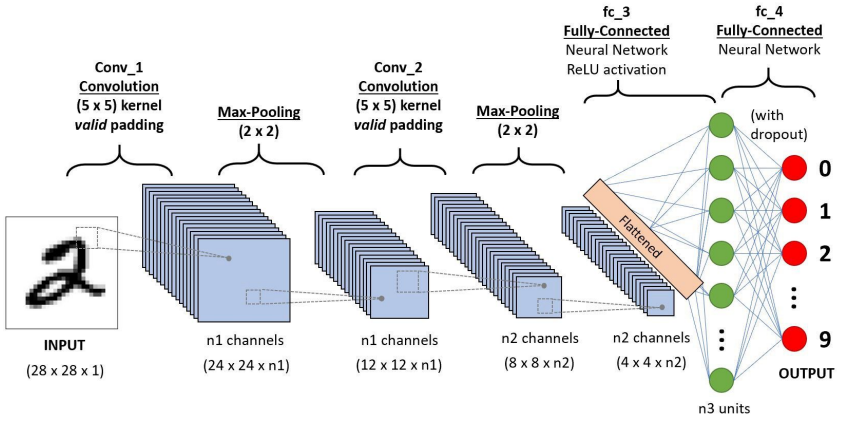


CONVOLUTION NEURAL NETWORK

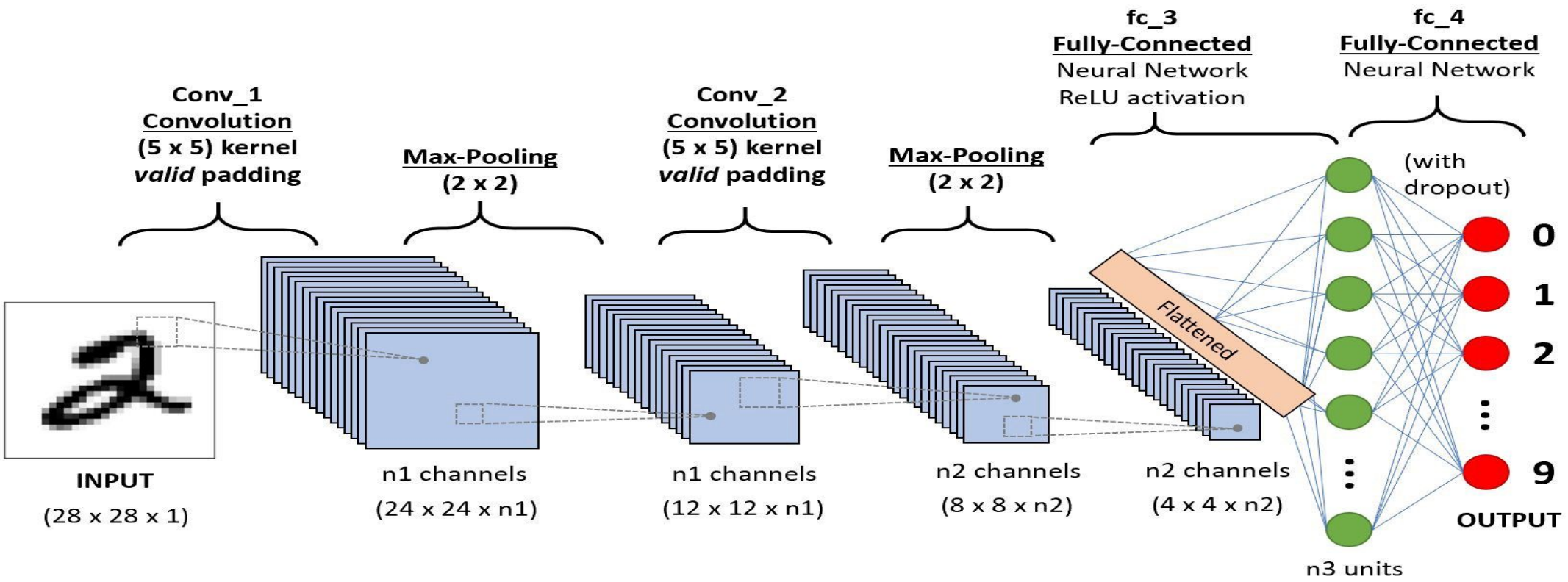
- Let's start by understanding what exactly is a Convolutional Neural Network. A Convolutional Neural Network (CNN) is a type of neural network widely used for image recognition and classification.
- CNNs are regularized versions of multilayer perceptrons. Multilayer perceptrons usually mean fully connected networks, that is, each neuron in one layer is connected to all neurons in the next layer.
- CNNs consists of the following layers: Convolution layer: A "kernel" of size for example, 3X3 or 5X5, is passed over the image and a dot product of the original pixel values with weights defined in the kernel is calculated. This matrix is then passed through an activation function "ReLu" that converts every negative value in the matrix to zero.

FULLY CONNECTED LAYER

- The final matrix is then flattened into a one-dimensional vector. This vector is then passed into the neural network.
- Finally, the output layer is a list of probabilities for different possible labels attached to the image (e.g. alphabets a,b,c).
- The label that receives the highest probability is the classification decision.

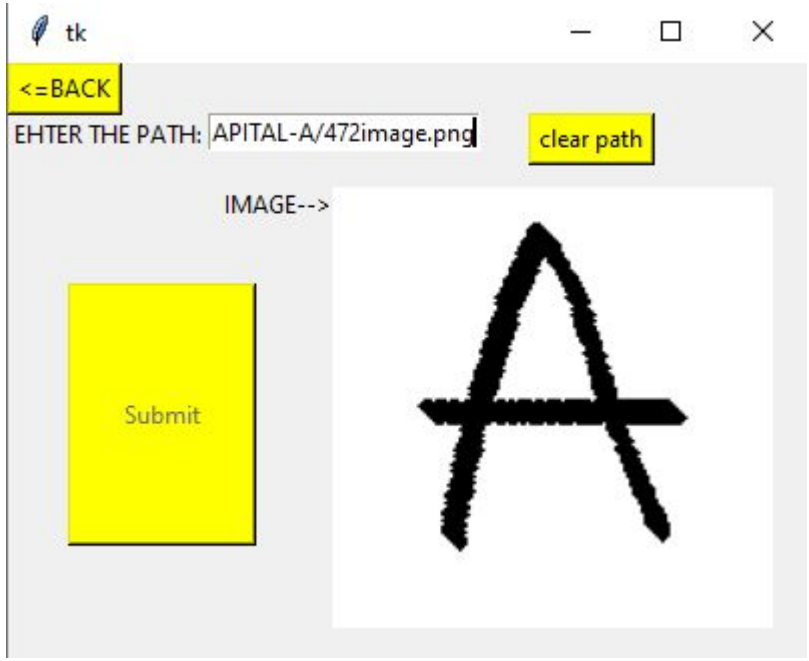


FULLY CONNECTED LAYER



INPUT TYPES

Input by path:



Input by drawing:

MODULES

User Module- User uploads image. If the image is not compatible not possible to upload file.

System Module- Initialize the input, run the module and generate output.

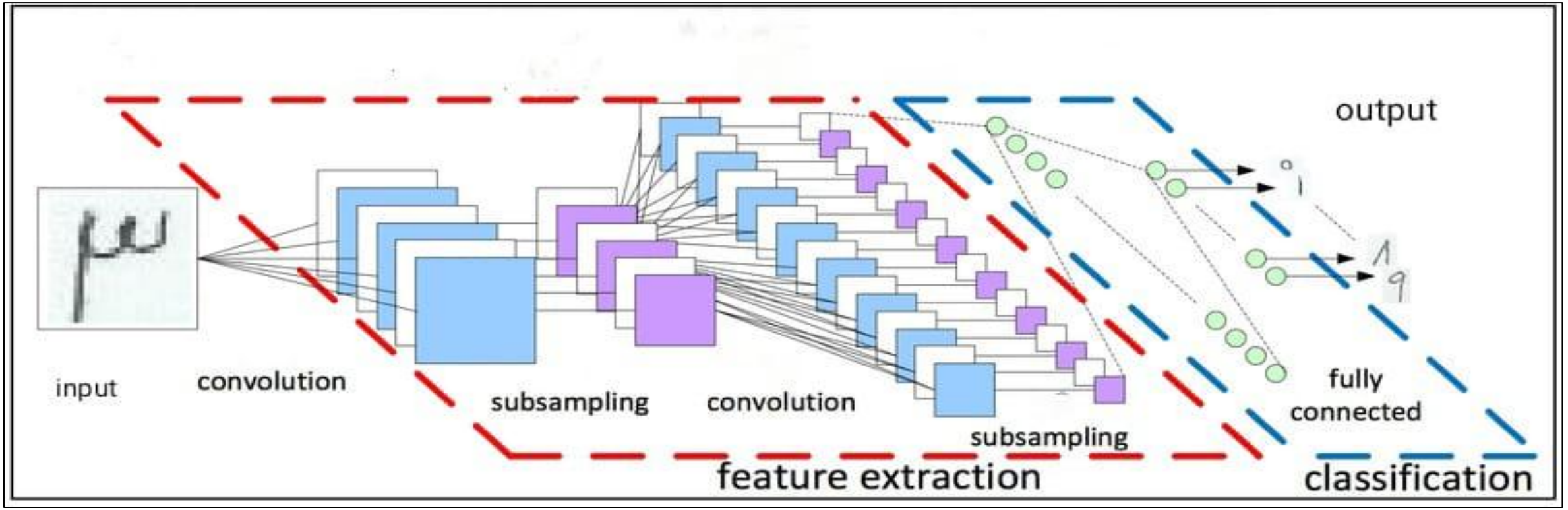
Pre-Processing Module- refers to all the transformations on the raw data before it is fed to the machine learning or deep learning algorithm. For instance, training a convolutional neural network on raw images will probably lead to bad classification performances.

MODULES

Feature Extraction Module:- Is a type of dimensionality reduction where a large number of pixels image are efficiently represented in such a way that interesting parts of the image are captured effectively.

Classification & Recognition Module:- refers to a predictive modeling problem where a class label is predicted for a given example of input data. Examples of classification problems include: Given an example, classify if it is spam or not. Given a handwritten character, classify it as one of the known characters.

ARCHITECTURE



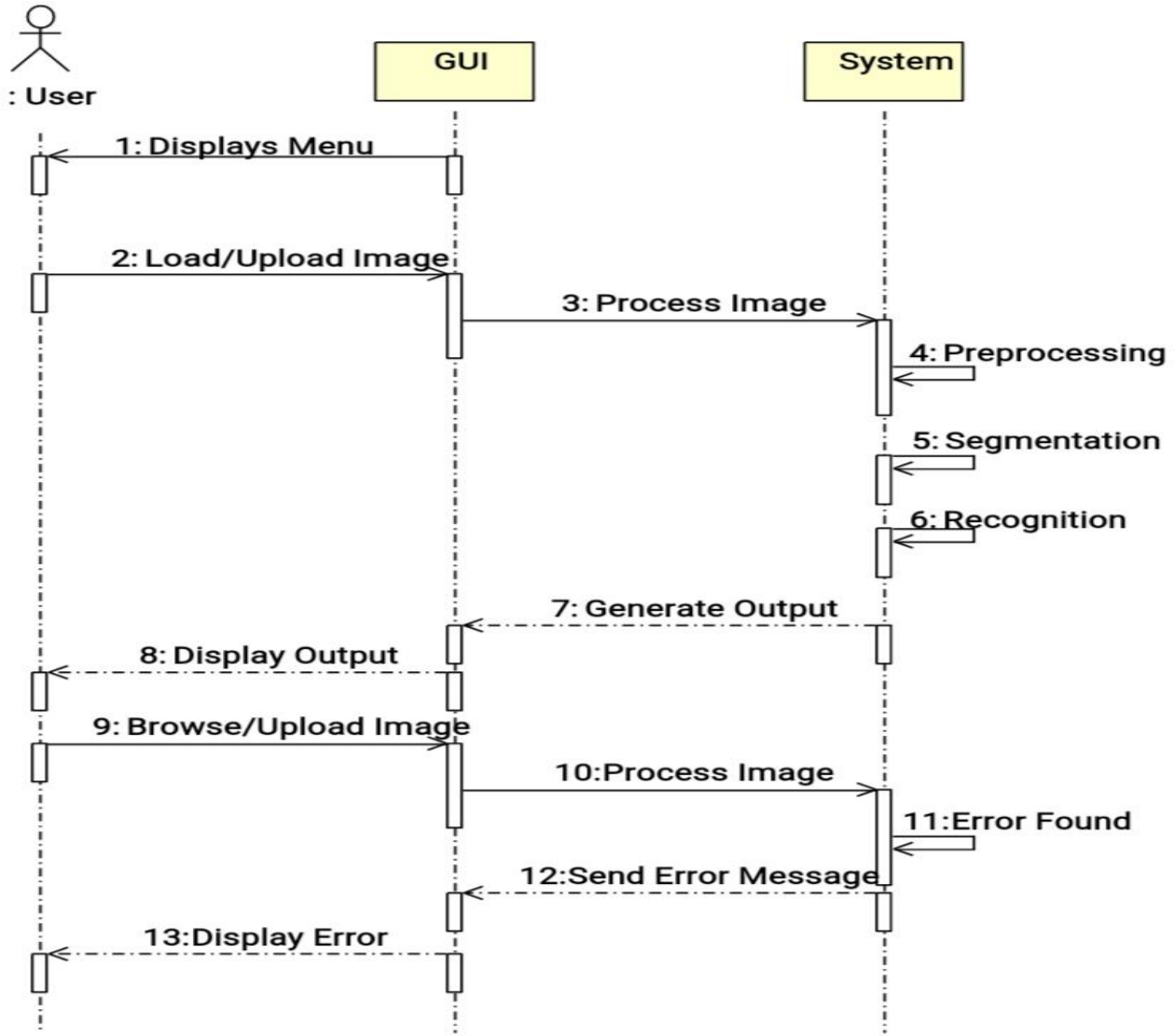
- Above architecture diagram represents flow of process from input image to output

UML DIAGRAMS

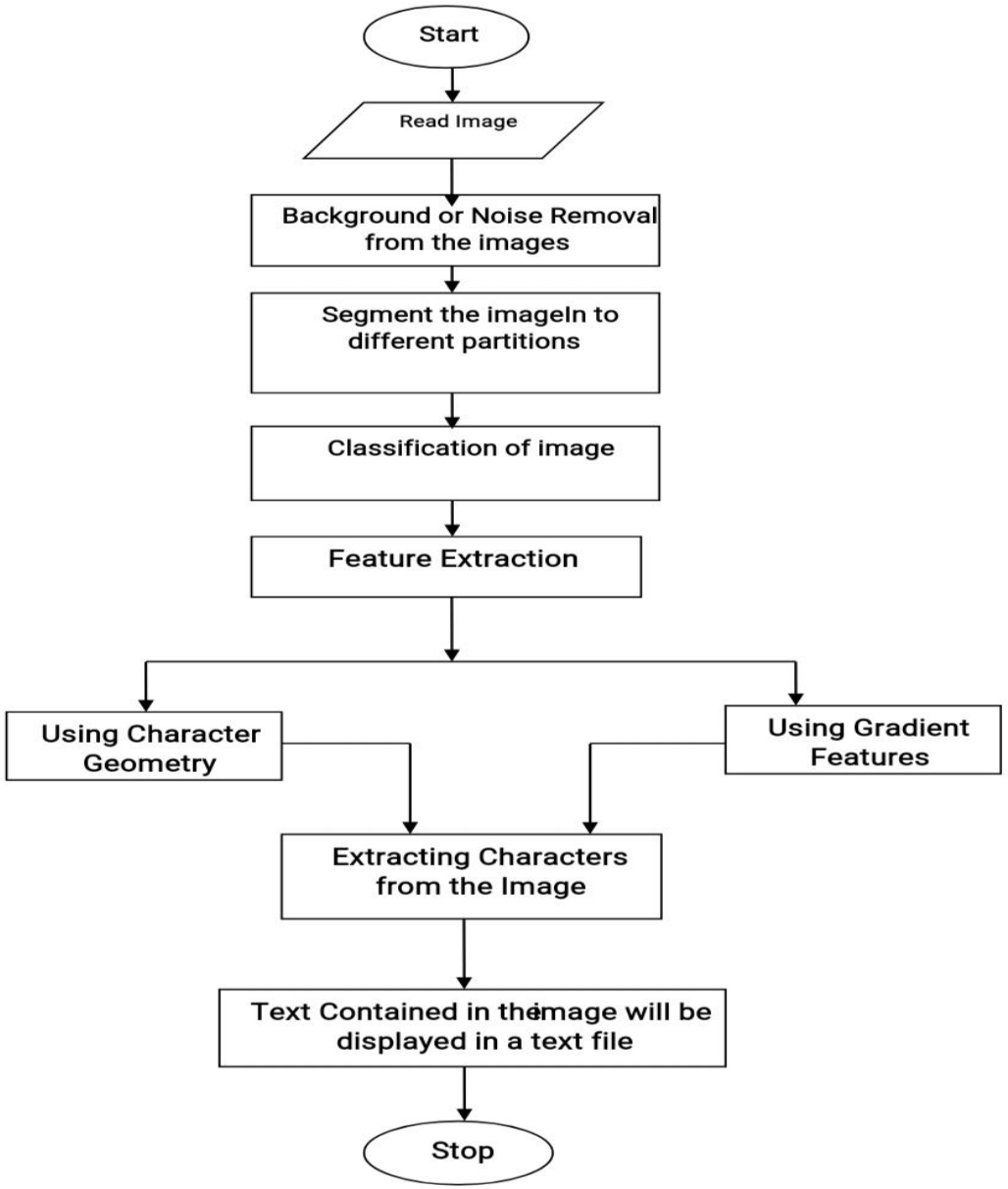
- The unified modelling language (UML) is a standard language for specifying, visualizing,constructing and documenting the artfacts of software systems, as well as for business modelling and other non-software systems.
- The UML is a very important part of developing objects oriented software and software development process.It mainly uses graphical notations to express the design of software projects.
- Using the UML helps project teams communicate, explore potential designs,and validate the architectural design of the software.

USE CASE DIAGRAM

SEQUENCE DIAGRAM

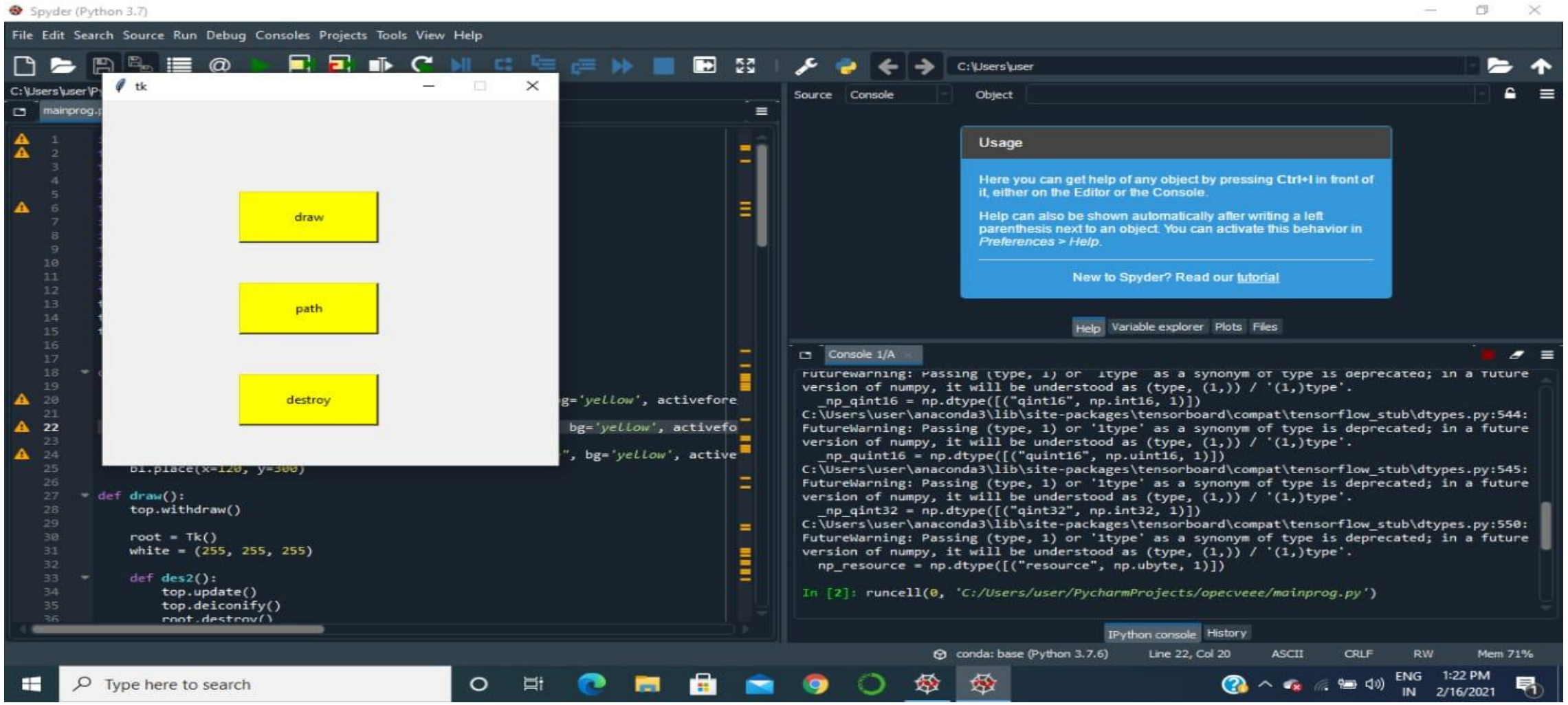


STATECHART DIAGRAM

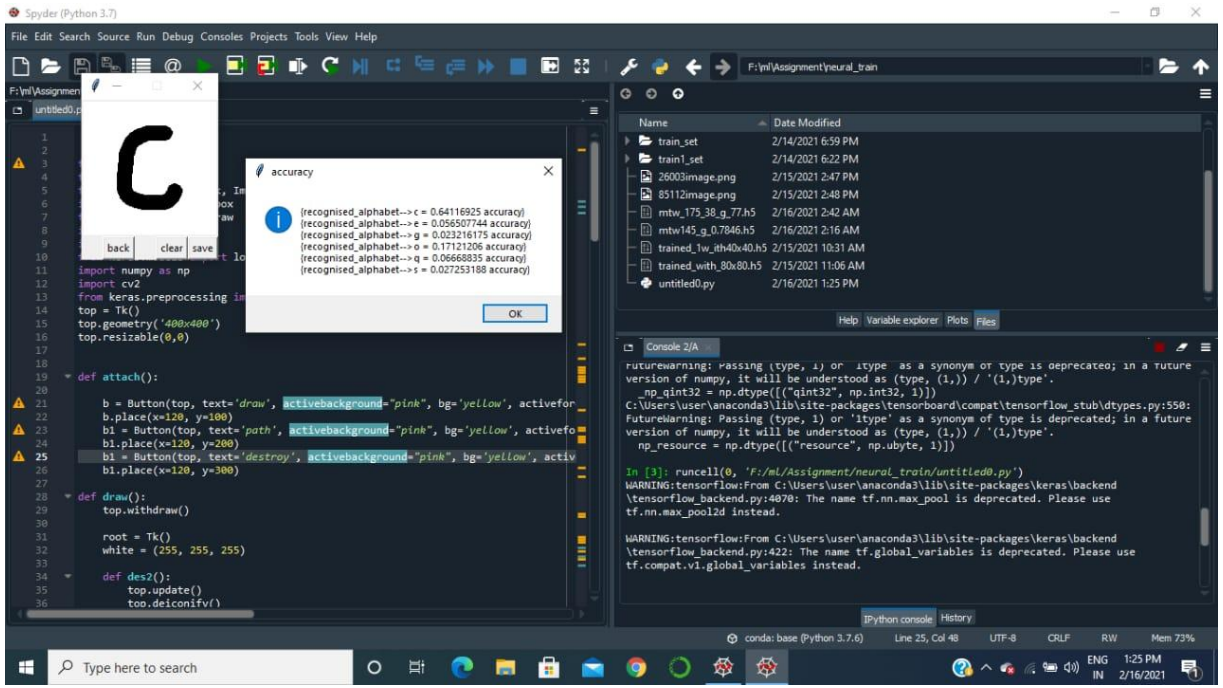


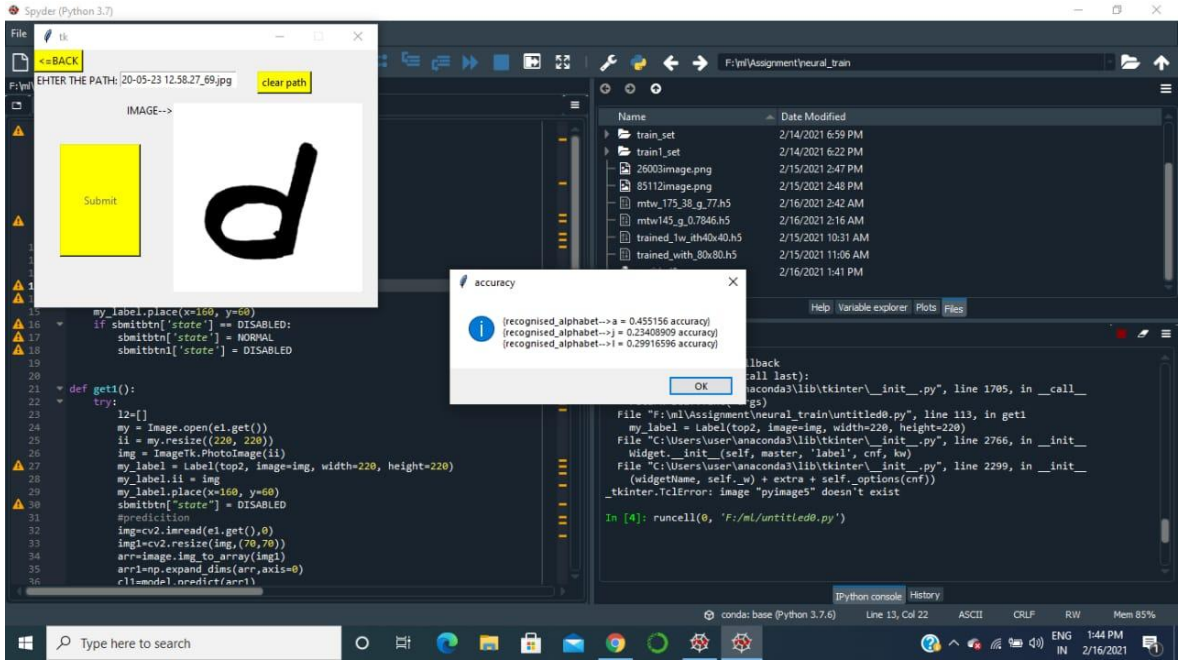
ACTIVITY DIAGRAM

OUTPUT SCREENS



OUTPUT SCREENS





FUTURE SCOPE

The application of this CNN algorithm is extensive. Now-a-days recent advancement in technologies has pushed the limits further for man to get rid of older equipment which posed inconvenience in using.

In our case that equipment is a keyboard. There are many situations when using a keyboard is cumbersome like,

- We don’t get fluency with keyboard as real word writing
- When any key on keyboard is damaged
- Keyboard have scripts on its keys in only one language
- We have to find each character on keyboard which takes time
- In touch-enabled portable devices it is difficult to add a keyboard with much ease

FUTURE SCOPE

On the other hand if we use an CNN software in any device, we can get benefits like,

- Multiple language support
- No keyboard required
- Real world writing style support
- Convenient for touch enabled devices
- Previously hand written record can be documented easily
- Extensive features can also be added to the software like,

1. Translation
2. Voice reading

CONCLUSION

- Classification of characters and learning of image processing techniques is done in this project. Also the scheme through which project is achieved is Artificial Neural Network scheme.
- The result which was got was correct up to more than 90% of the cases, but it would be improved at the end.
- This work was basically focused on envisaging methods that can efficiently extract feature vectors from each individual character. The method I came up with gave efficient and effective result both for feature extraction as well as recognition.
- There are also different methods through which ‘handwritten character recognition’ is achieved.


Any
Questions?


Thank You