Title: A Novel method for Handwritten digit recognition.

Project Objectives

By the end of this project, you will:

- Know fundamental concepts and techniques of the Artificial Neural Network and Convolution Neural Networks
- Gain a broad understanding of image data.
- Work with Sequential type of modelling
- Work with Keras capabilities
- Work with image processing techniques
- know how to build a web application using the Flask framework.

Project Flow

Project Flow:

- The user interacts with the UI (User Interface) to upload the image as input
- The uploaded image is analysed by the model which is integrated
- Once the model analyses the uploaded image, the prediction is showcased on the UI

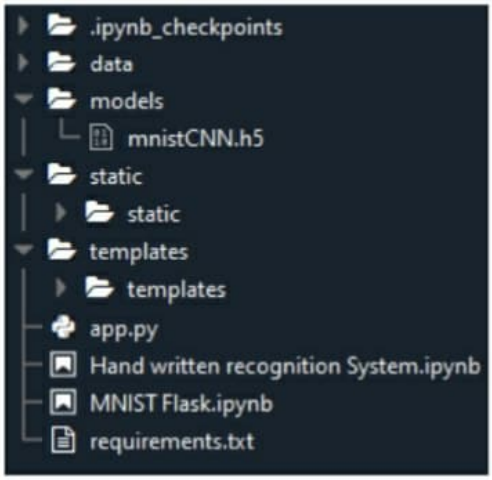
To accomplish this, we have to complete all the activities and tasks listed below

- Understanding the data.
  - Importing the required libraries
  - Loading the data
  - Analysing the data
  - Reshaping the data.
  - Applying One Hot Encoding
- Model Building
  - Creating the model and adding the input, hidden and output layers to it
  - Compiling the model
  - Training the model
  - Predicting the result

    - Testing the model by taking image inputs
    - Saving the model
- Application Building
    - Create an HTML file
    - Build Python Code

Project Structure

Create a Project folder which contains files as shown below



- We are building a Flask Application which needs HTML pages stored in the templates folder and a python script app.py for server-side scripting.
- The model is built in the notebook Hand written recognition system.ipynb
- We need the model which is saved and the saved model in this content is mnistCNN.h5
- The static folder will contain js and css files.
- The templates mainly used here are main.html and index6.html for showcasing the UI

Prerequisites

To complete this project, you should have the following software and packages

Anaconda Navigator:

Anaconda Navigator is a free and open-source distribution of the Python and R programming languages for data science and machine learning related applications. It can be installed on Windows, Linux, and macOS. Conda is an open-source, cross-platform, package management system. Anaconda comes with so very nice tools like JupyterLab, Jupyter Notebook, QtConsole, Spyder, Glueviz, Orange, Rstudio, Visual Studio Code. For this project, we will be using Jupiter notebook and Spyder

To install Anaconda navigator and to know how to use Jupyter Notebook a Spyder using Anaconda watch the video

To build Deep learning models you must require the following packages

Tensor flow: TensorFlow is an end-to-end open-source platform for machine learning. It has a comprehensive, flexible ecosystem of tools, libraries, and community resources that lets researchers push the state-of-the-art in ML and developers can easily build and deploy ML powered applications.

Keras: Keras leverages various optimization techniques to make high level neural network API easier and more performant. It supports the following features:

- Consistent, simple and extensible API.
- Minimal structure - easy to achieve the result without any frills.
- It supports multiple platforms and backends.
- It is user friendly framework which runs on both CPU and GPU.
- Highly scalability of computation.

Flask: Web frame work used for building Web applications