Handwritten Number Classifier:

Section A: Load Data

1. Select the data set through a choice box – We can load MNIST are any other Classification Dataset.
2. And the Next Option is to Upload Custom Classification Dataset, through Stream lit Choice Box.
   2.1. From the Custom Data Student can select the independent and dependent variable for the classification.
3. After the first section the student will get to know what X and y is for more visualization, we can add a random ten image and its respective labels.

Section B: Preprocessing

The Preprocessing we have add lot parameter it various according to the data set, for MNIST.

1. The Preprocessing we are using in the number classification is Converting the X and y into float32 and int64 datatypes.
2. Normalizing the X by diving by the maximum number (255) and showing the min and max for X
3. And Splitting data into training and test data, we can give and possibility to select the percentage of data to be split for testing.
4. Confirming the shape of after splitting original data vs the train test split

We can display the four steps through a step-by-step process flow, with their notes explaining why that step and what is the input to the process and output from the process.

Section C: Visualization

1. We initially visualized the random ten image and its label, after the preprocessing the values in the X changes into range (0-1) show we can add one more process show the value of X, how the image file is formed through the matrix of number with simple list.
2. It is Also an automated process we can ask student to select how images they want in the ML Presentation and row and columns.

Section D: Model Selection

1. We are using Both ANN and CNN in the Classification, so we can add a choice box With Both the Options.
2. If the Student Select ANN:
   2.1   The First Step is to Name the Model.
   2.2   Building the input layer with **Number of Neurons Layer,** input shape, activation function for the input layer.
   2.3   For Hidden Layers we will add a Button, which name itself as Hidden Layer1,2,3 etc according to the student preference.
          Each Layer as the Mandatory parameters the Number of Neurons, Kernal Size and Activation function and under a choice box.
   2.4   The Output layer as number of neurons based on the category. And the output activation function
3. The same for CNN Also, Before the Neural Network, we introduce the convolution and MaxPooling Layer and state what is for and its respective customizable parameters based on the student preference they change the kernel size in the Pooling Layer (**Pool Size**

(Kernel Size), Pooling Type) and Convolution Layers like Filter Size (Kernel Size), Number of Filters (Kernels),stride, padding and Activation Function.

Section E: Complier Design:

1. The Compiler design very import part NN, so the student as to build their own complier with all the basic essential parameters.
    1.1 The students as to know and Enter the Epochs, learning rate, Perfect and lose function.
    1.2 So can add multiple dropdown boxes to select those parameters with little description about the parameter and how it affects the model like running.
    1.3 We can start with default compiler parameters and later we can give the Custom option to select and build the own compiler.

Section F: Model Training:

1. Model Training is automated process after the model and the complier as be build and hit the Train button, model start processing the training process and do the prediction. And its ends with model training and prediction success prompt.
2. Visualizing Model Performance (Accuracy Score, Precision, Recall, F1etc.,) through Excel and Graph

Section G: Performance Evaluation:

1. In this Section we allow the students to select the various models and compiler they built and their performance so that they can see the difference in layers, neuron and activation function could affect the output of the model.
2. We can give then the choice like visualize the accuracy score of all the models they build with various layer in distinct colour so while adding into a report will be much presentable.

Section H: Report/ Comment Section:

1. Mandatory Report/Comment Box for student to type the knowledge gain from NN step they done.