

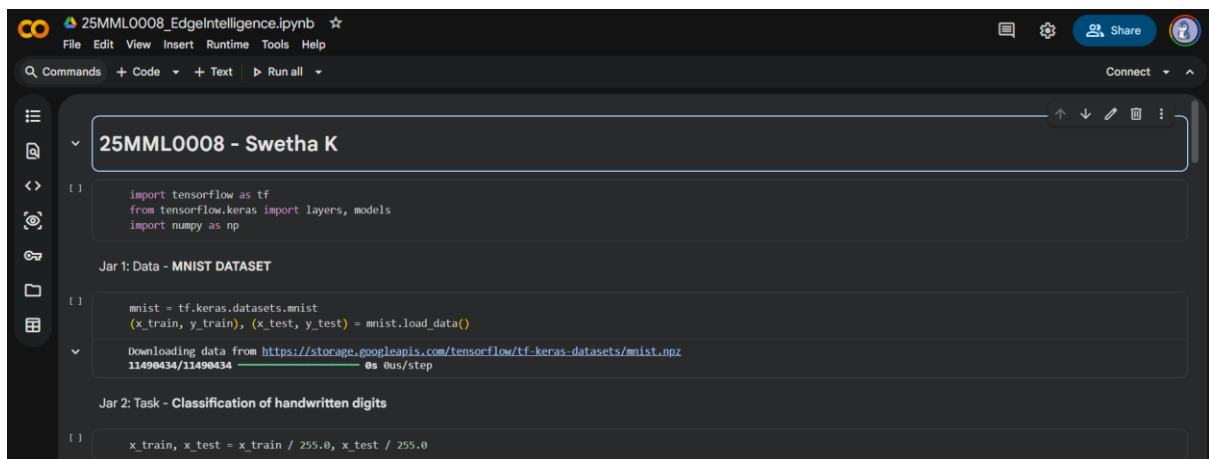
## EDGE INTELLIGENCE LAB ASSIGNMENT 2

SWETHA K

25MML0008

### Task 1:

Analysing MNIST dataset applying Artificial Neural Network, saving the model and finding the weight of the model



The screenshot shows a Jupyter Notebook titled "25MML0008\_EdgeIntelligence.ipynb". The notebook has a dark theme and includes a sidebar with icons for file explorer, search, and other functions. The main area displays the following code cells:

```
[ ] import tensorflow as tf
    from tensorflow.keras import layers, models
    import numpy as np

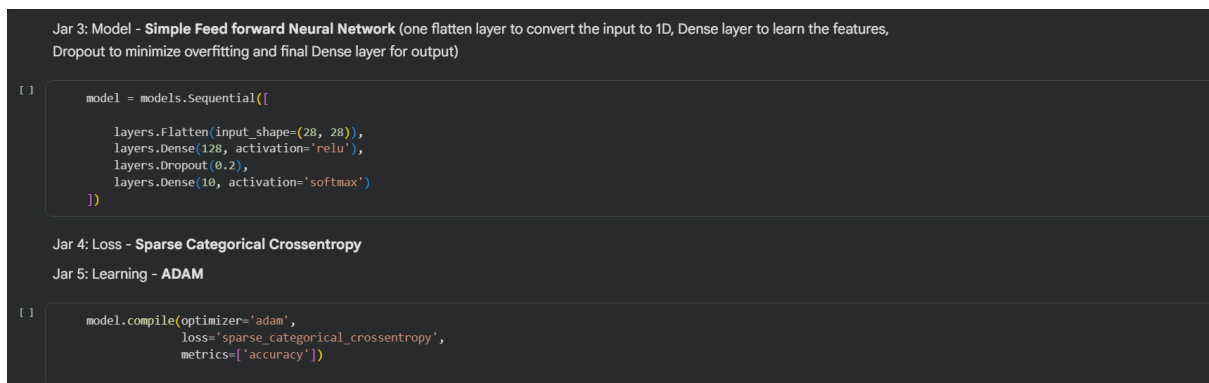
Jar 1: Data - MNIST DATASET

[ ] mnist = tf.keras.datasets.mnist
    (x_train, y_train), (x_test, y_test) = mnist.load_data()

    Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/mnist.npz
    11490434/11490434 — 0s 0us/step

Jar 2: Task - Classification of handwritten digits

[ ] x_train, x_test = x_train / 255.0, x_test / 255.0
```



The screenshot shows the continuation of the Jupyter Notebook with the following code cells:

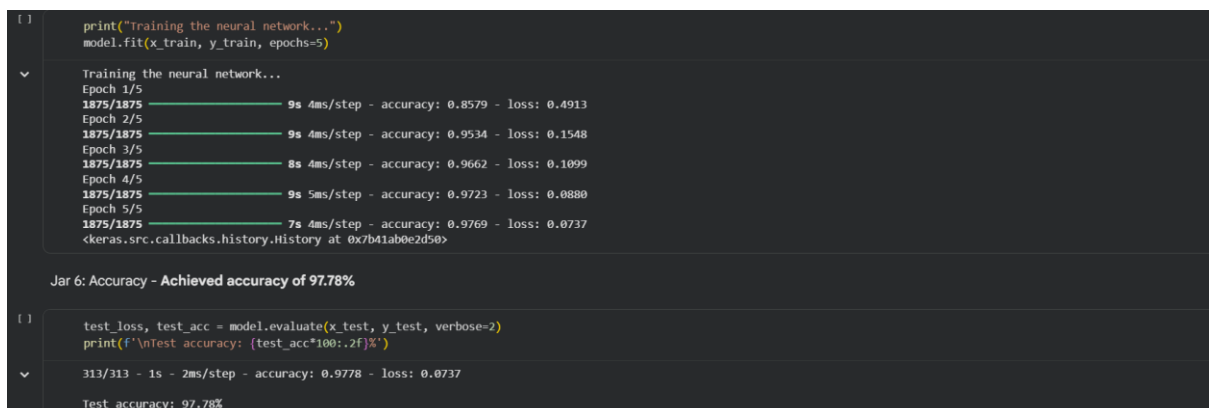
```
Jar 3: Model - Simple Feed forward Neural Network (one flatten layer to convert the input to 1D, Dense layer to learn the features,
Dropout to minimize overfitting and final Dense layer for output)

[ ] model = models.Sequential([
    layers.Flatten(input_shape=(28, 28)),
    layers.Dense(128, activation='relu'),
    layers.Dropout(0.2),
    layers.Dense(10, activation='softmax')
])

Jar 4: Loss - Sparse Categorical Crossentropy

Jar 5: Learning - ADAM

[ ] model.compile(optimizer='adam',
    loss='sparse_categorical_crossentropy',
    metrics=['accuracy'])
```



The screenshot shows the final code cells of the Jupyter Notebook, including the training process and the final accuracy result:

```
[ ] print("Training the neural network...")
    model.fit(x_train, y_train, epochs=5)

    Training the neural network...
    Epoch 1/5 ————— 9s 4ms/step - accuracy: 0.8579 - loss: 0.4913
    Epoch 2/5 ————— 9s 4ms/step - accuracy: 0.9534 - loss: 0.1548
    Epoch 3/5 ————— 8s 4ms/step - accuracy: 0.9662 - loss: 0.1099
    Epoch 4/5 ————— 9s 5ms/step - accuracy: 0.9723 - loss: 0.0880
    Epoch 5/5 ————— 7s 4ms/step - accuracy: 0.9769 - loss: 0.0737
    <keras.src.callbacks.history.History at 0x7b41ab0e2d50>

Jar 6: Accuracy - Achieved accuracy of 97.78%

[ ] test_loss, test_acc = model.evaluate(x_test, y_test, verbose=2)
    print(f'\nTest accuracy: {test_acc*100:.2f}%')

    313/313 - 1s - 2ms/step - accuracy: 0.9778 - loss: 0.0737

    Test accuracy: 97.78%
```

## Saving the model

## Load the model

### Using the pickled model to get the accuracy from test data

Test Loss: 0.0737  
Test Accuracy: 97.78%

```
model.summary()
```

Layer (type)	Output Shape	Param #
flatten_1 (Flatten)	(None, 784)	0
dense_2 (Dense)	(None, 128)	100,480
dropout_1 (Dropout)	(None, 128)	0
dense_3 (Dense)	(None, 10)	1,290

```
Total params: 305,312 (1.16 MB)
Trainable params: 181,770 (397.54 KB)
Non-trainable params: 0 (0.00 B)
Optimizer params: 203,542 (795.09 KB)
```

**Findings:** Since the model is using ANN (Simple Neural Network) the number of parameters of the model are lesser compared to a CNN model, thus the weight of the model is 397.54KB.

## Task 2:

1. Creating an account on Edge Impulse
2. Data acquisition
3. Choosing data connect -> Scan QR through phone
4. Selecting labels and uploading dataset
5. Splitting dataset into train and test.

The screenshot displays the Edge Impulse Studio web interface. The left sidebar contains navigation links: Dashboard, Devices, Data acquisition, Experiments, EON Tuner, Impulse design, Create impulse, and Live classification. An 'Upgrade Plan' button is also visible. The main content area is titled 'skpati29 / skpati29-project-1' and includes tabs for Dataset, Data explorer, Data sources, Synthetic data, AI labeling (marked as NEW), and CSV Wizard. A summary section shows 'DATA COLLECTED 27 items' and 'TRAIN / TEST SPLIT 81% / 19%'. Below this, a 'Dataset' table lists training samples. To the right, there is a 'Collect data' section with a 'Connect a device' link and a 'RAW DATA' section with a 'Click on a sample to load...' prompt. A 'Resume tutorial' button is located at the bottom right.

SAMPLE NAME	LABEL	ADDED
Chair.6ebbnaos	Chair	Yesterday, 17:...
Chair.6ebbau3l	Chair	Yesterday, 17:...
Chair.6ebbag96	Chair	Yesterday, 17:...
Chair.6ebb9qm2	Chair	Yesterday, 17:...
Chair.6ebb7fvp	Monitor	Yesterday, 17:...
Keyboard.6ebb5dm1	Keyboard	Yesterday, 17:...