

# Edge Intelligence

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25MML0032

## Task-1:

### Key Take aways:

1. Analysing an image dataset-MNIST and applying basic preprocessing operations,
2. Applied Artificial neural network on the following dataset.
3. Saving the model using pickle model.

Code:

```
jupyter D. Sai Mohith 25MML0032 Last Checkpoint: 12 minutes ago
```

```
File Edit View Run Kernel Settings Help
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```
File Edit View Run Kernel Settings Help
```

```
[23]: import tensorflow as tf
from tensorflow.keras import layers,models
from tensorflow.keras.utils import to_categorical
import numpy as np
(x_train,y_train),(x_test,y_test) = tf.keras.datasets.mnist.load_data()
```

```
[24]: x_train=x_train.astype("float32")/255.0
x_test=x_test.astype("float32")/255.0

x_train=x_train.reshape(-1,784)
x_test=x_test.reshape(-1,784)

y_train=to_categorical(y_train,10)
y_test=to_categorical(y_test,10)
```

```
[25]: model=models.Sequential([
    layers.Dense(64,activation='relu',input_shape=(784,)),
    layers.Dense(32,activation='relu'),
    layers.Dense(10,activation='softmax')
])
```

```
model.summary()
```

```
Model: "sequential_3"
```

Layer (type)	Output Shape	Param #
dense_9 (Dense)	(None, 64)	50,240
dense_10 (Dense)	(None, 32)	2,080
dense_11 (Dense)	(None, 10)	330

```
Total params: 52,650 (205.66 KB)
```

```
Trainable params: 52,650 (205.66 KB)
```

```
Non-trainable params: 0 (0.00 B)
```

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

```

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

history=model.fit(
    x_train,y_train,
    epochs=5,
    batch_size=128,
    validation_split=0.1,
    verbose=1
)

Epoch 1/5
422/422 4s 7ms/step - accuracy: 0.7617 - loss: 0.8098 - val_accuracy: 0.9472 - val_loss: 0.1925
Epoch 2/5
422/422 3s 6ms/step - accuracy: 0.9378 - loss: 0.2158 - val_accuracy: 0.9602 - val_loss: 0.1494
Epoch 3/5
422/422 2s 6ms/step - accuracy: 0.9525 - loss: 0.1650 - val_accuracy: 0.9643 - val_loss: 0.1239
Epoch 4/5
422/422 2s 6ms/step - accuracy: 0.9644 - loss: 0.1222 - val_accuracy: 0.9662 - val_loss: 0.1083
Epoch 5/5
422/422 2s 6ms/step - accuracy: 0.9704 - loss: 0.0998 - val_accuracy: 0.9697 - val_loss: 0.0987

test_loss,test_acc=model.evaluate(x_test,y_test)
print(test_acc)

313/313 1s 4ms/step - accuracy: 0.9645 - loss: 0.1203
0.9674999713897705

import pickle
from joblib import Parallel, delayed
import joblib

# Save the model as a pickle in a file
joblib.dump(model, 'Model.pkl')

```

['Model.pkl']

```
#Loading model
knn_from_joblib = joblib.load('Model.pkl')
```

```
# Using mn
knn_from_joblib.predict(x_test)

313/313 1s 2ms/step
array([[1.1633743e-06, 4.0897052e-07, 8.9151312e-05, ..., 9.9886167e-01,
       5.9455942e-06, 3.5978155e-05],
       [2.1035637e-06, 3.1101084e-04, 9.9802101e-01, ..., 1.1188741e-07,
       1.9130403e-04, 1.7233789e-09],
       [1.5596344e-05, 9.9899894e-01, 2.3897045e-04, ..., 4.3203219e-04,
       1.1988523e-04, 4.3392272e-05],
       ...,
       [2.7945777e-09, 5.4175042e-10, 1.8290272e-09, ..., 1.6284190e-05,
       9.7806937e-05, 5.4433109e-04],
       [2.6654772e-07, 4.2919970e-07, 3.7009013e-08, ..., 4.3409457e-07,
       6.0357887e-04, 2.7900020e-09],
       [2.4362751e-07, 8.7505470e-10, 3.7320308e-07, ..., 7.2588663e-12,
       1.5195829e-07, 2.0652326e-08]], dtype=float32)
```

## Size of file:

<input type="checkbox"/>	Saved Games	9 months ago	
<input type="checkbox"/>	scikit_learn_data	5 months ago	
<input type="checkbox"/>	Searches	9 months ago	
<input type="checkbox"/>	Videos	9 months ago	
<input checked="" type="checkbox"/>	25MML0032_Lab-1_Image_Processing_MNIST.ipynb	28 days ago	5 KB
<input checked="" type="checkbox"/>	25MML0032_LogData.ipynb	21 days ago	33.2 KB
<input checked="" type="checkbox"/>	Animal_ImageDataAnalysis_25MML0032.ipynb	21 days ago	9.3 KB
<input checked="" type="checkbox"/>	AnimalDataAnalysis.ipynb	27 days ago	9.3 KB
<input checked="" type="checkbox"/>	API and NLTK.ipynb	2 months ago	8.2 KB
<input checked="" type="checkbox"/>	API_Dataset.ipynb	22 days ago	2.4 KB
<input checked="" type="checkbox"/>	CarsDataEngineering.ipynb	3 months ago	167.3 KB
<input checked="" type="checkbox"/>	clustering.ipynb	2 months ago	25.5 KB
<input checked="" type="checkbox"/>	clusteringProject.ipynb	2 months ago	68.5 KB
<input checked="" type="checkbox"/>	Customer_segmentation_unsupervised.ipynb	2 months ago	452.7 KB
<input checked="" type="checkbox"/>	D. Sai Mohith 25MML0032.ipynb	now	13.7 KB

## **Task-2**

**Steps to collect the data are listed below in detail:**

**1. Make an Edge Impulse account**

Initially, go to the Edge Impulse website and register for a new user account using your email address or one of the accepted login credentials. After registering successfully, access the Edge Impulse Studio dashboard. Projects, datasets, and model training all require this account.

**2. Visit the section on data acquisition**

Create a new project or open an existing one after logging in. Go to the Data Acquisition tab on the project dashboard. The raw data (pictures, audio, or sensor data) that will be used to train the machine learning model is gathered and uploaded in this step.

**3. Select the "Connect Data" option.**

Choose Connect Data from the Data Acquisition page. This enables you to directly gather data from Edge Impulse by connecting external devices like a computer, development board, or cell phone.

**4. Use your phone to scan the QR code.**

Edge Impulse shows a QR code on the screen after choosing the connect option. Scan this code using your smartphone's camera or QR scanner. This allows you to take and upload data straight from your phone by connecting it to the Edge Impulse project.

**5. Prior to clicking a picture, choose Label Data**

Select the proper label (class name) for the data before taking any pictures, such as "cat," "dog," or "car." Accurately labelling the data at the time of collection is crucial since it aids the machine learning model in comprehending the meaning of each image.

**6. Divide the recorded images into training and testing sets**

Once the photos have been gathered, separate the dataset into training and testing sets.

The screenshot shows the Edge Impulse web interface. On the left is a sidebar with navigation links: Dashboard, Devices, Data acquisition, Experiments, EON Tuner, Impulse design (with 'Create impulse'), Upgrade Plan (with 'View plans'), and a 'Resume tutorial' button. The main area is titled 'Dataset' and shows a summary: 'DATA COLLECTED 20 ite...' and 'TRAIN / TEST SPL... 80% / ...'. Below this is a table of dataset samples:

SAMPLE NAME	LABEL	ADDED
Fan.6ebblibl	Fan	Today, 17:...
Fan.6ebblibl8h5	Fan	Today, 17:...
Monitor.6ebba22j	Monitor	Today, 17:...
Keyboard.6ebbb6p4n	Keyboard	Today, 17:...
Mouse.6ebbb3lio	Mouse	Today, 17:...

At the bottom right of the main area is a dark blue button with white text: 'RAW DATA Click on a sample to load...'. In the top right corner of the main area, there is a green circular icon with a white letter 'M' and a status bar indicating 'Target: Cortex-M4F 80MHz'.

Total pictures are 20 out of which 16 are for training and 4 are for testing ie 80:20 ratio

A modal dialog box is open, titled 'Dataset train / test split ratio'. It contains the following text: 'Training data is used to train your model, and testing data is used to test your model's accuracy after training. We recommend an approximate 80/20 train/test split ratio for your data for every class (or label) in your dataset, although especially large datasets may require less testing data.' Below this text is a horizontal progress bar labeled 'SUGGESTED TRAIN / TEST SPLIT' with the value '80% / 20%'.

Below the progress bar is a section titled 'Labels in your dataset' with a question mark icon. It lists four categories with their respective counts and ratios:

Label	Count	Ratio
FAN	4	80% / 20% (4 / 1)
KEYBOARD	4	80% / 20% (4 / 1)
MONITOR	4	80% / 20% (4 / 1)
MOUSE	4	80% / 20% (4 / 1)

At the bottom right of the modal is a 'Dismiss' button, and at the very bottom right of the entire interface is a red 'Resume tutorial' button.

EDGE IMPULSE

20 ite... 80% /...

Dataset

Training (16) Test (4)

SAMPLE NAME	LABEL	ADDED
Fan.6ebblibi	Fan	Today, 17:...
Fan.6ebbi8h5	Fan	Today, 17:...
Monitor.6eba22j	Monitor	Today, 17:...
Keyboard.6ebb6p4n	Keyboard	Today, 17:...
Mouse.6ebb3lio	Mouse	Today, 17:...
Mouse.6ebb3kom	Mouse	Today, 17:...
Mouse.6ebb2sab	Mouse	Today, 17:...
Mouse.6ebb2ekb	Mouse	Today, 17:...

Connect device

Connect a device to start building your dataset.

RAW DATA

Monitor.6eba22j



A Resume tutorial