Documentation

Task 1: Comprehensive Documentation of Creating A Neural network

I work on Google Colab to write my code and all kinds of analysis for creating neural networks.

Data load

I use tensorflow to build a convolution neural network where data is built in it. The first stage involves loading the data and then partitioning it into separate datasets for training and testing purposes.The dataset used for training the model consists of 28x28 pictures of handwritten digits, denoted as x_train.The variable y_train represents the collection of labels that correspond to the dataset x_train.The dataset x_test consists of pictures of handwritten digits, each with dimensions of 28x28 pixels, which will be used for testing the model.The dataset y_test consists of labels that relate to the dataset x_test.

Preprocess the data

It is desired that each value falls between the range of 0.0 and 1.0. To normalize the values, it is necessary to divide them by 255.0, since they all initially lie within the range of 0.0-255.0.

The specification of the input shape is necessary in order to inform the model about the nature of the input data, which consists of 28x28 pictures in the x_train dataset.

Neural Network Model

The proposed architecture consists of a Sequential model consisting of two Conv2D layers, which are afterwards followed by MaxPooling2D layers. This is then followed by a Flatten layer and two completely linked Dense layers. The model accepts a grayscale picture with dimensions of 28x28 as its input and generates a probability distribution that encompasses the 10 potential digit labels.

Compile & Training Model

The provided code builds the model using the categorical_crossentropy loss function, the adam optimizer, and the accuracy metric. Subsequently, the model is trained on the training set over a span of 5 epochs, using a batch size of 32. Following each epoch, the model's performance is assessed by evaluating it on the test set.

```
Epoch 1/5
1875/1875 [==============================] - 89s 47ms/step - loss: 0.1329 - accuracy: 0.9600 - val_loss: 0.0528 - val_accuracy: 0.9829
Epoch 2/5
1875/1875 [==============================] - 65s 35ms/step - loss: 0.0458 - accuracy: 0.9859 - val_loss: 0.0338 - val_accuracy: 0.9874
Epoch 3/5
1875/1875 [==============================] - 61s 33ms/step - loss: 0.0321 - accuracy: 0.9897 - val_loss: 0.0412 - val_accuracy: 0.9866
Epoch 4/5
1875/1875 [==============================] - 62s 33ms/step - loss: 0.0245 - accuracy: 0.9919 - val_loss: 0.0341 - val_accuracy: 0.9889
Epoch 5/5
1875/1875 [==============================] - 61s 33ms/step - loss: 0.0165 - accuracy: 0.9948 - val_loss: 0.0323 - val_accuracy: 0.9899
<keras.src.callbacks.History at 0x79bf4aa47460>
```

Evaluate the Model

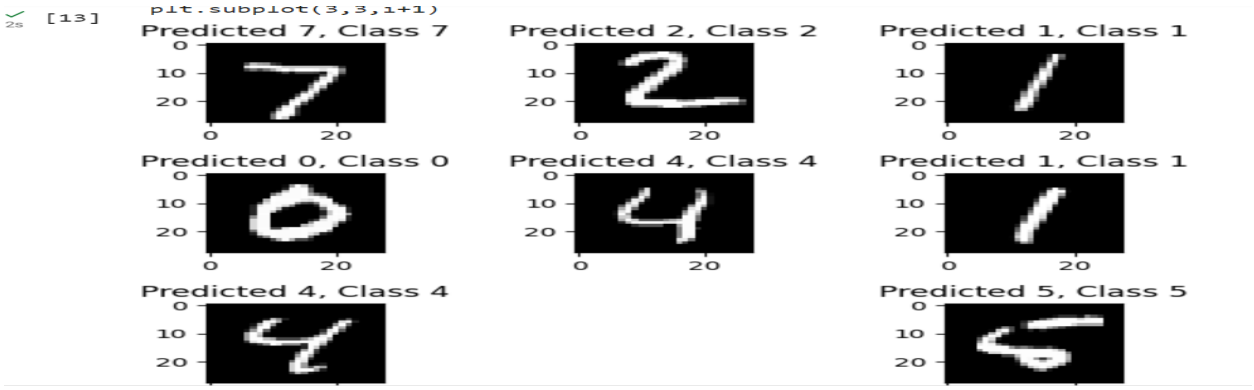
Test loss: 0.032322403043508 53 Test accuracy: 0.9898999929428101

```
313/313 [==============================] - 3s 10ms/step - loss: 0.0323 - accuracy: 0.9899
Test loss: 0.032322403043508 53
Test accuracy: 0.9898999929428101
```

Predict Labels

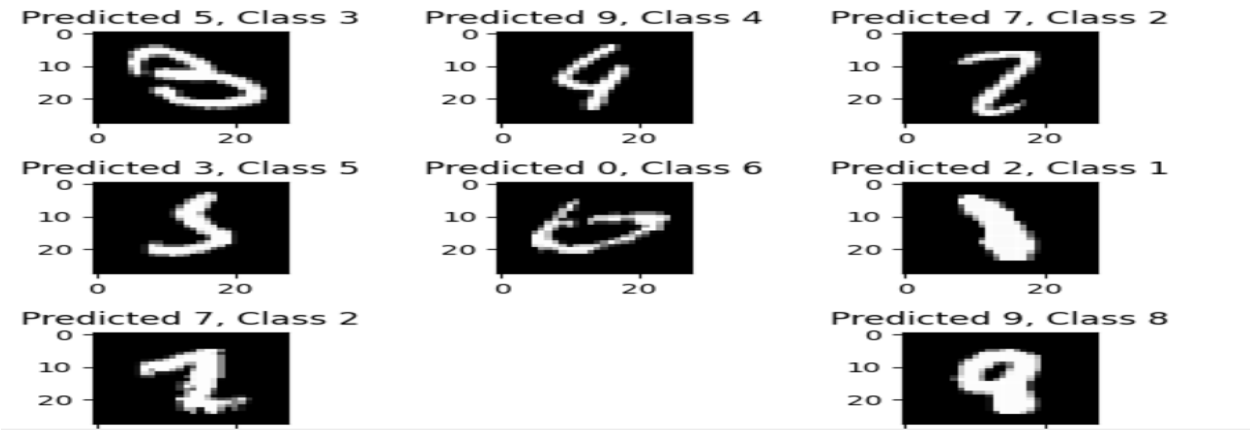
Result of Correctly Predicted

Here all the images are not similar pattern. So all the class are corrently predicted.



Result of incorrectly Predicted

Here model is not able to classify the above images correctly, but it seems like a variety of the similar patterns present on multiple classes affect the performance of the classifier although CNN is a robust architecture. For example, images number 3 and 6 both belong to different classes but look kind of similar to 3 and 7. but those are 5 and 2.

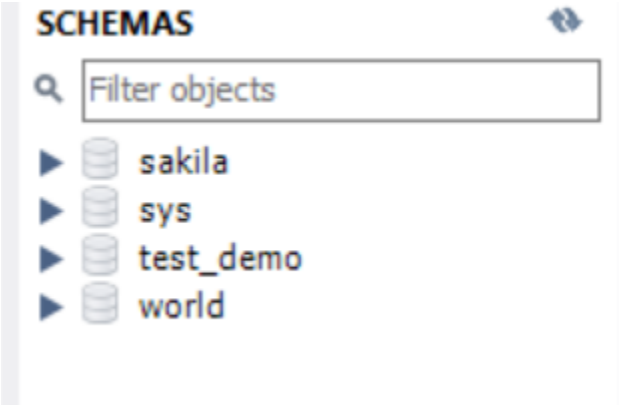


Task 2: Comprehensive Documentation of Working with Database

I use a mysql database server as well as pycharm IDE to write my code. Here I also use mysql-connector-python library to interface between pycharm IDE and mysql database. Note: mysql-connector library will not work in this project.

Create Database:

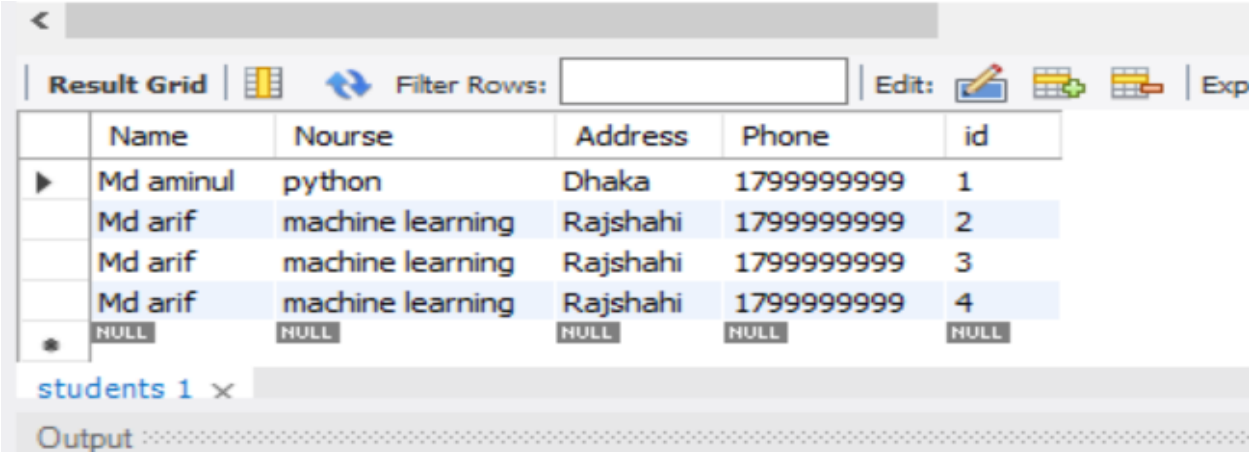
I create a database as test_demo



All databases:

There are others database such as sakila, world.

Create table and insert data:



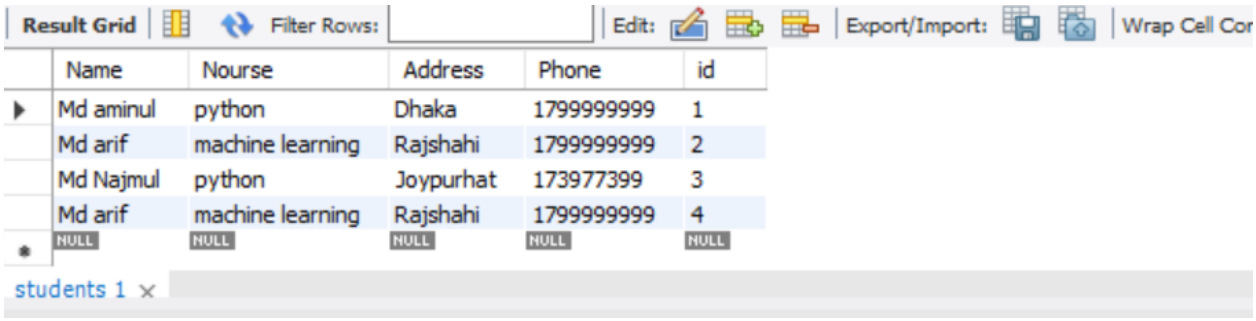
Select all column and row of a table:

```
"C:\Users\IT Gadgets\AppData\Local\Programs\Python\Python311\python.exe" "C:\Users\IT G
('Md aminul', 'python', 'Dhaka', 1799999999, 1)
('Md arif', 'machine learning', 'Rajshahi', 1799999999, 2)
('Md arif', 'machine learning', 'Rajshahi', 1799999999, 3)
('Md arif', 'machine learning', 'Rajshahi', 1799999999, 4)
<mysql.connector.connection_cext.CMySQLConnection object at 0x0000020ADC9833D0>
```

Select Name and phone column

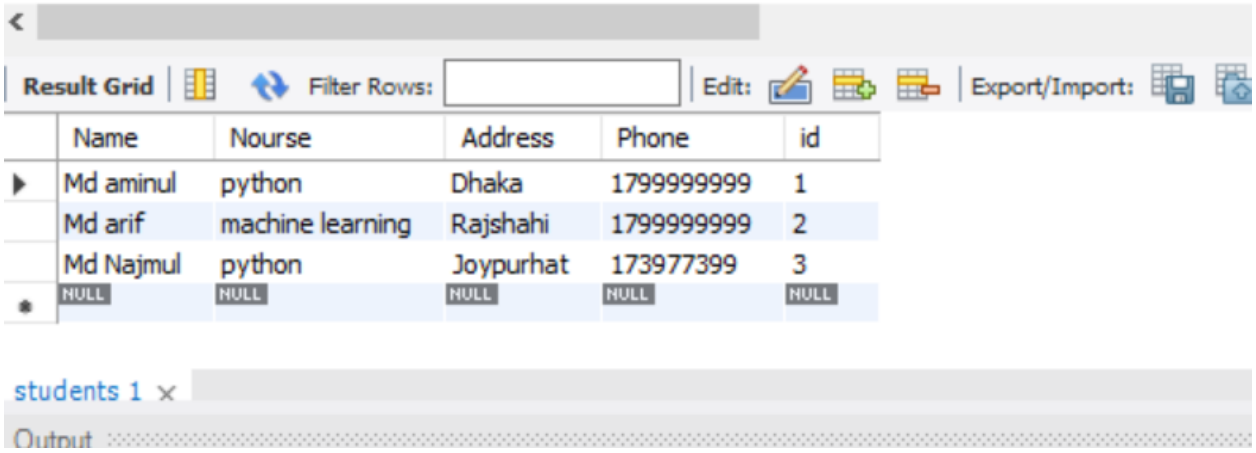
```
"C:\Users\IT Gadgets\AppData\Local\Programs\Python\Python311\python.exe" "C:\Users
('Md aminul', 1799999999)
('Md arif', 1799999999)
('Md arif', 1799999999)
('Md arif', 1799999999)
<mysql.connector.connection_cext.CMySQLConnection object at 0x000001E007A27390>
```

Update:
We update where id number 3.



Delete

We delete row where id is 4.



Task 3: Comprehensive Documentation of Integration of Google API

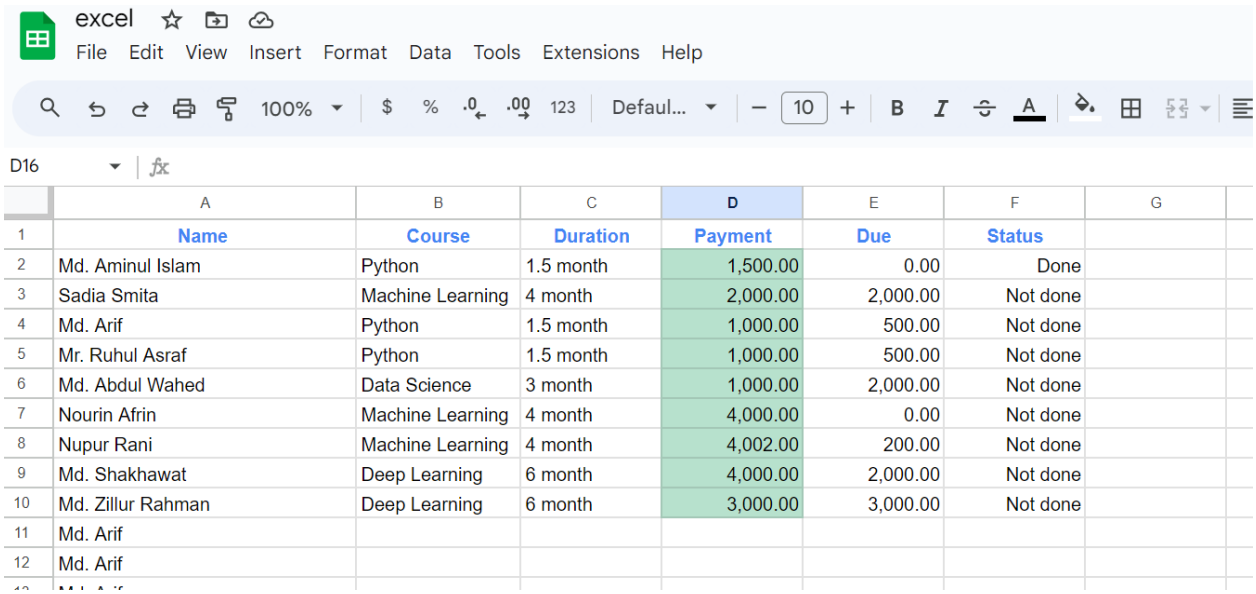
I use google sheet api for this work and google colab to write code . pip install --upgrade gspread==3.6 package has to be installed otherwise google colab won't work. And I use gspread api for google sheets.

Pythonsheetapp-46859d2ea255.json is my credential file.

Establish the connection:

```
<Spreadsheet 'excel' id:1ntILbrQxNncEGV2fZQCfEP44B_fO3U5d0agBT22GZy0>
```

Spreadsheet on Google sheet



	A	B	C	D	E	F	G
1	Name	Course	Duration	Payment	Due	Status	
2	Md. Aminul Islam	Python	1.5 month	1,500.00	0.00	Done	
3	Sadia Smita	Machine Learning	4 month	2,000.00	2,000.00	Not done	
4	Md. Arif	Python	1.5 month	1,000.00	500.00	Not done	
5	Mr. Ruhul Asraf	Python	1.5 month	1,000.00	500.00	Not done	
6	Md. Abdul Wahed	Data Science	3 month	1,000.00	2,000.00	Not done	
7	Nourin Afrin	Machine Learning	4 month	4,000.00	0.00	Not done	
8	Nupur Rani	Machine Learning	4 month	4,002.00	200.00	Not done	
9	Md. Shakhawat	Deep Learning	6 month	4,000.00	2,000.00	Not done	
10	Md. Zillur Rahman	Deep Learning	6 month	3,000.00	3,000.00	Not done	
11	Md. Arif						
12	Md. Arif						

Acess all the records with python

```
[ ]  all_data=first_sheet.get_all_records()
```

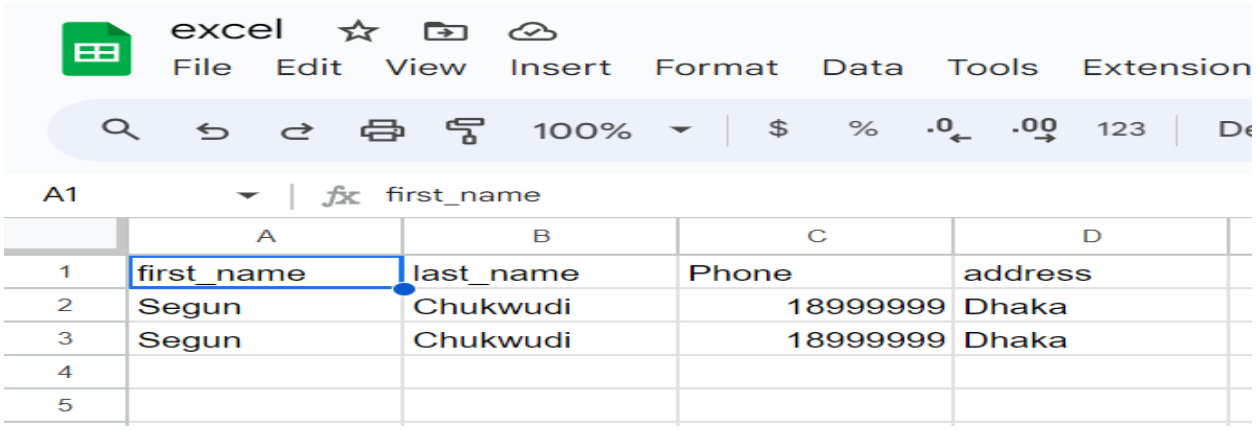
```
[ ]  # Acess all the records
     data = pd.DataFrame(all_data)
     data
```

	Name	Course	Duration	Payment	Due	Status
0	Md. Aminul Islam	Python	1.5 month	1,500.00	0.0	Done
1	Sadia Smita	Machine Learning	4 month	2,000.00	2,000.00	Not done
2	Md. Arif	Python	1.5 month	1,000.00	500.0	Not done
3	Mr. Ruhul Asraf	Python	1.5 month	1,000.00	500.0	Not done
4	Md. Abdul Wahel	Data Science	3 month	1,000.00	2,000.00	Not done
5	Nourin Afrin	Machine Learning	4 month	4,000.00	0.0	Not done
6	Nupur Rani	Machine Learning	4 month	4,002.00	200.0	Not done
7	Md. Shakhawat	Deep Learning	6 month	4,000.00	2,000.00	Not done
8	Md. Zillur Rahman	Deep Learning	6 month	3,000.00	3,000.00	Not done

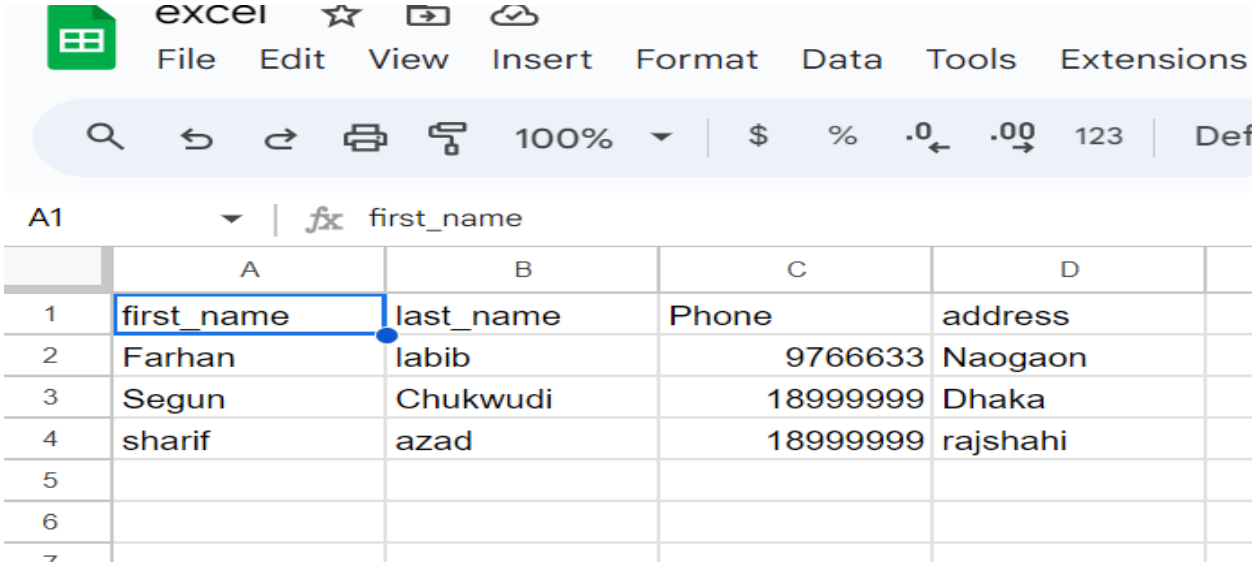
Obtaining the values

```
'Sadia Smita'
```

Insert values in the second sheet



Updating values



	A	B	C	D
1	first_name	last_name	Phone	address
2	Farhan	labib	9766633	Naogaon
3	Segun	Chukwudi	18999999	Dhaka
4	sharif	azad	18999999	rajshahi
5				
6				