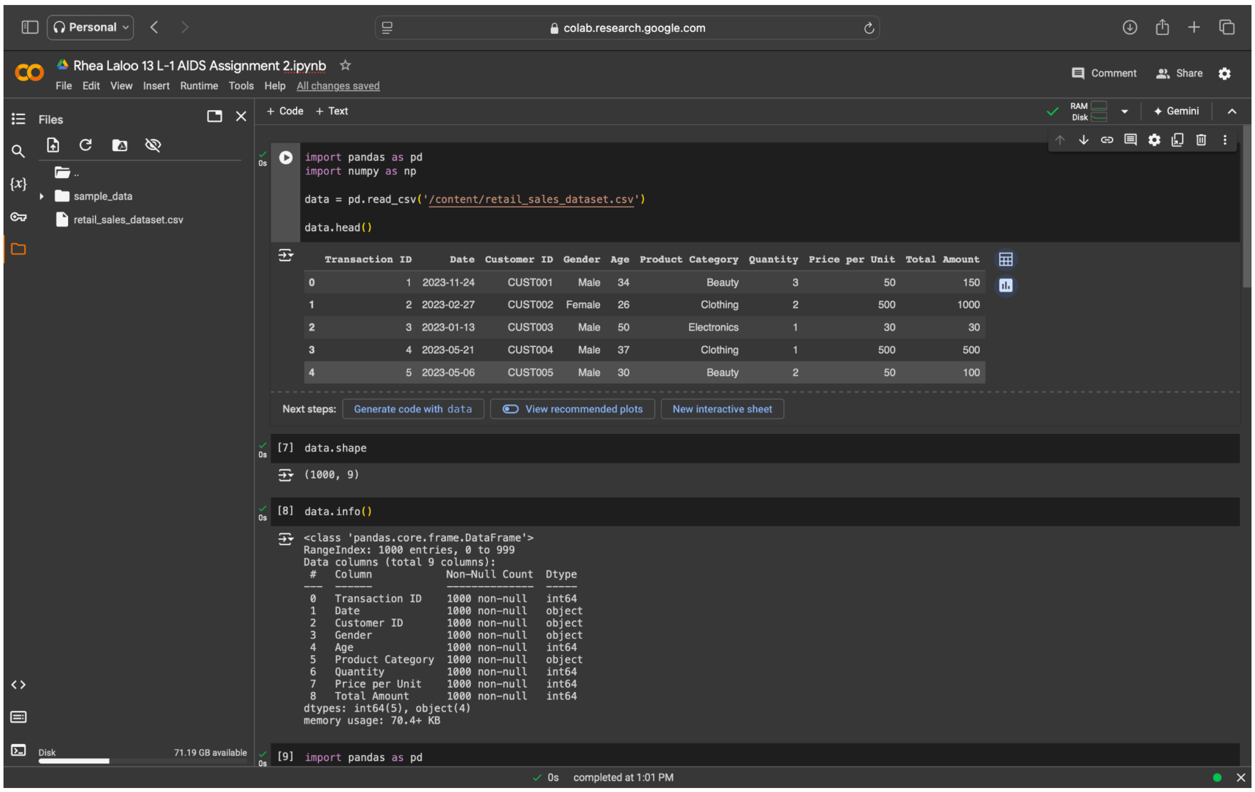
Rhea Laloo
LY - IT
13

Assignment 2
Topic: Retail Industry

Aim: Develop cognitive application for Retail Industry using Neural Network.

Software Required: Google collab

Code:



```
import pandas as pd
import numpy as np

data = pd.read_csv('/content/retail_sales_dataset.csv')

data.head()
```

	Transaction ID	Date	Customer ID	Gender	Age	Product Category	Quantity	Price per Unit	Total Amount
0	1	2023-11-24	CUST001	Male	34	Beauty	3	50	150
1	2	2023-02-27	CUST002	Female	26	Clothing	2	500	1000
2	3	2023-01-13	CUST003	Male	50	Electronics	1	30	30
3	4	2023-05-21	CUST004	Male	37	Clothing	1	500	500
4	5	2023-05-06	CUST005	Male	30	Beauty	2	50	100

```
[7] data.shape
(1000, 9)
```

```
[8] data.info()
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 9 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   Transaction ID    1000 non-null   int64
 1   Date              1000 non-null   object
 2   Customer ID       1000 non-null   object
 3   Gender            1000 non-null   object
 4   Age               1000 non-null   int64
 5   Product Category  1000 non-null   object
 6   Quantity          1000 non-null   int64
 7   Price per Unit    1000 non-null   int64
 8   Total Amount      1000 non-null   int64
dtypes: int64(5), object(4)
memory usage: 70.4+ KB
```

```
[9] import pandas as pd
```

colab.research.google.com

Rhea Laloo 13 L-1 AIDS Assignment 2.ipynb

File Edit View Insert Runtime Tools Help All changes saved

Files: sample_data, retail_sales_dataset.csv

```
[8] data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 9 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   Transaction ID    1000 non-null   int64
 1   Date              1000 non-null   object
 2   Customer ID       1000 non-null   object
 3   Gender            1000 non-null   object
 4   Age               1000 non-null   int64
 5   Product Category  1000 non-null   object
 6   Quantity          1000 non-null   int64
 7   Price per Unit    1000 non-null   int64
 8   Total Amount      1000 non-null   int64
dtypes: int64(5), object(4)
memory usage: 70.4+ KB
```

```
[9] import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder, StandardScaler
import tensorflow as tf
from tensorflow.keras import layers, models
```

```
# Drop unnecessary columns
data = data.drop(columns=['Transaction ID', 'Date', 'Customer ID'])

# Encode categorical variables
label_encoder = LabelEncoder()
data['Gender'] = label_encoder.fit_transform(data['Gender'])
data['Product Category'] = label_encoder.fit_transform(data['Product Category'])
```

```
# Split features and target
X = data.drop(columns=['Total Amount'])
y = data['Total Amount']

# Split the data into training and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
```

0s completed at 1:01 PM

colab.research.google.com

Rhea Laloo 13 L-1 AIDS Assignment 2.ipynb

File Edit View Insert Runtime Tools Help All changes saved

```
[13] # Standardize the data
scaler = StandardScaler()
X_train = scaler.fit_transform(X_train)
X_test = scaler.transform(X_test)
```

```
[14] # Build the neural network model
model = models.Sequential([
    layers.Dense(64, activation='relu', input_shape=(X_train.shape[1],)),
    layers.Dense(32, activation='relu'),
    layers.Dense(1)  # Output layer for regression
])
```

```
/usr/local/lib/python3.10/dist-packages/keras/src/layers/core/dense.py:87: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. W
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
[15] # Compile the model
model.compile(optimizer='adam', loss='mse', metrics=['mae'])
```

```
# Train the model
history = model.fit(X_train, y_train, epochs=100, batch_size=8, validation_data=(X_test, y_test))
```

```
Epoch 1/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 3s 6ms/step - loss: 514554.5625 - mae: 450.6855 - val_loss: 496635.9062 - val_mae: 454.7620
Epoch 2/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 1s 2ms/step - loss: 515640.5625 - mae: 447.5891 - val_loss: 434861.8125 - val_mae: 411.3623
Epoch 3/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 413669.7812 - mae: 374.1629 - val_loss: 286844.9062 - val_mae: 316.1369
Epoch 4/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 258463.3125 - mae: 290.8029 - val_loss: 123978.3125 - val_mae: 231.2967
Epoch 5/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 112084.8984 - mae: 212.5737 - val_loss: 52383.4414 - val_mae: 174.6551
Epoch 6/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 43768.4297 - mae: 150.7558 - val_loss: 36087.9062 - val_mae: 143.0025
Epoch 7/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 35192.9297 - mae: 135.3039 - val_loss: 28729.0508 - val_mae: 125.2193
Epoch 8/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 26256.3906 - mae: 114.4197 - val_loss: 23951.8125 - val_mae: 113.0351
Epoch 9/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 1s 6ms/step - loss: 23455.3105 - mae: 106.1891 - val_loss: 20494.4414 - val_mae: 104.4679
Epoch 10/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 1s 3ms/step - loss: 20633.6641 - mae: 101.2722 - val_loss: 18205.0312 - val_mae: 98.3009
Epoch 11/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 18358.2715 - mae: 97.5962 - val_loss: 16446.7363 - val_mae: 94.9570
Epoch 12/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - loss: 14430.5176 - mae: 84.7517 - val_loss: 14942.7559 - val_mae: 93.8942
Epoch 13/100
```

0s completed at 1:01 PM

Personal

colab.research.google.com

Rhea Laloo 13 L-1 AIDS Assignment 2.ipynb

File Edit View Insert Runtime Tools Help All changes saved

Comment Share

Files

+ Code + Text

RAM Disk

Gemini

..

sample_data

retail_sales_dataset.csv

Disk 71.19 GB available

```
Epoch 80/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 1035.4906 - mae: 18.9608 - val_loss: 857.2573 - val_mae: 17.0466
Epoch 81/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 950.0554 - mae: 18.2173 - val_loss: 767.0985 - val_mae: 16.3364
Epoch 82/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 810.0249 - mae: 17.3197 - val_loss: 706.7126 - val_mae: 15.1624
Epoch 83/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 635.7963 - mae: 15.2855 - val_loss: 660.5154 - val_mae: 14.8876
Epoch 84/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 806.0803 - mae: 16.5669 - val_loss: 594.0093 - val_mae: 13.6061
Epoch 85/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 741.3809 - mae: 15.4689 - val_loss: 570.6733 - val_mae: 14.0381
Epoch 86/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - loss: 530.4100 - mae: 14.0085 - val_loss: 530.1775 - val_mae: 13.3367
Epoch 87/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - loss: 663.3443 - mae: 15.1488 - val_loss: 505.7026 - val_mae: 13.4613
Epoch 88/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 1s 3ms/step - loss: 400.0198 - mae: 12.4486 - val_loss: 509.1889 - val_mae: 13.6481
Epoch 89/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 1s 3ms/step - loss: 392.0890 - mae: 11.8677 - val_loss: 436.8138 - val_mae: 12.5268
Epoch 90/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 1s 3ms/step - loss: 347.7538 - mae: 11.5570 - val_loss: 390.3159 - val_mae: 11.9588
Epoch 91/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 1s 2ms/step - loss: 407.1020 - mae: 12.2921 - val_loss: 399.8335 - val_mae: 12.4438
Epoch 92/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 330.0865 - mae: 11.3507 - val_loss: 361.6323 - val_mae: 12.1209
Epoch 93/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 277.0168 - mae: 10.6322 - val_loss: 313.0415 - val_mae: 11.0772
Epoch 94/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 249.2933 - mae: 10.2394 - val_loss: 288.8316 - val_mae: 10.8389
Epoch 95/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 236.3116 - mae: 10.2661 - val_loss: 277.3303 - val_mae: 10.8243
Epoch 96/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 211.6070 - mae: 9.7464 - val_loss: 266.3480 - val_mae: 10.7560
Epoch 97/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 213.4667 - mae: 9.7750 - val_loss: 239.4844 - val_mae: 10.4496
Epoch 98/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 197.0285 - mae: 9.3272 - val_loss: 226.8317 - val_mae: 10.0450
Epoch 99/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 184.3680 - mae: 9.1381 - val_loss: 200.1706 - val_mae: 9.3363
Epoch 100/100
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 139.6310 - mae: 8.2568 - val_loss: 198.2962 - val_mae: 9.5834
```

[17]

```python
# Evaluate the model
loss, mae = model.evaluate(X_test, y_test)
print(f"Test MAE: {mae}")
```

```
7/7 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 210.4728 - mae: 9.7239
Test MAE: 9.583444595336914
```

0s completed at 1:01 PM