SDAIA
الهيئة السعودية للبيانات والذكاء الاصطناعي
Saudi Data & AI Authority

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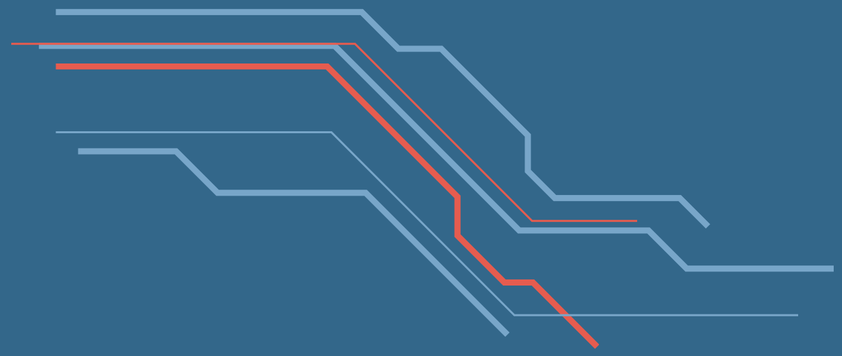
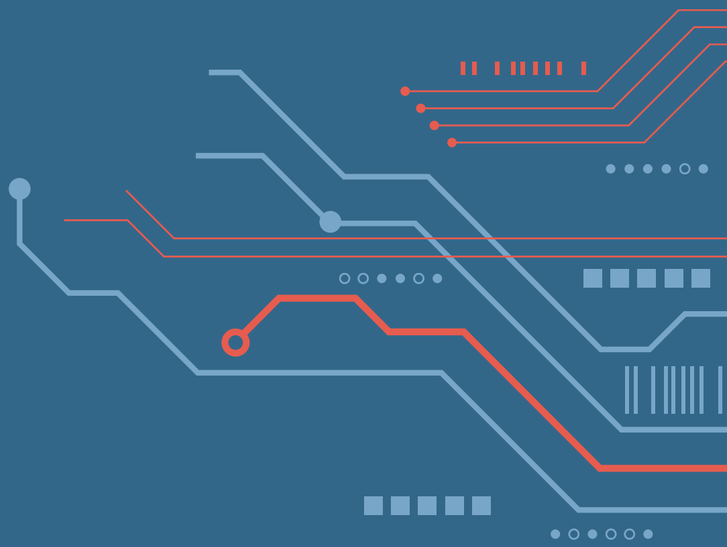
Traffic Flow Predction

T5 Mini Project





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Traffic Flow Predction

The project's concept is to use the existing data, which includes the time of day, the number and kind of cars on the road, and the type of traffic, to build a deep learning model for predicting traffic jams on roads. The model will predict the type and timing of congestion based on the provided data.

Traffic Flow Predction

Dataset

Source : Kaggle

- The dataset is mostly concerned with transportation in cities congestion.
- The dataset offers a thorough perspective of traffic patterns over the course of a month, with updates occurring every 15 minutes.
- To help users in determining the degree of congestion, it has a traffic scenario column with four categories: Heavy, High, Normal, and Low.
- 18 columns represent the dataset: 12 integer, 4 string, and 2 DateTime.

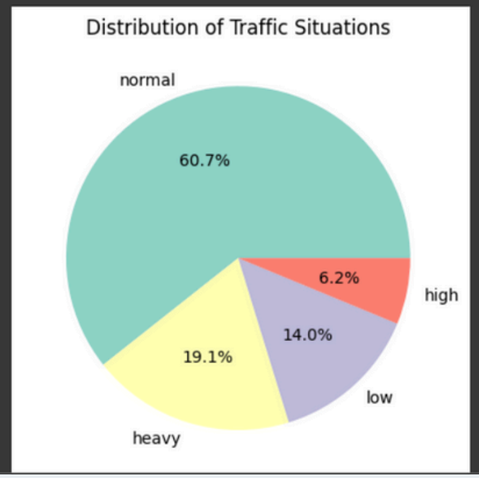
Traffic Flow Predction

Column Name	Description
Time : object	The time column is used to indicate the period of congestion.
Traffic Situation : Object	The date of the congestion occurrence.
Day of the week : object	the day of the congestion occur
CarCount : int	Count how many car occur in the Traffic
BikeCount : int	Count how many bike occur in the Traffic
BusCount : int	Count how many bus occur in the Traffic
TruckCount : int	Count how many Truck occur in the Traffic
Total : int	Count Total Cars occur in the Traffic
Date : int	Describe the Traffic situation if it's normal or havey ..etc

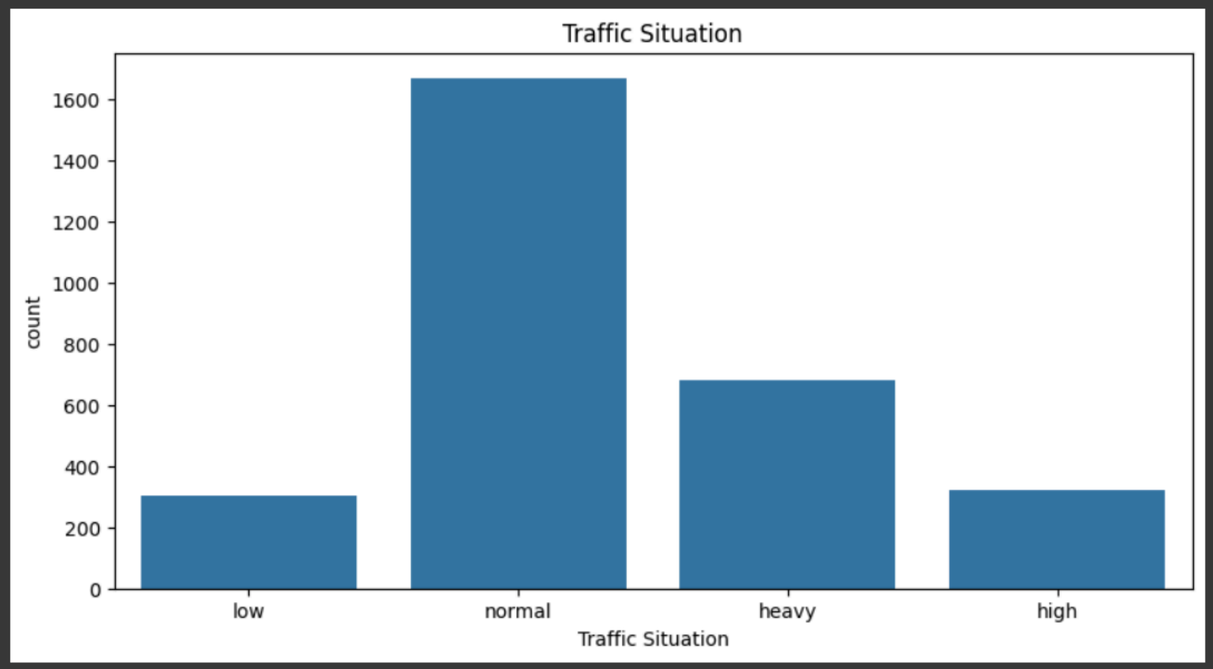
EDA

Chart plot

```
traffic_two_month_df['Traffic Situation'].value_counts().plot.pie(autopct='%1.1f%%', colors=sns.color_palette('Set3'))
plt.title('Distribution of Traffic Situations')
plt.ylabel('')
plt.show()
```




```
[ ]  plt.figure(figsize=(10,5))
     sns.countplot(x=traffic_df['Traffic Situation'],data=traffic_df)
     plt.title('Traffic Situation')
     plt.show()
```

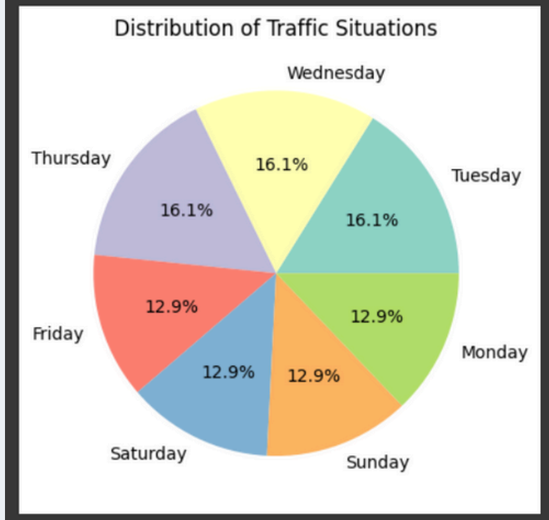


Count plot

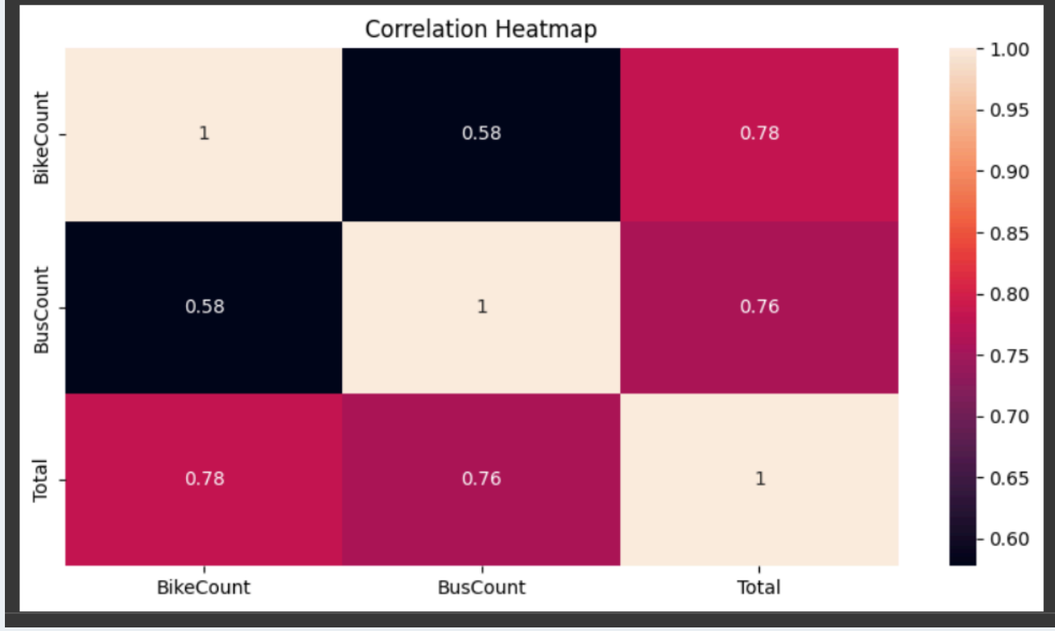
EDA

PieChart plot

```
# visualizing using pie chart
traffic_two_month_df['Day of the week'].value_counts().plot.pie(autopct='%1.1f%%', colors=sns.color_palette('Set3'))
plt.title('Distribution of Traffic Situations')
plt.ylabel('')
plt.show()
```

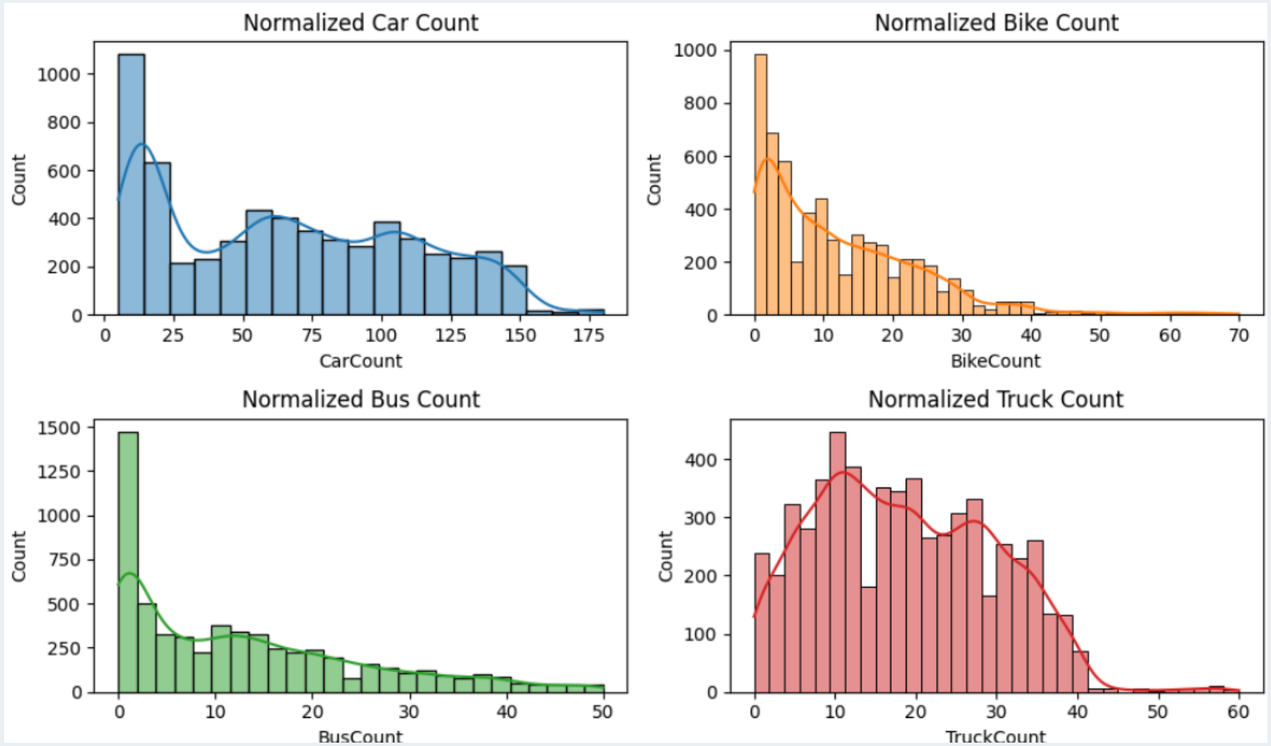



```
plt.figure(figsize=(10,5))
sns.heatmap(corr, annot=True  )
plt.title('Correlation Heatmap')
plt.show()
```



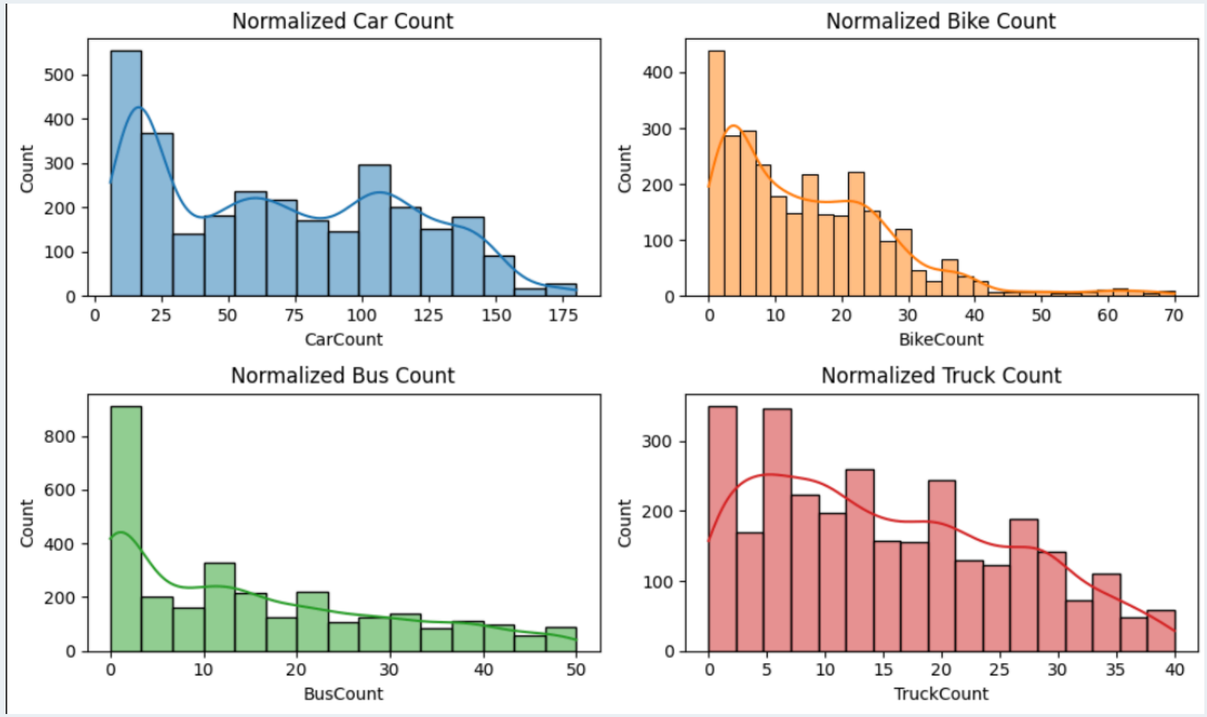
Heatmap plot

EDA



Old dataset

Updated dataset



ANN Model

- Most appropriate and productive
- optimal outcomes
- Potential for future development to handle larger volumes of text, video, and image data

Eveluating the Model

```
#here we disply confusion_matrix and classification_report with the plot

print(classification_report(y_test, y_pred_classes))
print(confusion_matrix(y_test, y_pred_classes))

ConfusionMatrixDisplay.from_predictions(y_test, y_pred_classes)
plt.show()
```

```
              precision    recall  f1-score   support

           0       0.87      0.94      0.91       133
           1       0.62      0.46      0.53        39
           2       0.91      0.90      0.90        67
           3       0.94      0.94      0.94       282

    accuracy                           0.90       521
   macro avg       0.84      0.81      0.82       521
weighted avg       0.90      0.90      0.90       521

[[125   6   0   2]
 [ 13  18   0   8]
 [  0   0  60   7]
 [  5   5   6 266]]
```

```
[ ]  model = Sequential()

     # Add input layer and first hidden layer
     model.add(Dense(units=64, input_dim=X_train.shape[1], activation='relu'))
     # Add hidden layer
     model.add(Dense(units=8, activation='relu'))

     model.add(Dense(units=8, activation='relu'))

     model.add(Dense(units=8, activation='relu'))

     # Add output layer
     model.add(Dense(units=4, activation='softmax'))  # Adjust the number of units

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

Model Average

	A	B	C
1		train	test
2		89%	87%
3		89%	88%
4		87%	85%
5		89%	87%
6		90%	88%
7		93%	92%
8		92%	88%
9		96%	96.24%
10	Avg:	91%	89%

Solutions

- **Smart Traffic Management:** Real-time traffic signal timing adjustments can be made by applying prediction results.
- **Emergency Management:** Using predictions, direct emergency vehicles (fire trucks, ambulances) along less crowded routes.
- **Dedicated Routes for Public Transportation:**Assign particular lanes for public transportation according to predictions.

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Team Work :

- Dana Almistdadi : EDA & Visualization
- Rana al-Harsan : Evaluation Models
- Joud Tarek : Deep Learning model
- Retaj Alanzii : Deep Learning Model

Thank You

Question’s?