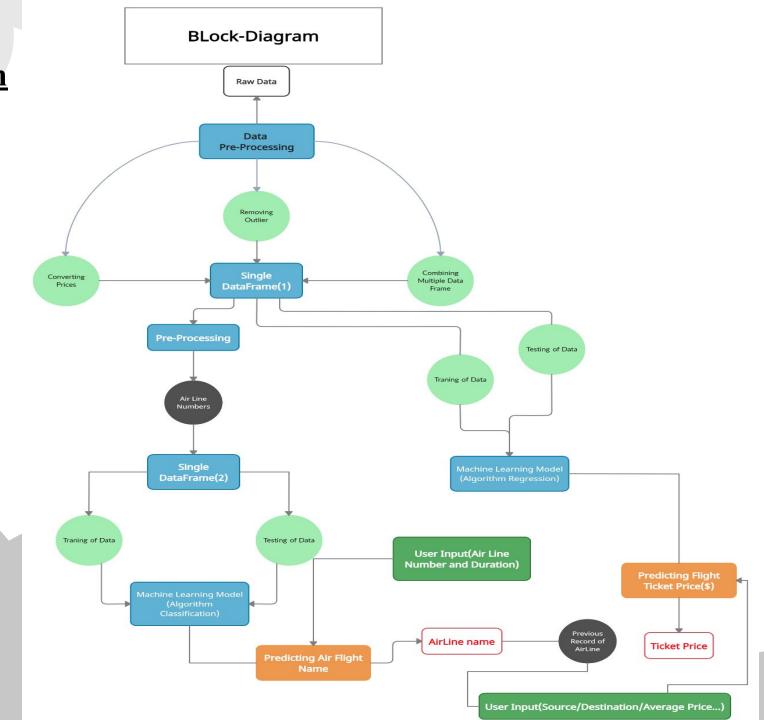


Syed Nehal Hassan Shah Supervisor Dr. Muhammad Adnan **MSAI-222378**

Complete Block Diagram



Bagging Decision Tree

```
confusion_matrix
default parameter
[[4 0 0 ... 0 0 0]
[0 2 0 ... 0 0 0]
[0 0 2 ... 0 0 0]
[0 0 0 ... 3 0 0]
[0 0 0 ... 0 0 0]
[0 0 0 ... 0 0 1]]
classification_report
                                      precision
                                                   recall f1-score support
                     Aegean Airlines
                                           1.00
                                                     1.00
                                                               1.00
        Aegean Airlines, Bulgaria Air
                                                               1.00
                                           1.00
                                                     1.00
             Aegean Airlines, Finnair
                                           1.00
                                                     1.00
                                                               1.00
                 Aegean Airlines, LOT
                                           1.00
                                                     1.00
                                                               1.00
```

accuracy			0.99	15030	
macro avg	0.80	0.82	0.80	15030	
weighted avg	0.99	0.99	0.99	15030	

		Airline	Source	Destination	n Duration	Total	Lstops
3046	SAS, Pegasus A	irlines	NYC	RUI	1300	2	stops
3047	Qatar Airways,	SAUDIA	NYC	RUI	1420	2	stops
3048	Qatar Airwa	ys, MEA	NYC	RUI	1415	2	stops
3049	Emirates, Turkish A	irlines	NYC	RUH	1100	2	stops
3050	Lufthar	sa, MEA	NYC	RUI	1115	3	stops
	Price Date	Average	Price	Airline Nu	umber Sour	ce Nur	mber \
3046	930.40 2022-04-13	838.	732500		714		2
3047	1018.40 2022-04-13	1972.	813714		303		2
3048	1049.87 2022-04-13	1133.	548015		783		2
3049	1053.60 2022-04-13	1023.	900221		784		2
3050	1139.73 2022-04-13	1023.	714222		785		2

```
Enter the Airline number
. . . . . . . . 783
Enter time in minutes
-----1415
Qatar Airways, MEA --Airline
                Airline Source Destination Duration Total stops
                                                                   Price \
3048 Qatar Airways, MEA NYC
                                                1415
                                                                 1049.87
                                                      2 stops
          Date Average Price Airline Number Source Number \
3048 2022-04-13
                  1133.548015
                                          783
     Destination Number Stop Numbers Source Numbers
3048
```

AdaBoost Decision Tree

```
confusion_matrix
default parameter
[[0 0 0 ... 0 0 0]
[0 0 0 ... 0 0 0]
[0 0 0 ... 0 0 0]
[0 0 0 ... 0 0 0]
[0 0 0 ... 0 0 0]
[0 0 0 ... 0 0 0]]
classification_report
                                    precision recall f1-score support
                    Aegean Airlines
                                        0.00
                                                 0.00
                                                          0.00
                                                0.27
                                                           15030
       accuracy
      macro avg
                         0.01
                                     0.01
                                                0.01
                                                           15030
   weighted avg
                                     0.27
                                                           15030
                         0.10
                                                0.14
```

KNN

```
default parameter
[[4 0 0 ... 0 0 0]
[0 2 0 ... 0 0 0]
[0 0 2 ... 0 0 0]
[0 0 0 ... 0 0 0]
[0 0 0 ... 0 3 0]
[0 0 0 ... 0 0 0]]
classification_report
                                     precision
                                                 recall f1-score
                                                                   support
                     Aegean Airlines
                                         0.67
                                                            0.80
                                                   1.00
        Aegean Airlines, Bulgaria Air
                                                            1.00
                                         1.00
                                                   1.00
                                                   0.92
                                                              15030
        accuracy
       macro avg
                           0.48
                                       0.49
                                                   0.47
                                                              15030
   weighted avg
                           0.91
                                       0.92
                                                   0.91
                                                              15030
```

Decision Tree

```
confusion_matrix
[[400...000]
[0 \ 0 \ 0 \ \dots \ 0 \ 0 \ 0]
[0 0 2 ... 0 0 0]
[0 0 0 ... 3 0 0]
[0 0 0 ... 0 0 0]
[0 0 0 ... 0 0 1]]
classification_report
                                      precision
                                                  recall f1-score support
                     Aegean Airlines
                                                              1.00
                                          1.00
                                                    1.00
          Aegean Airlines, Air Canada
                                                              0.00
                                          0.00
                                                    0.00
        Aegean Airlines, Bulgaria Air
                                          1.00
                                                    1.00
                                                              1.00
             Aegean Airlines, Finnair
                                          1.00
                                                    1.00
                                                              1.00
                                                     0.99
                                                                  15030
      accuracy
                          0.81
                                        0.83
                                                      0.81
                                                                  15030
     macro avg
 weighted avg
                          0.99
                                        0.99
                                                      0.99
                                                                  15030
```

```
Airline Source Destination Duration Total stops
3046
           SAS, Pegasus Airlines
                                                        1300
                                                                2 stops
                                    NYC
3047
           Qatar Airways, SAUDIA
                                    NYC
                                                        1420
                                                                2 stops
3048
              Qatar Airways, MEA
                                    NYC
                                                        1415
                                                                2 stops
      Emirates, Turkish Airlines
                                    NYC
                                                        1100
                                                                2 stops
3050
                  Lufthansa, MEA
                                    NYC
                                                        1115
                                                                3 stops
                    Date Average Price Airline Number Source Number \
        Price
       930.40 2022-04-13
3046
                             838.732500
                                                   714
3047 1018.40 2022-04-13
                            1972.813714
3048 1049.87 2022-04-13
                            1133.548015
3049 1053.60 2022-04-13
                            1023.900221
                                                   784
3050 1139.73 2022-04-13
                            1023.714222
                                                    785
Enter the Airline number
Enter time in minutes
Lufthansa, MEA --Airline
            Airline Source Destination Duration Total stops
                                                               Price \
3050 Lufthansa, MEA NYC
                                            1115
                                                    3 stops 1139.73
          Date Average Price Airline Number Source Number \
3050 2022-04-13
                  1023.714222
                                          785
      Destination Number Stop Numbers Source Numbers
3050
```

Extra Decision Tree

confusion_matrix		_					
default parameter							
[[4 0 0 0 0 0]]						
[0 2 0 0 0 0]]						
[0 0 2 0 0 0]]						

[0 0 0 0 0 0]	1						
[0 0 0 0 3 0]							
[0 0 0 0 0 1]							
AND							
classification_rep							
C.C. 253111Cac1011_1 e	port		nnooicion	200011	f1-score	support	
			hiecision	recatt	11-2001.6	sopport	
	Aegean Air	lines	0.47	1.00	0.80	4	
A							
	irlines, Bulgari		1.00	1.00	1.00	2	
8000	oon Albilance I.	Innain	-1 616	1 111	1 6161	18.00	
accur	racy				0.98	15030	
		0 75		0.77	0 77	45070	
macro	avg	0.75		0.76	0.75	15030	
weighted	avo	0.98		0.98	0.98	15030	
no ± gircou		0.170			0.170		

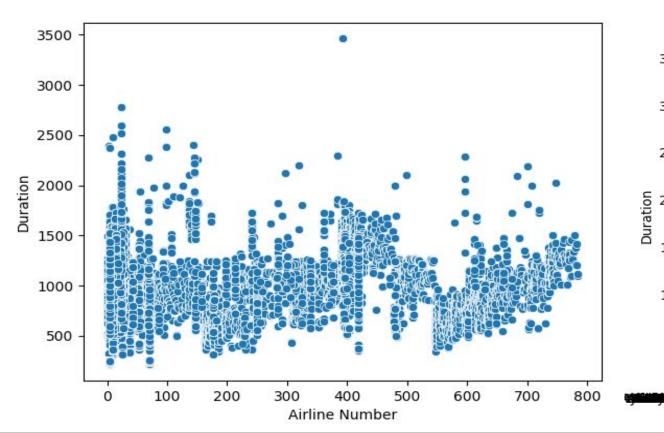
```
Airline Source Destination Duration Total stops
3046
          SAS, Pegasus Airlines
                                  NYC
                                                      1300
                                                              2 stops
3047
          Qatar Airways, SAUDIA
                                                      1420
                                  NYC
                                                              2 stops
             Qatar Airways, MEA
3048
                                  NYC
                                                      1415
                                                              2 stops
3049 Emirates, Turkish Airlines
                                  NYC
                                                      1100
                                                              2 stops
3050
                 Lufthansa, MEA
                                  NYC
                                                      1115
                                                              3 stops
                   Date Average Price Airline Number Source Number \
        Price
3046 930.40 2022-04-13
                           838.732500
                                                  714
3047 1018.40 2022-04-13
                          1972.813714
3048 1049.87 2022-04-13
                          1133.548015
                                                  783
3049 1053.60 2022-04-13
                          1023.900221
                                                  784
3050 1139.73 2022-04-13
                          1023.714222
                                                  785
Enter the Airline number
Enter time in minutes
Qatar Airways, MEA --Airline
                Airline Source Destination Duration Total stops
                                                                  Price \
3048 Qatar Airways, MEA NYC
                                               1415 2 stops 1049.87
           Date Average Price Airline Number Source Number \
3048 2022-04-13
                  1133.548015
                                         783
      Destination Number Stop Numbers Source Numbers
3048
```

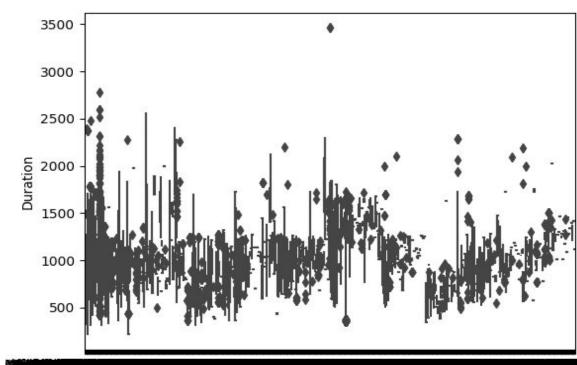
Random Forest

```
confusion_matrix
default parameter
[[4 0 0 ... 0 0 0]
[0 2 0 ... 0 0 0]
[0 0 2 ... 0 0 0]
[0 0 0 ... 0 0 0]
[0 0 0 ... 0 3 0]
[0 0 0 ... 0 0 1]]
classification_report
                                                 recall f1-score support
                                     precision
                     Aegean Airlines
                                          1.00
                                                   1.00
                                                             1.00
        Aegean Airlines, Bulgaria Air
                                          1.00
                                                   1.00
                                                             1.00
                                                    0.98
                                                               15030
        accuracy
                           0.70
                                       0.70
                                                    0.69
                                                               15030
      macro avq
                                                               15030
  weighted avg
                                       0.98
                           0.98
                                                    0.97
```

```
Airline Source Destination
                                                    Duration Total stops \
           SAS, Pegasus Airlines
 3046
                                    NYC
                                                         1300
                                                                 2 stops
           Qatar Airways, SAUDIA
 3047
                                    NYC
                                                         1420
                                                                 2 stops
 3048
              Qatar Airways, MEA
                                                         1415
                                                                 2 stops
      Emirates, Turkish Airlines
                                    NYC
                                                         1100
                                                                 2 stops
                  Lufthansa, MEA
 3050
                                                         1115
                                                                 3 stops
                    Date Average Price Airline Number Source Number \
        Price
 3046
       930.40 2022-04-13
                             838.732500
                                                    714
      1018.40 2022-04-13
                            1972.813714
                                                    303
 3047
      1049.87 2022-04-13
                            1133.548015
                                                    783
      1053.60 2022-04-13
                            1023.900221
                                                    784
 3050 1139.73 2022-04-13
                            1023.714222
Enter the Airline number
Enter time in minutes
SAS --Airline
      Airline Source Destination Duration Total stops
                                                            Price
                                                                         Date \
13496
          SAS
                 PAR
                              NYC
                                        1450
                                                          1405.87 2022-02-02
                                                 1 stop
13497
                                                          1481.60 2022-02-03
          SAS
                 PAR
                              NYC
                                        1420
                                                2 stops
13498
          SAS
                 PAR
                              NYC
                                        1360
                                                 1 stop
                                                          1405.33 2022-02-06
13499
                                                          1475.73 2022-02-06
          SAS
                 PAR
                              NYC
                                        1350
                                                2 stops
13500
                                                          1481.60 2022-02-08
          SAS
                 PAR
                              NYC
                                        1420
                                                2 stops
       Average Price Airline Number Source Number Destination Number \
13496
          1452.06129
          1452.06129
13497
```

GRAPH





Airline

CO-RELATION BETWEEN FEATURES

- 0.8

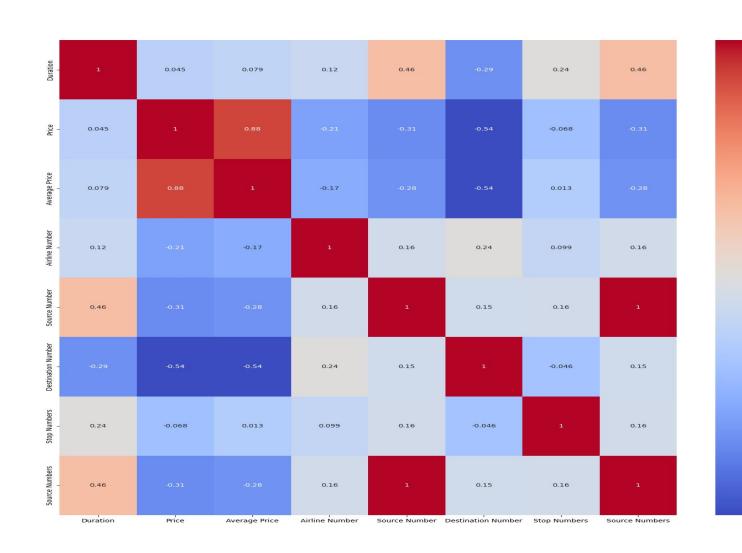
- 0.6

- 0.2

- 0.0

- -0.2

- -0.4





Final Result

Algorithm Names	Variance	Accuracy
Random Forest + Decision Tree(with tuning)	94.52	98
Random Forest + Decision Tree(with out tuning)	94.55	99

```
Lufthansa, MEA --Airline
            Airline Source Destination Duration Total stops
                                                               Price \
3050 Lufthansa, MEA
                                            1115
                                                  3 stops 1139.73
          Date Average Price Airline Number Source Number \
3050 2022-04-13 1023.714222
     Destination Number Stop Numbers Source Numbers
3050
[O to 3]enter Total stops=3
enter Source_PAR[0 or 1]
enter Source_RUH[0 or 1]
enter Source_SVO[0 or 1]
enter Destination_PAR[0 or 1]
enter Destination_RUH[0 or 1]
enter Destination_SVO[0 or 1]
enter Average price1023.714222
1058.8685931634914 $USD 5% Increase
1110.0543042634913 $USD
```

Schedule(Weekly)

Weeks(1 to 8)	Day And Time	Target	Con
(10-Nov)	Thursday	Data Preprocessing/ Regression Algorithms	D
(17-Nov)	Thursday	Comparison between Algorithms(R)	D
(24-Nov)	Thursday	Classification Algorithms/	
		Comparison between Algorithms(C)	D
(01-Dec)	Thursday	Combining both (R) and (C)	D
(08-Dec)	Thursday	Research Paper writing	Rer

Completed
Done
Done
Done
Done
Remaining



Thanks For Listening