



# Airline passenger satisfaction

By

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# Introduction

- Obtained about 129880 of flight satisfaction surveys from Kaggle.
- Goal: Identify critical factors that ensure satisfaction.
- Find out the best model for the data through Regularization.

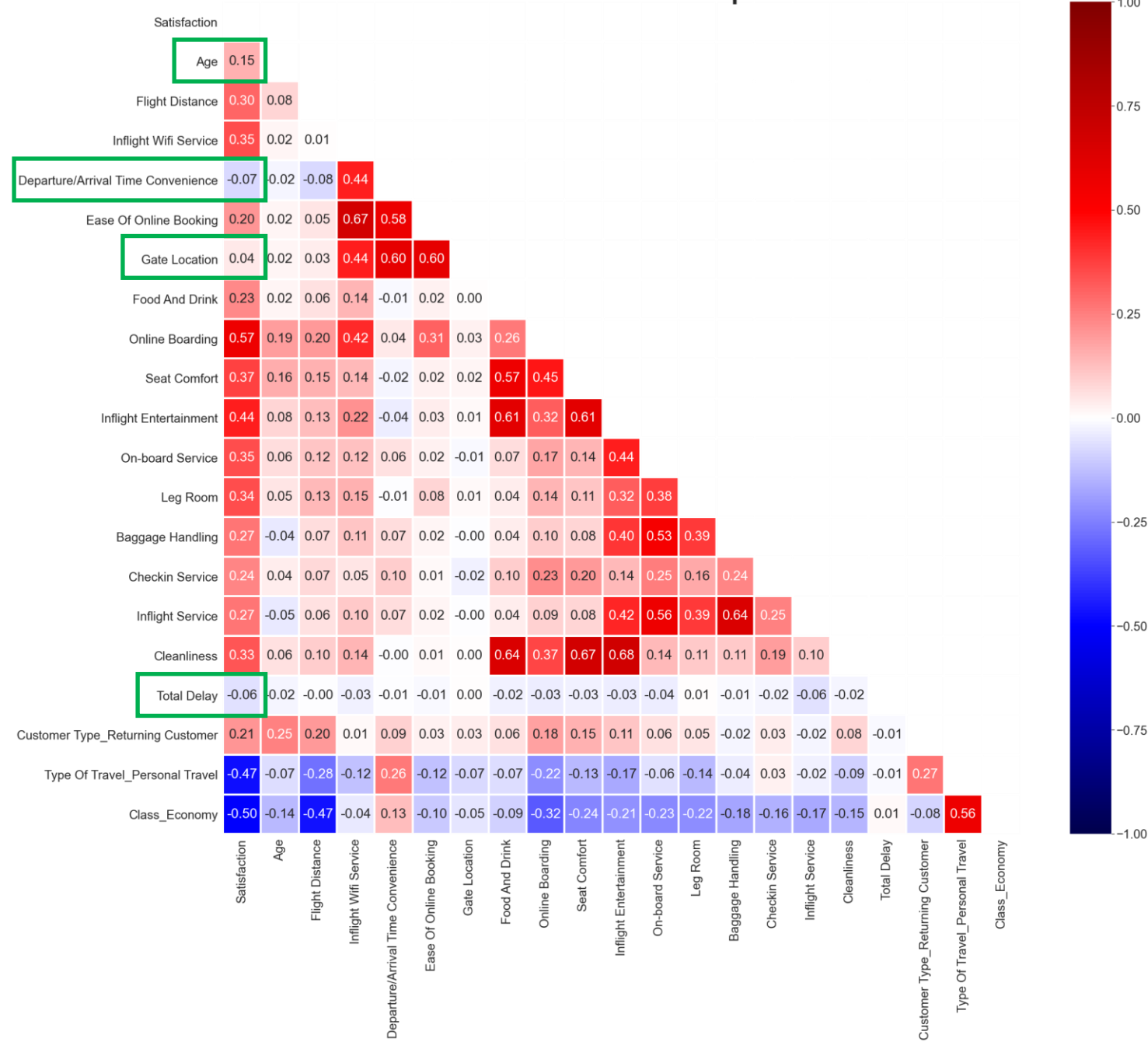
## 2. EDA and Feature Selection



Target

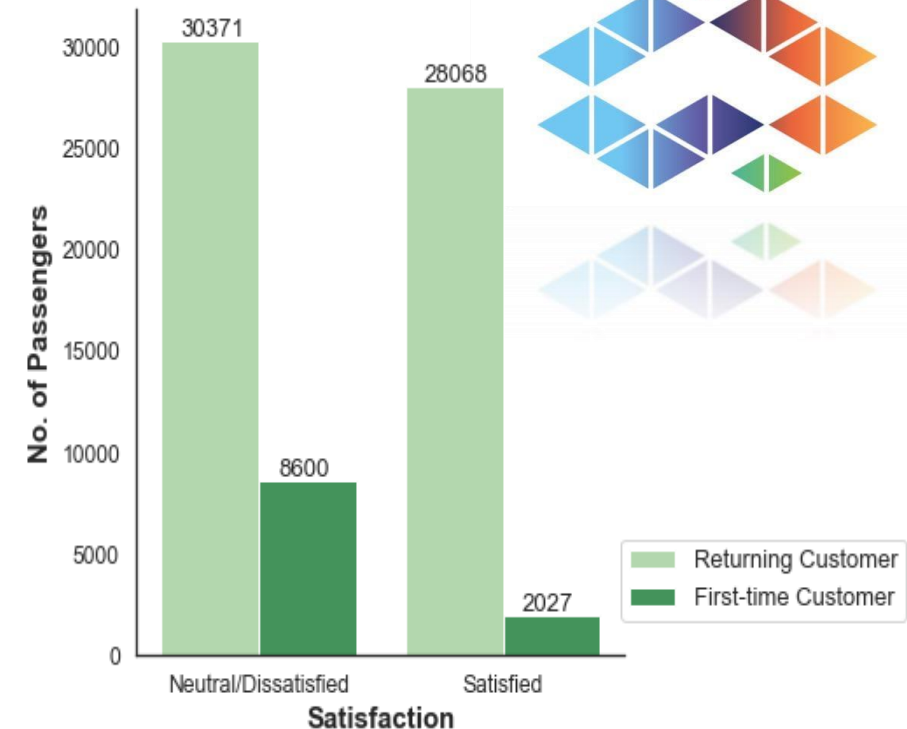
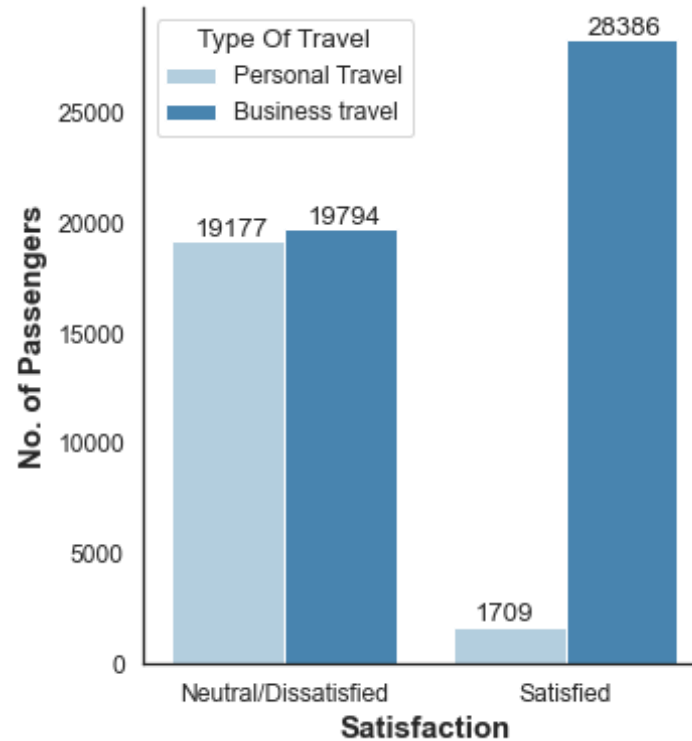
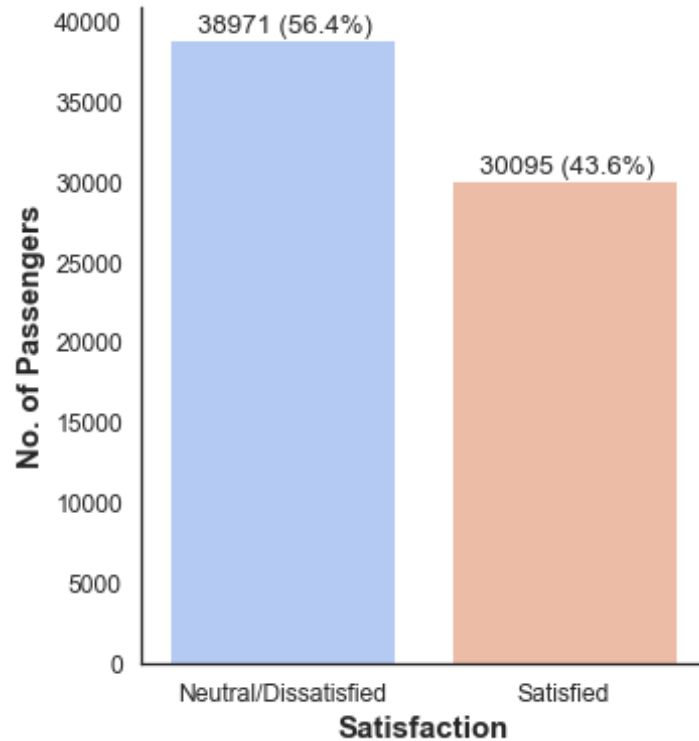
	Satisfaction	Gender	Customer Type	Age	Type Of Travel	Class	Flight Distance	Inflight Wifi Service	Departure/Arrival Convenience	Ease Of Online Booking	Gate Location	Food And Drink	Online Boarding	Seat Comfort	Inflight Entertainment	On-board Service	Leg Room	Baggage Handling	Checkin Service	Inflight Service	Cleanliness	Total Delay
0	Neutral/Dissatisfied	Male	Returning Customer	13	Personal Travel	Economy	460	3	4	3	1	5	3	5	5	4	3	4	4	5	5	43.0
1	Neutral/Dissatisfied	Male	First-time Customer	25	Business travel	Business	235	3	2	3	3	1	3	1	1	1	5	3	1	4	1	7.0
2	Neutral/Dissatisfied	Female	Returning Customer	25	Business travel	Business	562	2	5	5	5	2	2	2	2	2	5	3	1	4	2	20.0
3	Satisfied	Male	Returning Customer	61	Business travel	Business	214	3	3	3	3	4	5	5	3	3	4	4	3	3	3	0.0
4	Neutral/Dissatisfied	Female	Returning Customer	26	Personal Travel	Economy	1180	3	4	2	1	1	2	1	1	3	4	4	4	4	1	0.0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
69061	Neutral/Dissatisfied	Female	First-time Customer	36	Business travel	Economy	432	1	5	1	3	4	1	4	4	5	2	5	2	3	4	0.0
69062	Neutral/Dissatisfied	Male	First-time Customer	34	Business travel	Business	526	3	3	3	1	4	3	4	4	3	2	4	4	5	4	0.0
69063	Neutral/Dissatisfied	Female	Returning Customer	17	Personal Travel	Economy	828	2	5	1	5	2	1	2	2	4	3	4	5	4	2	0.0
69064	Satisfied	Male	Returning Customer	14	Business travel	Business	1127	3	3	3	3	4	4	4	4	3	2	5	4	5	4	0.0
69065	Neutral/Dissatisfied	Female	Returning Customer	42	Personal Travel	Economy	264	2	5	2	5	4	2	2	1	1	2	1	1	1	1	0.0

Correlation Heatmap



# Final Feature Selection

- Features to drop:
  - Gender
  - Age
  - Gate Location
  - Total Delay
  - Flight Distance
  - Departure/Arrival Time Convenience



The target classes are rather balanced with 56.4% of passengers reporting Neutral/Dissatisfied (negative class: 0) and 43.6% reporting Satisfied (positive class 1)

segment the satisfaction classes by customer types, we see that first-time customers have a lower ratio of satisfaction

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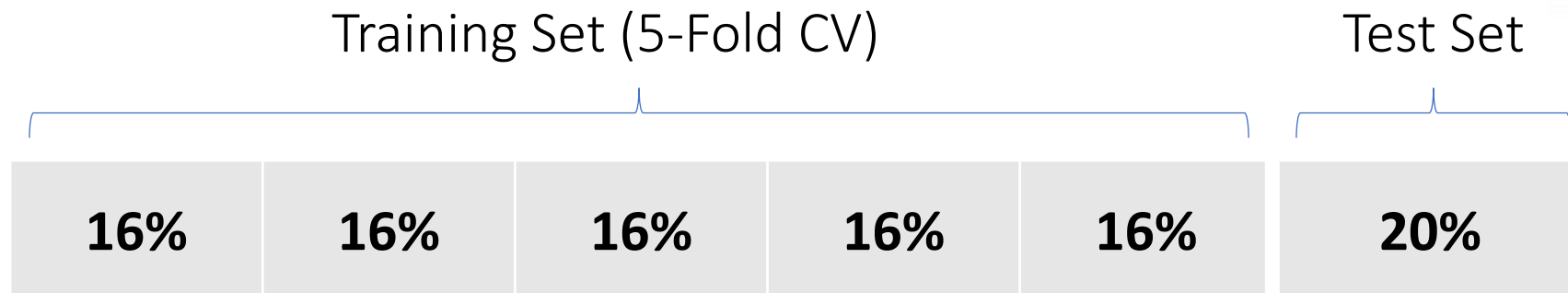
# Model Selection

- k-Nearest Neighbors KNN:
- Logistic Regression Lr:
- Decision Trees:
- Random Forest:
- Ensemble :



# Model Selection

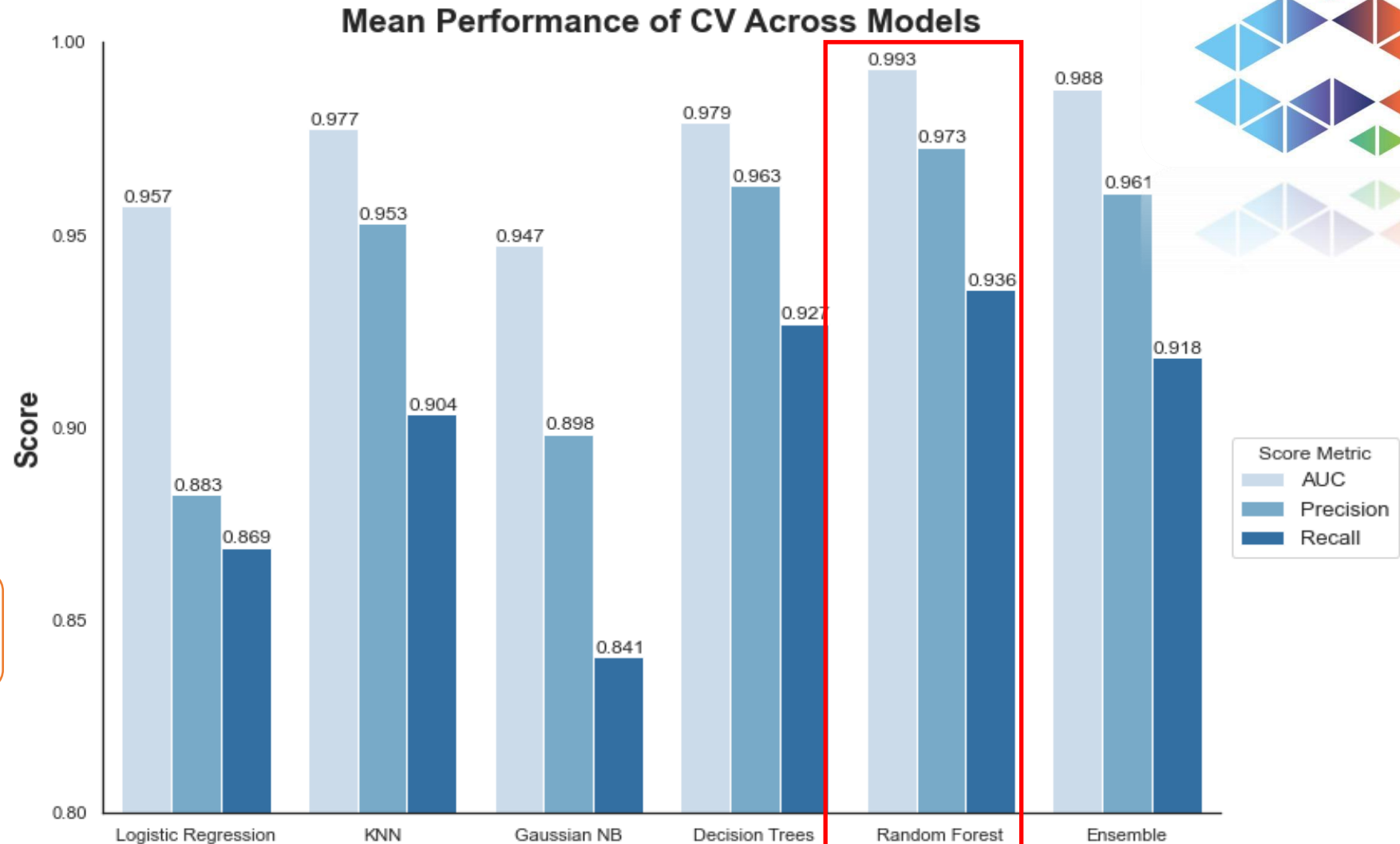
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# Model Selection

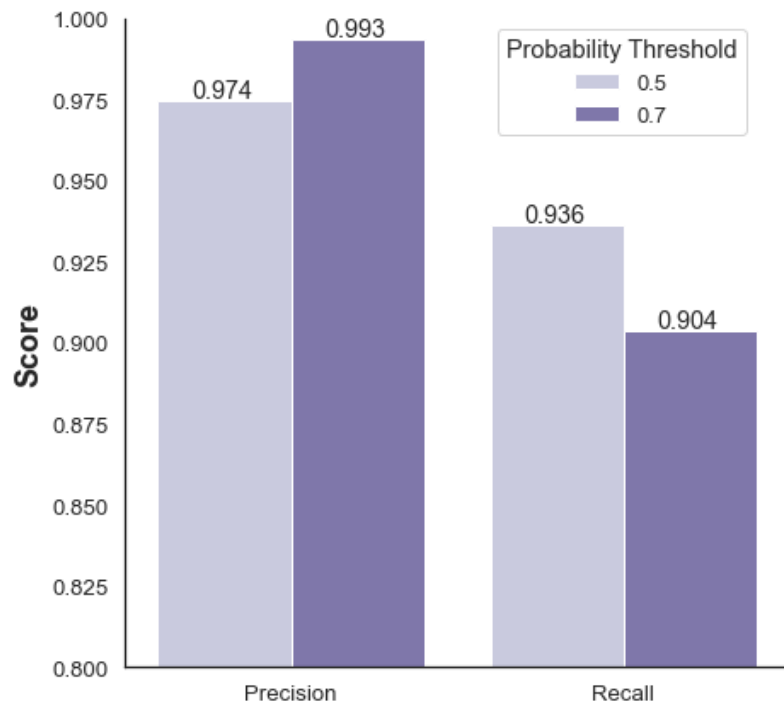
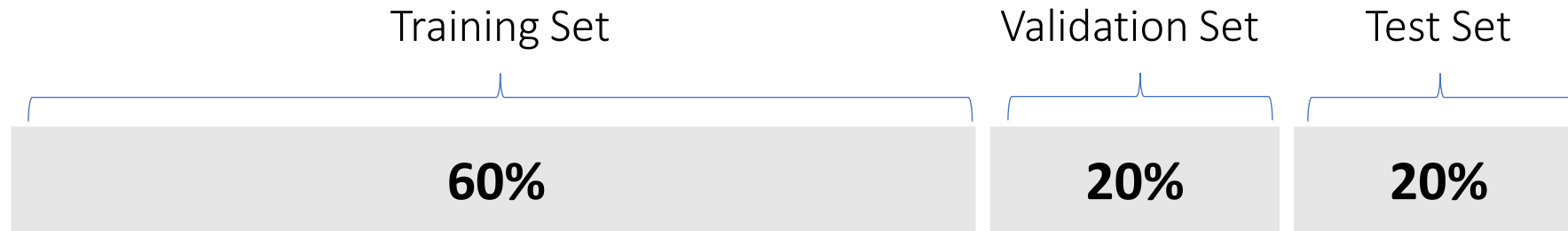


	Model	Scoring	Score
0	Logistic Regression	AUC	0.957475
1	Logistic Regression	Precision	0.882574
2	Logistic Regression	Recall	0.868921
3	KNN	AUC	0.977434
4	KNN	Precision	0.952958
5	KNN	Recall	0.903554
6	Gaussian NB	AUC	0.947164
7	Gaussian NB	Precision	0.898347
8	Gaussian NB	Recall	0.840534
9	Decision Trees	AUC	0.979282
10	Decision Trees	Precision	0.963492
11	Decision Trees	Recall	0.927137
12	Random Forest	AUC	0.992917
13	Random Forest	Precision	0.972766
14	Random Forest	Recall	0.935849
15	Ensemble	AUC	0.987846
16	Ensemble	Precision	0.961036
17	Ensemble	Recall	0.917993





# Random Forest

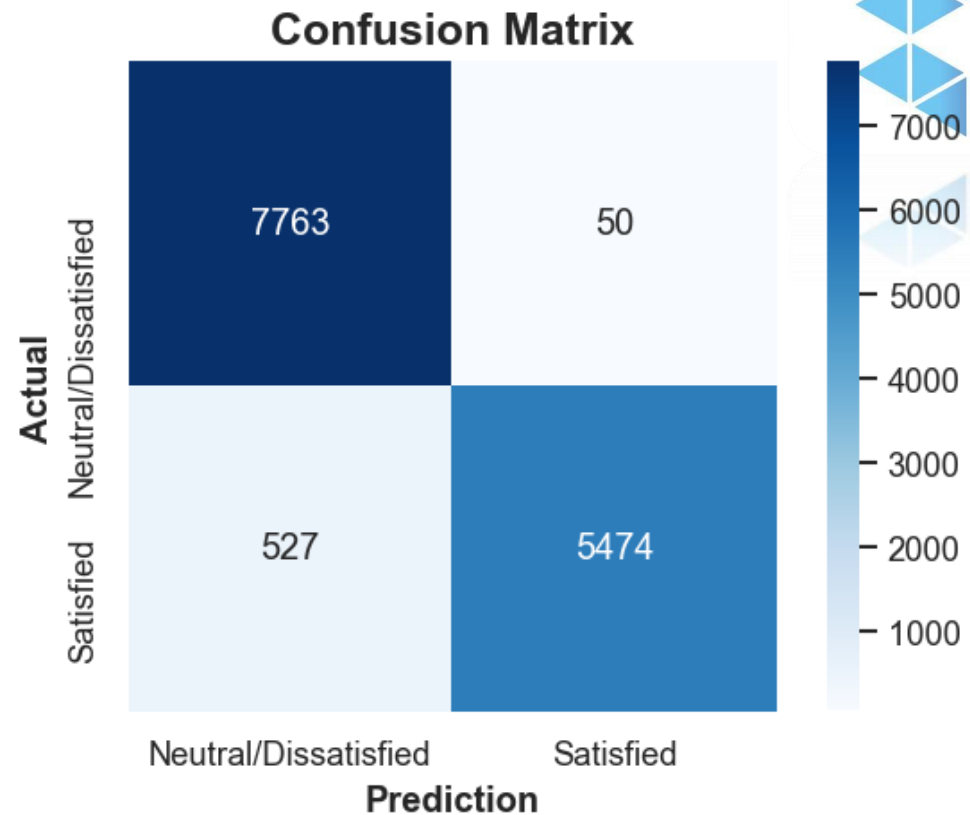
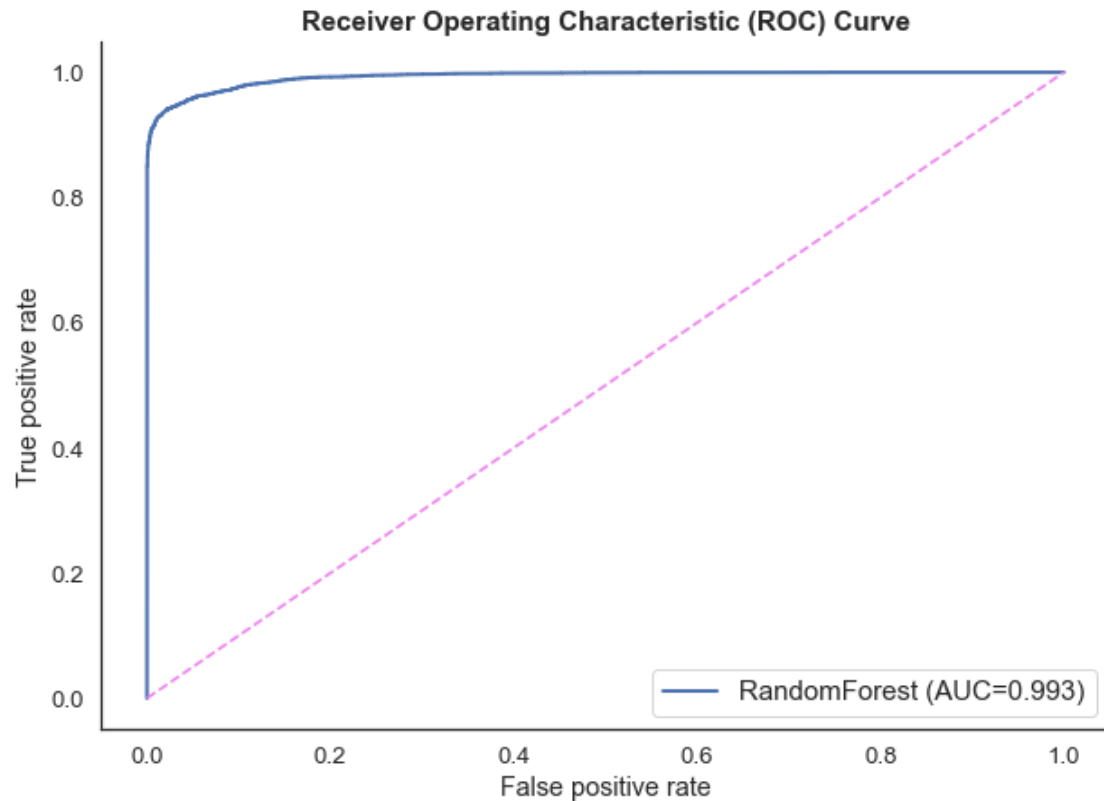


- Increase threshold from 0.5 to 0.7
- Precision increase from 97% to 99%

	Scoring	Threshold	Score
0	Precision	0.5	0.974476
1	Precision	0.7	0.993353
2	Recall	0.5	0.936335
3	Recall	0.7	0.903746

- Precision-Recall trade-off from adjustment of the probability threshold.

# Model Evaluation – Test Set

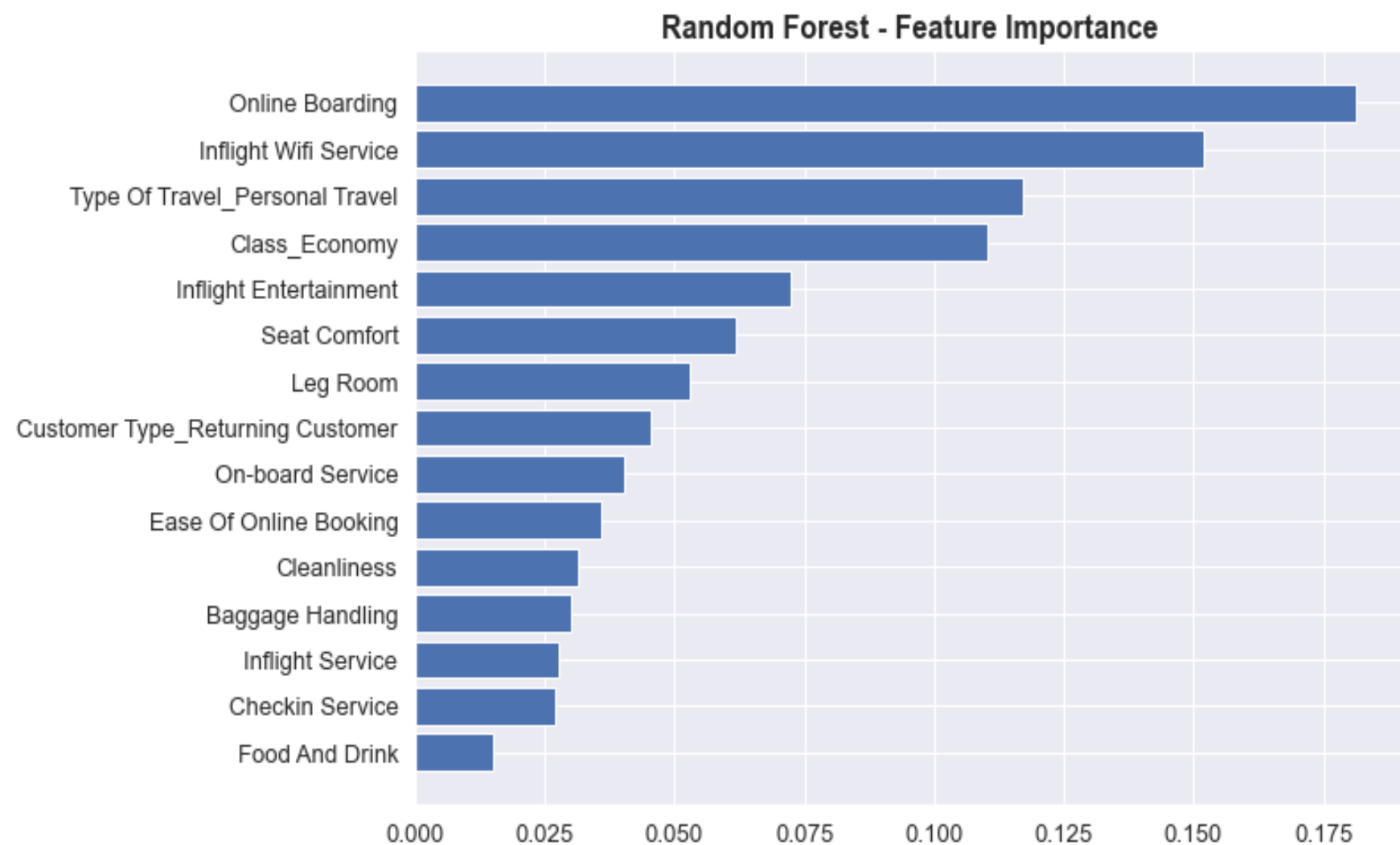


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The final evaluation of model performance gives a AUC of 0.993, Recall of 91.2% and Precision of 99.1%.

# Feature Importance



features	importance
Food And Drink	0.015048
Checkin Service	0.026856
Inflight Service	0.027592
Baggage Handling	0.030065
Cleanliness	0.031272
Ease Of Online Booking	0.035996
On-board Service	0.040355
Customer Type_Returning Customer	0.045322
Leg Room	0.052875
Seat Comfort	0.061945
Inflight Entertainment	0.072244
Class_Economy	0.110338
Type Of Travel_Personal Travel	0.116912
Inflight Wifi Service	0.151804
Online Boarding	0.181375

# Conclusion

- Airlines should highly focus on inflight wi-fi experience.
- Ease of online booking is important for business customers.



Thank You!

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