

Hotel Booking Cancellation Classification

By: Sarah Alabdulwahab & Asma Althakafi



Hotel Bookings Data

The dataset contains **32 features** and **119,390 observations**

- Hotel Type
- Arrival Date
- Stays
- Distribution Channel
- Meal Package
- Country
- Previous Cancellations
- Number of People

Is Canceled – The Target

GOAL

Classify the customers that will **cancel** their hotel booking and those that will not

Cleaning Process



Drop
Duplicates



Drop
Nulls



Drop & merge
Features



Remove
Outliers



Value
Conversion

After cleaning, the dataset contains **25 features** and **81,229 observations**

Which Values Did We Convert?



Country

ISO 3166 ^[1]			ISO 3166-1 ^[2]			ISO 3166-2 ^[3]	
Country name ^[5]	Official state name ^[6]	Sovereignty ^{[6][7][8]}	Alpha-2 code ^[5]	Alpha-3 code ^[5]	Numeric code ^[5]	Subdivision code links ^[3]	Internet ccTLD ^[9]
 Afghanistan	The Islamic Republic of Afghanistan	UN member state	AF	AFG	004	ISO 3166-2:AF	.af
 Akrotiri and Dhekelia – See United Kingdom, The.							
 Åland Islands	Åland	Finland	AX	ALA	248	ISO 3166-2:AX	.ax
 Albania	The Republic of Albania	UN member state	AL	ALB	008	ISO 3166-2:AL	.al

Scraped from Wikipedia



Visualizations

Moving to Tableau...



Percentage of Bookings	Percentage of Cancellations	Percentage of Cancellations per Arrival Data
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Country	All
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31.47%

Hotel Booking Cancellation Classification

Percentage of
Bookings

Percentage of
Cancellations

Percentage of
Cancellations per
Arrival Data

Percentage of Cancellations

Is Canceled
All

Hotel
All

Customer Type
All

Distribution Channel
All

Meal
All

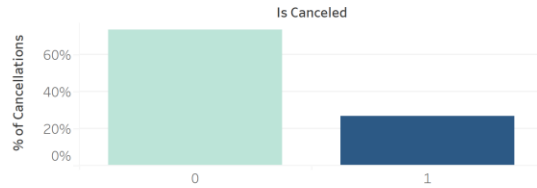
Reserved Room Type
All

Is Canceled

0

1

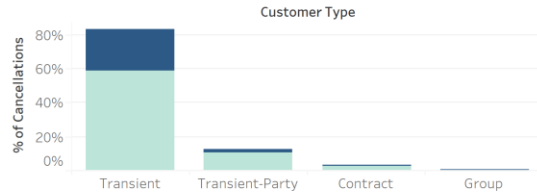
Percentage of Cancellations



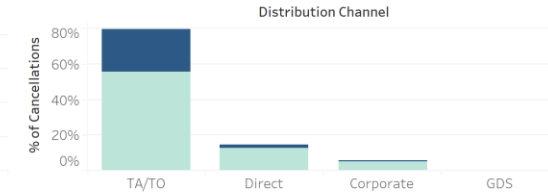
Percentage of Cancellations per Hotel



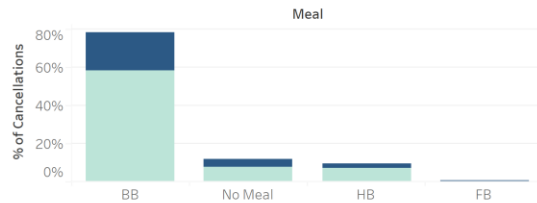
Percentage of Cancellations per Customer Type



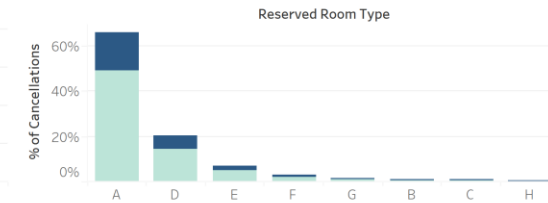
Percentage of Cancellations per Distribution Channel



Percentage of Cancellations per Meal



Percentage of Cancellations per Reserved Room Type



Hotel Booking Cancellation Classification

Percentage of Bookings	Percentage of Cancellations	Percentage of Cancellations per Arrival Data
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Percentage of Cancellations per Arrival Data

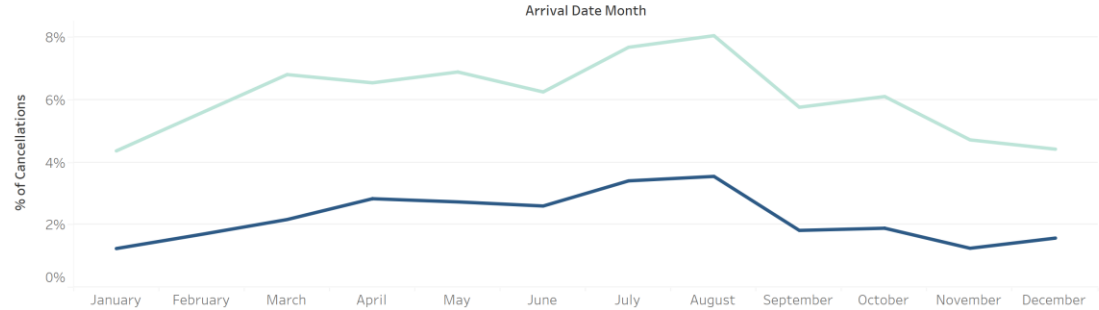
Is Canceled
All

Arrival Date Month
All

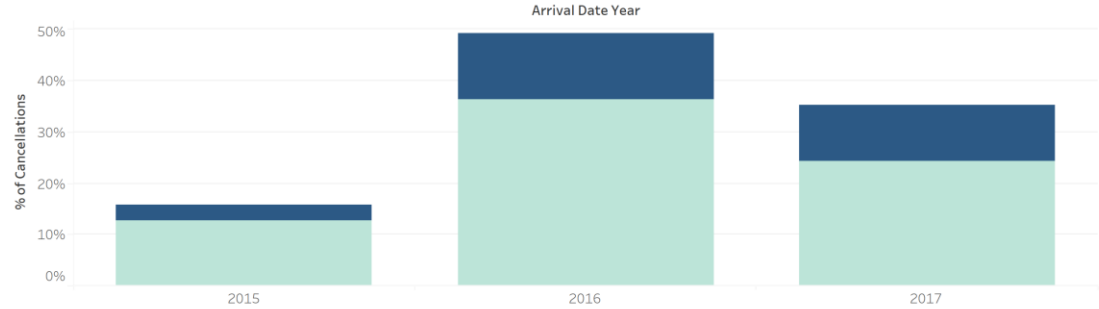
Arrival Date Year
All

Is Canceled 1 0

Percentage of Cancellations per Arrival Data Month



Percentage of Cancellations per Arrival Data Year



Models

K Neighbors Classifier

Logistic Regression

Decision Tree Classifier

Bernoulli Naive Bayes

Random Forest Classifier

Gradient Boosting Classifier

Bagging with Decision Tree Classifiers

Ada Boost with Decision Tree Classifiers



Experiments

Fit the models on the data with:

1

All observations and features

2

All features and downsampling
of the negative observations

3

Selected features based on our
interpretation

4

Selected features using
Permutation Importance

Experiment 1 – Results

	Accuracy	Precision	Recall	F1
Gradient Boosting	83.96%	83.35%	83.96%	83.37%
Bagging	82.50%	81.77%	82.50%	81.88%
Decision Tree	81.99%	81.39%	81.99%	81.57%

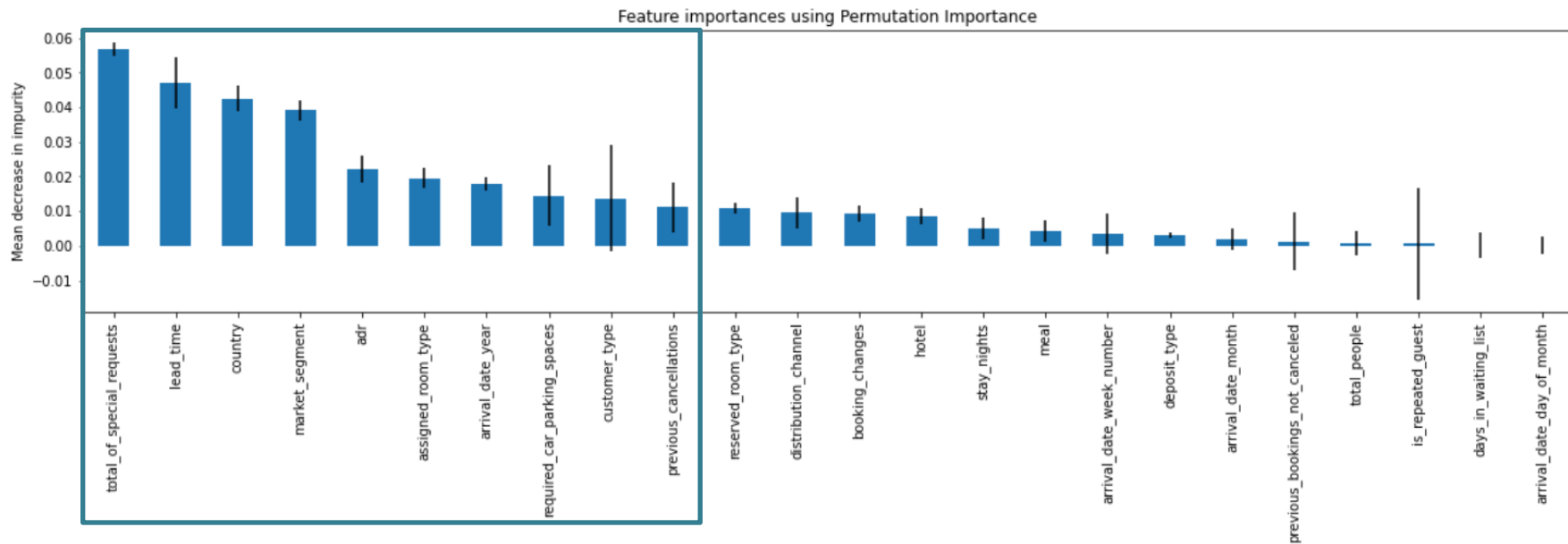
Experiment 2 – Results

	Accuracy	Precision	Recall	F1
Gradient Boosting	81.15%	81.33%	81.15%	81.13%
Bagging	79.83%	80.16%	79.83%	79.78%
Random Forest	79.62%	80.01%	79.62%	79.56%

Experiment 3 – Results

	Accuracy	Precision	Recall	F1
Bagging	75.07%	72.20%	75.07%	71.87%
Gradient Boosting	74.19%	71.21%	74.19%	71.41%
K Neighbors	73.77%	70.88%	73.77%	71.31%

Permutation Importance



Experiment 4 – Results

	Accuracy	Precision	Recall	F1
Gradient Boosting	81.61%	80.87%	81.61%	81.03%
Bagging	81.10%	80.36%	81.10%	80.55%
Ada Boost	80.33%	79.85%	80.33%	80.04%

Conclusions

- Overall, Gradient Boosting Classifier performed the best, followed by Bagging
- Considering the number of features and the F1 score, the 4th experiment was the best

THANKS!

ANY QUESTIONS?