Tour Packages Sales Predicting Model

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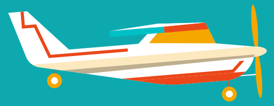
Problem Description

The travel agency is suffering from low number of sales despite the resources directed on pitch sales.

This presentation aims to:

- Explore any patterns regarding the success or fail of a sale pitch
- Build a predictive model for future customers



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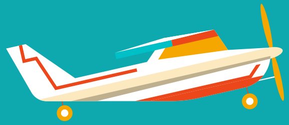
Data Model



01

Tools

Tools

Jupyter Notebook

Data Processing

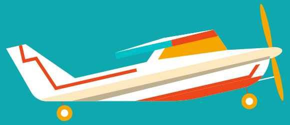
Numpy, Pandas

Vizualization

Matplotlib and Seaborn

Modeling

imblearn and sickit-learn



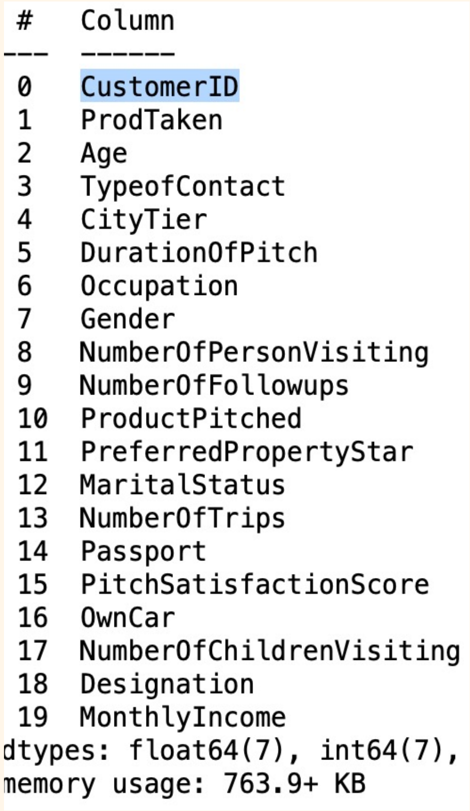
02

Dataset

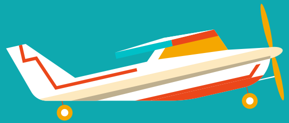
- The data set is made of 4888 rows and 20 columns.

- The dataset consists of different datatypes and is a mix of ordinal, categorical and numeric data

- The data covers information both about the customer and the sale pitch interaction



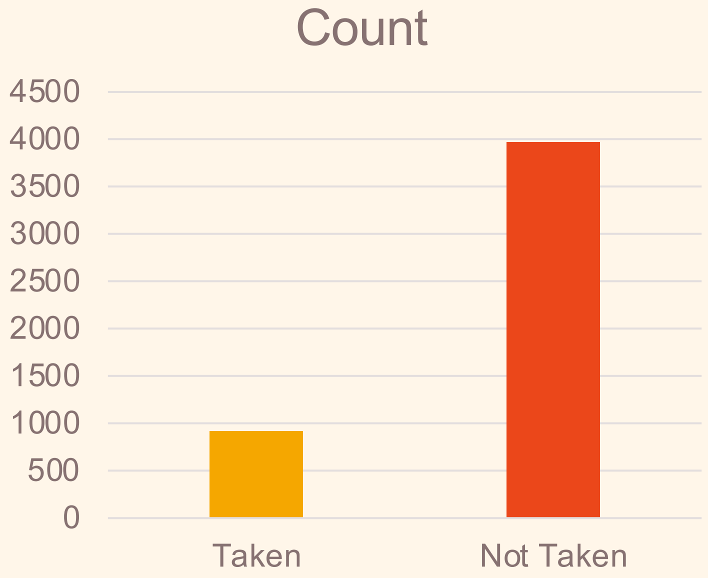
```
 #   Column
---  ------
 0   CustomerID
 1   ProdTaken
 2   Age
 3   TypeofContact
 4   CityTier
 5   DurationOfPitch
 6   Occupation
 7   Gender
 8   NumberOfPersonVisiting
 9   NumberOfFollowups
 10  ProductPitched
 11  PreferredPropertyStar
 12  MaritalStatus
 13  NumberOfTrips
 14  Passport
 15  PitchSatisfactionScore
 16  OwnCar
 17  NumberOfChildrenVisiting
 18  Designation
 19  MonthlyIncome
dtypes: float64(7), int64(7),
memory usage: 763.9+ KB
```



03

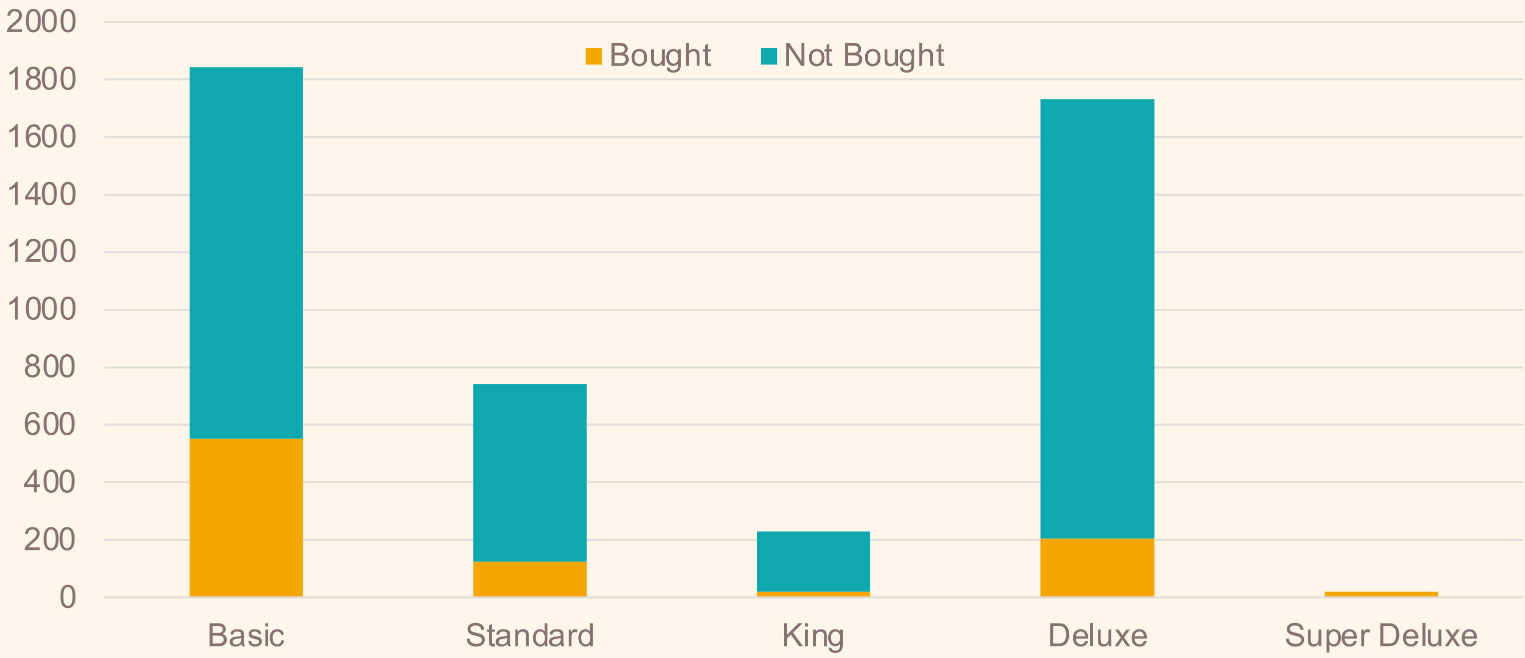
Findings

Products Taken

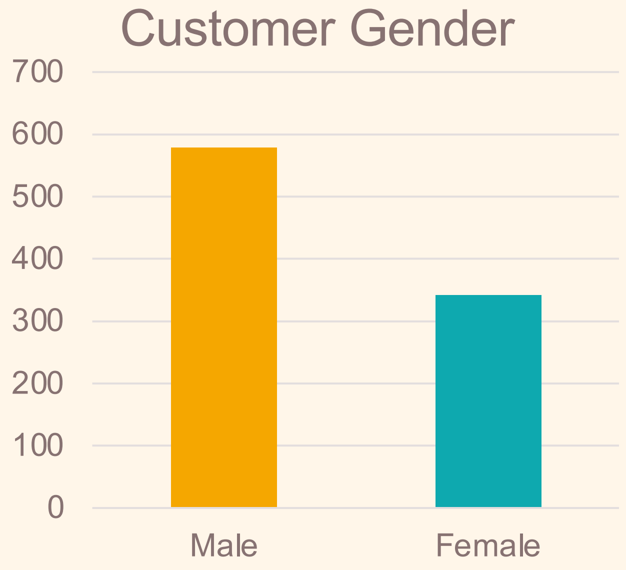


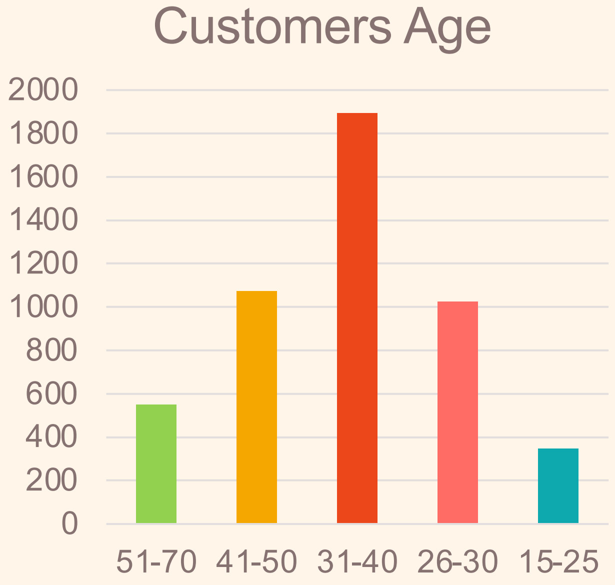
- We notice very low number of sales, indicating big amount of wasted time and resources

Products pitched vs. Products Bought

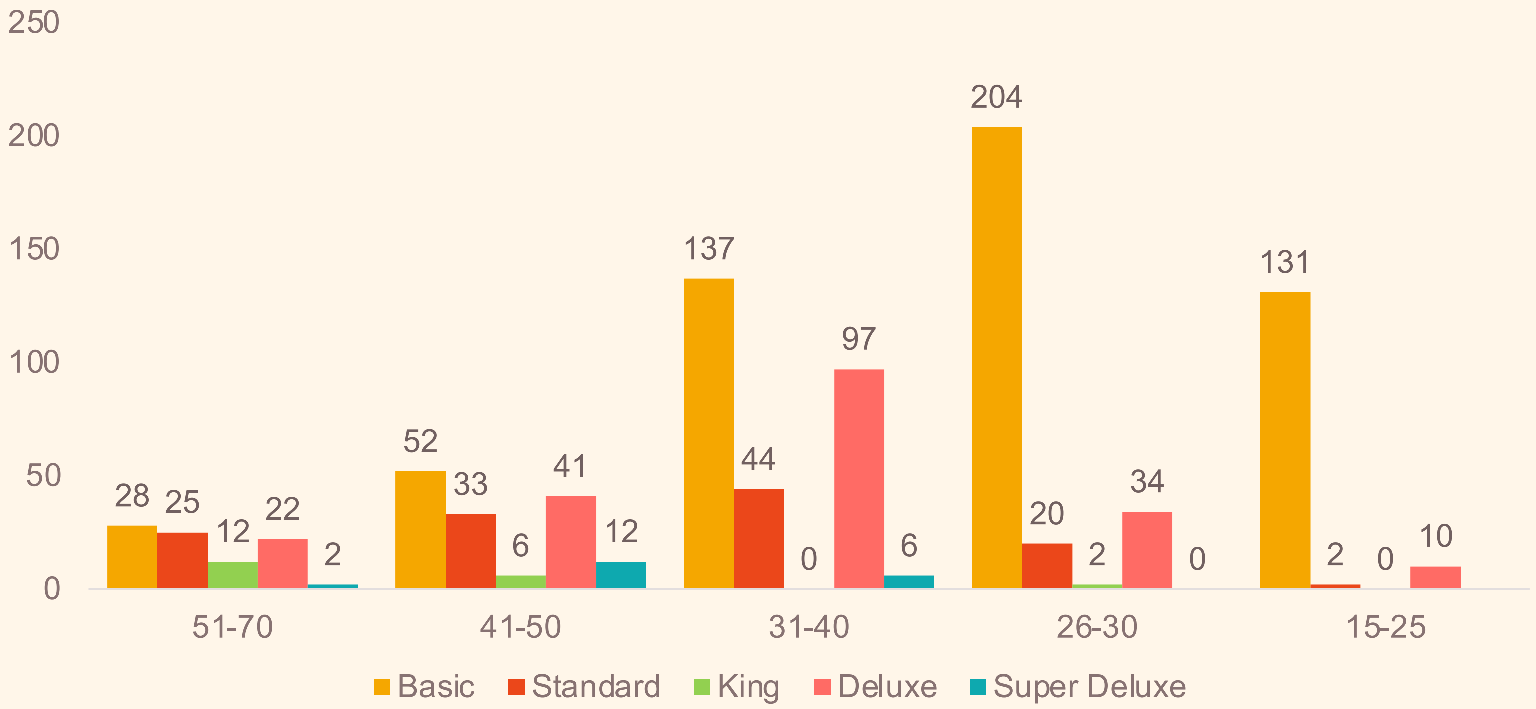


Personal Profile of Customers

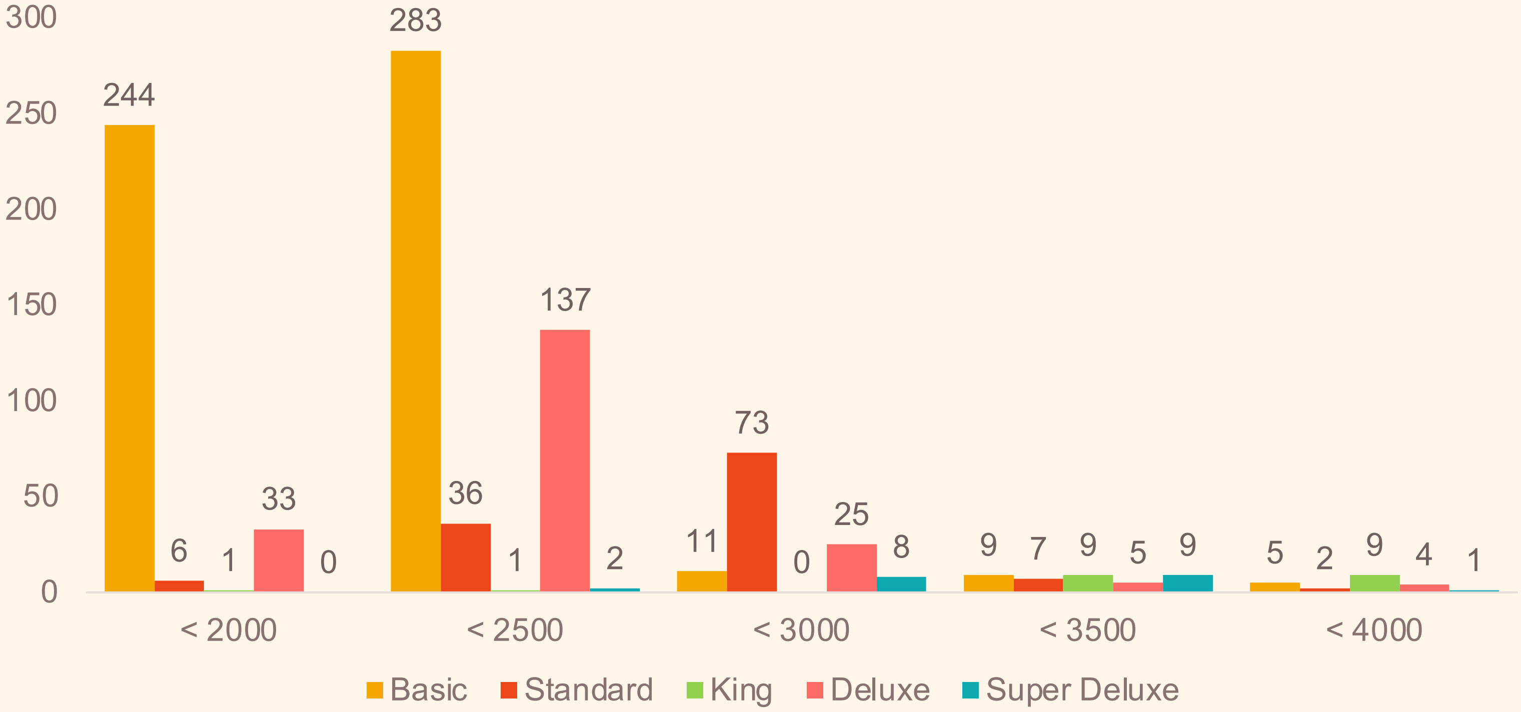


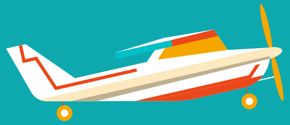


Customer age and purchased product



Monthly Income and purchased product





04

Data Model

Testing Plan

Data

- Clean data
- Clean data + Oversampling
- Clean data +oversampling + feature selection

Over Sampling

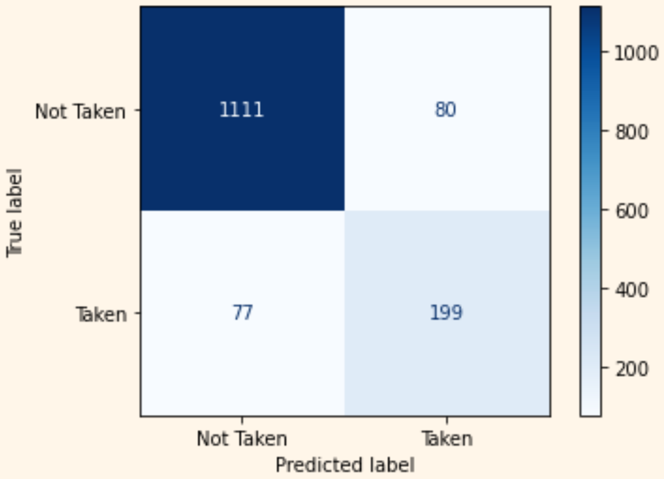
- SMOTE
- RandomOver Sampler

Classification

- Random Forest
- Logistic Regression
- XGBoost
- AdaBoost

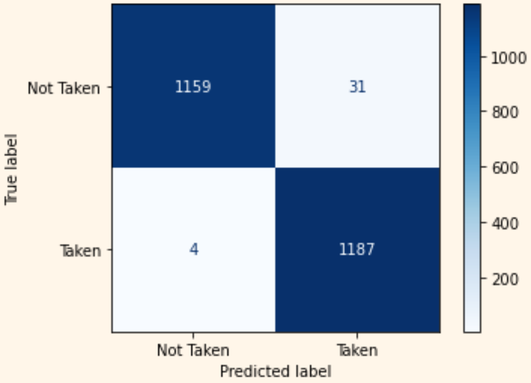
Testing (Clean Data)

- Testing on Clean Data resulted in high accuracy 90% . The Recall was at 72%.

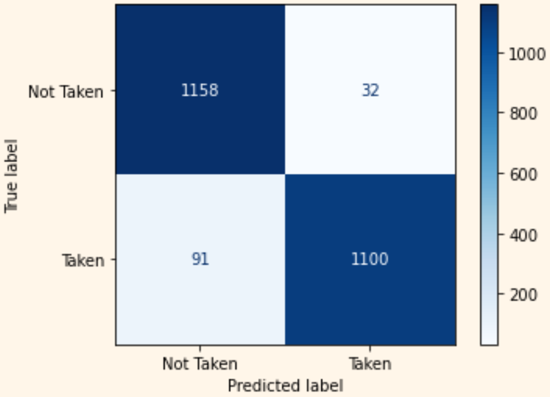


Testing (Over Sampling)

- Mixed and matched Oversampling algorithms with different classification models
- RandomOverSampler tends to cause overfitting of the data



RandomOverSampler + Random Forest



SMOTE+ Random Forest

RESULTS (SMOTE)

Model	Accuracy	Recall	Precision	F1
Decision Tree	90%	90%	91%	90%
Random Forest	94%	92%	97%	94%
XGBoost	90%	87%	93%	90%
AdaBoost	88%	85%	90%	87%
Logistic Regression	87%	83%	91%	87%

- Data was skewed so we needed to Over Sample
- Good results, leans toward overfitting
- Random Forest produced the highest accuracy

RESULTS (RANDOM OVER SAMPLER)

Model	Accuracy	Recall	Precision	F1
Decision Tree	96%	98%	93%	95%
Random Forest	98%	99%	97%	98%
XGBoost	82%	82%	81%	82%
AdaBoost	76%	77%	75%	76%
Logistic Regression	73%	74%	72%	73%

- Data was skewed so we needed to Over Sample
- RandomOverSampler higher results thatn SMOTE
- Random Forest produced too high of a result (Overfitting)

RESULTS (FEATURE SELECTION+SMOTE)

Model	Accuracy	Recall	Precision	F1
Decision Tree	89%	91%	88%	89%
Random Forest	88%	90%	87%	89%
XGBoost	90%	85%	93%	89%
AdaBoost	89%	85%	93%	89%
Logistic Regression	86%	83%	88%	86%

- Selected features based on customer profile only
- Numbers are lower >> more balanced
- XGBoost produced the highest accuracy

RESULTS (FEATURE SELECTION+OverSampler)

Model	Accuracy	Recall	Precision	F1
Decision Tree	95%	99%	91%	95%
Random Forest	95%	99%	91%	95%
XGBoost	79%	78%	80%	79%
AdaBoost	74%	75%	73%	74%
Logistic Regression	72%	74%	71%	73%

- Selected features based on customer profile only
- Numbers are lower >> more balanced
- XGBoost produced the highest accuracy

Thank you for Listening