



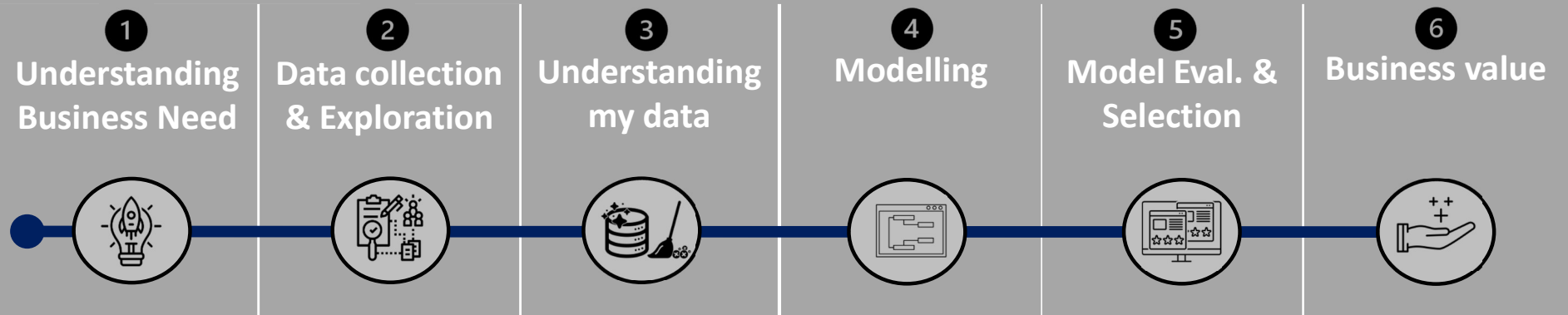
Falcon Airlines

Final Presentation
Submitted by: Mohammed T. Gomaa
Date: 12 July 2020

We Understand that...

...**Falcon Airlines** has been recently **losing passengers** to the competition, due to overall **drop** in Passengers' **satisfaction** of our flights' services. The Airline has been working to resolve this issue by attempting to understand & map out the **key factors affecting** overall **satisfaction** and finding the **best means** to **predict it**.

As a response to this issue we have designed a **six-step approach** that utilizes advances analytics including machine learning to **map out the key factors affecting satisfaction and supports future prediction**.





Severity of the issue...

1	Understanding Business Need	2	Data collection and processing.	3	Understand my data.	4	Modelling	5	Model Evaluation and Selection.	6	Business value
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In our attempt to **quantify the potential impact of severity of the issue** at hands, we broke it to three key areas.



Reputational damage.

In 2017, Untied Airlines Stocks prices were severely dropped by ~4% due to reputation damage.



Market share loss.

~45% of our sample were not Satisfied, putting our Market share at risk of loss with a similar percentage.



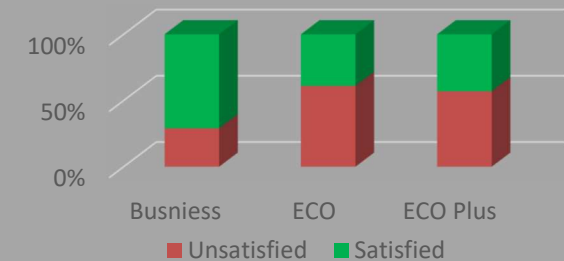
■ Satisfied ■ Unsatisfied

Losing ~29k Loyal customers and ~13k Disloyal ones.



Financial loss.

The two most impacted classes are ECO & ECO plus (~70% seating cap.)



In a monetary terms losses might reach up to U\$63m and U\$34m for Business and Eco classes, resp.



Collected a Reflective sample, at 99% + confidence level...

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We successfully surveyed a **sample** of **~91k passengers** of our total population with a **margin of error ~0.43%**. Along with their relevant **flights data**.



Flight data

Flight manifest providing operational details and passengers demographics.



Survey Data

A survey designed at 99% plus Confidence level, covering 16 key service areas offered by Falcon Airlines, along with overall Satisfaction question.

The main key takeaways from this stage was these **data sets can't be looked in isolation**, and by combining them we can **understand further the impact of passengers' demographics' and flights operations impact of Satisfaction**. Also, we were able to map out the **data key issues** with the data sets to be treated in the following stage.





Preparing data ensures modelling accuracy...

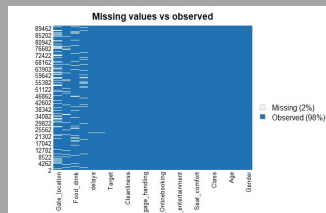
1 Understanding Business Need	2 Data collection and processing	3 Understand my data.	4 Modelling	5 Model Evaluation and Selection.	6 Business value
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In this step of our approach we mainly focus **preparing our data sets for the modelling** stage, mainly focusing in three main areas;

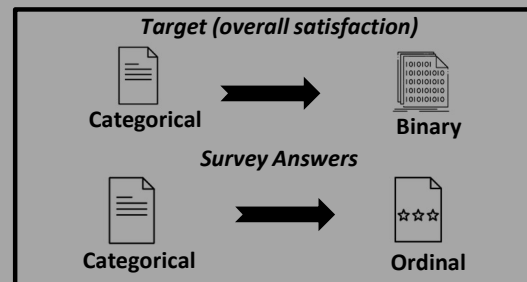


Fixing data issues

*Treated Missing value and outliers.
In our Missing value treatment we used Machine learning to impute missing values.*



Variables additions and transformations



Merge and split data

1- Cleaned Master Data Set



Master dataset with 100% of passengers sampled (91k).

2- Data split into Train & Test data sets



Train dataset with 70% of sample.



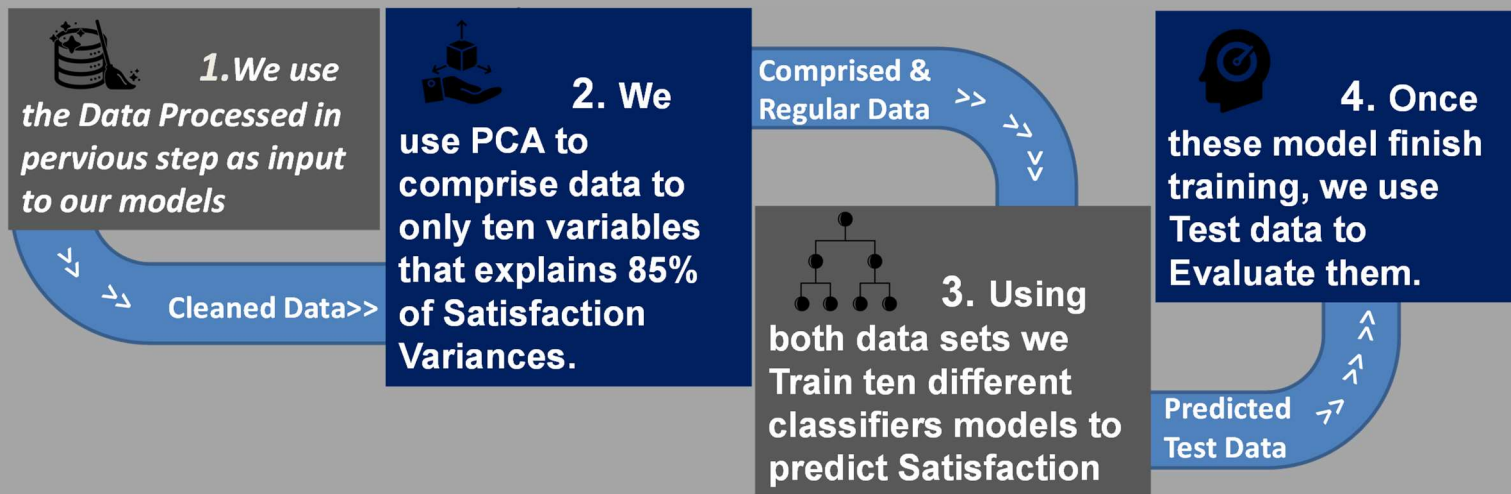
Test dataset with 30% of sample.



Selecting the suitable tools for problem at hand...

1 Understanding Business Need	2 Data collection and processing	3 Understand my data.	4 Modelling	5 Model Evaluation and Selection.	6 Business value
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Based on our understanding of issues we believe that it can be classed under a **classification issue**, simply the classing passengers either **Satisfied or Not**, along with understanding of the **most important variables**. We believe that PCA and Classifier type models are the best tool for it.





Clear Evaluation criteria to select the best model...

1 Understanding Business Need	2 Data collection and processing	3 Understand my data.	4 Modelling	5 Model Evaluation and Selection.	6 Business value
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We have defined a criteria to evaluate and select the best performing model, our criteria covers **four areas performance measures**. We have listed below top performing models in order.

1 <i>Quality of Model's Predictions</i> <i>The model with highest Accuracy and Precision, were</i> 1. XGB: 95% and 96% 2. RF: 95% and 94%	3 <i>True Positive Rate vs. False Positive Rate.</i> <i>A graphical method that compares models;</i> 1. XGB: AUC 99.1% and Gini 45% 2. RF: AUC 99% and Gini 44%
2 <i>Class Separation</i> <i>Ability of the model to separate predicted classes</i> 1. RF: 90% 2. RF: 89%	4 <i>Model Predictive Power</i> <i>Comparing each output probability being false vs True</i> 1. RF: 99.1% 2. XGB: 99%

Based on the results shown we recommend using **ensemble models either XGBoost or Random Forest**, with more favor towards **Random forest due its performance on class separation**. These models can provide prediction to Falcon Airlines with **~95% plus Accuracy and Precision**.



We started with project with two main objectives...

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| 1 Understanding Business Need | 2 Data collection and processing | 3 Understand my data. | 4 Modelling | 5 Model Evaluation and Selection. | 6 Business value |
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...as an attempt to provide a solution for the ongoing challenge with Falcon Airlines. Objective one was around finding the key *parameters that affects Satfication. While Objective was around the ability to predict Satfication.*

Project Objective no. one outcomes

The most important variables in predicting satisfaction are:



1- Seat comfort



2- Entrainment



3- Checking-services



4- Customer type



5- Travel type



6- Online support

If Falcon airlines works to improve these top services, we believe they might see a noticeable improvement in Passengers' overall Satisfaction.

Project Objective no. two outcomes

We recommend that you use **ensemble models** to predict Passengers Satfication, namely;



Random Forest



XGBoost

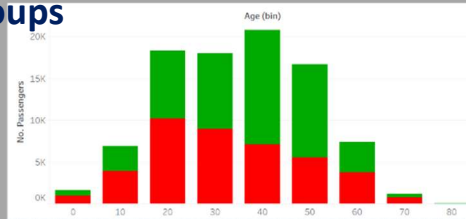


We recommend to promptly improve experience...

- 1 Understanding Business Need
- 2 Data collection and processing
- 3 Understand my data.
- 4 Modelling
- 5 Model Evaluation and Selection.
- 6 Business value

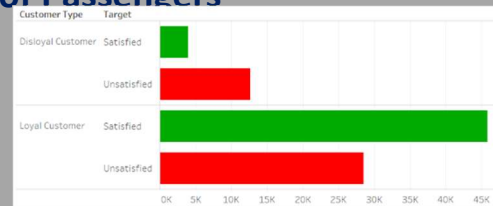
...passengers for the following areas or demographic, for a full analysis please use [Tableau Link](#) ;

Age Groups



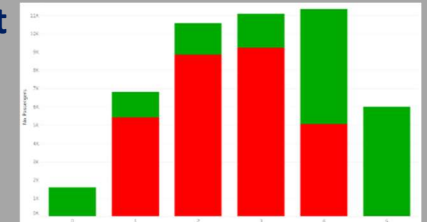
To focus efforts on improving the experience of the riskiest Age groups are between 0-30 years and 60+ years old.

Type of Passengers



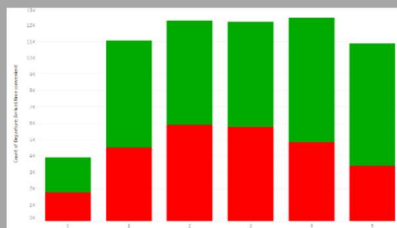
We have a noticeable issues with Disloyal customers, Falcon airlines need to introduce some perks that improves their experience.

Seat Comfort



Most problematic classes are Eco & Eco plus, which affecting overall experience of the passengers.

Timing



Business travelers are one of Falcon strong customers, improving flights timing will help in improving the overall experience.

By Class



Falcon Should consider reviewing the perks of ECO class to improve passenger experience

Type of Travel



Falcon Should consider improving the experience of personal travelers, not to be branded solely as a business airlines.



Thank You



Appendix: Data Sources and reference...

Raw Data

Survey Data



Microsoft Excel
ma Separated Valu

Flights Data



Microsoft Excel
ma Separated Valu

Processed Data

Cleaned Master Dataset



Microsoft Excel
Worksheet

Training Dataset



Microsoft Excel
Worksheet

Testing Dataset



Microsoft Excel
Worksheet