Assessing delivery success in the first attempt

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Highlights

- Delivery success is a high demand topic that impacts **companies costs and customer satisfaction**
- Driver's experience can positively **increase delivery success by 11%**
- Our best models reached near **90% accuracy** with **55% recall**
- Mastering the reasons that lead to delivery failure can have a **huge impact on our business.**
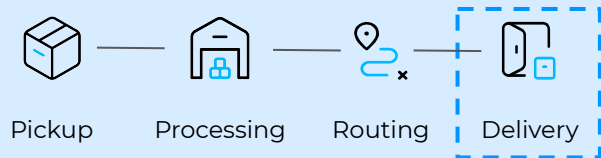
Loggi - Connecting Brazil

Loggi is a **logistics** company that, through **technology**, is **connecting Brazil**.

Understanding the problem

Last Mile Delivery in a Nutshell

Pickup — Processing — Routing — Delivery

We are focusing on the outcomes during the **package delivery** processes

Why this problem matters?

**Customer experience -** Delays and delivery failures negatively influence customer satisfaction

Demand - There is an overall growing demand for deliveries, especially e-commerce

Cost - Last Mile delivery is the least efficient in the supply chain, representing 28% of the delivery cost

Picture - The cost of goods from failed deliveries is over 1.2 billion pounds in the UK alone

Data

Our dataset consists of information from about 6 million deliveries that happened between the months of February and April 2021

First Delivery Attempt Distribution

Success Rate by Route Cluster
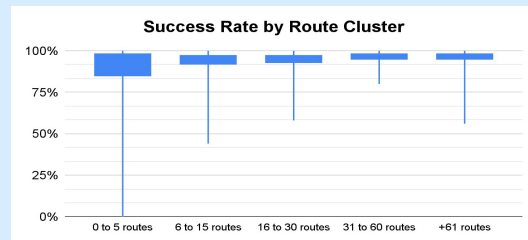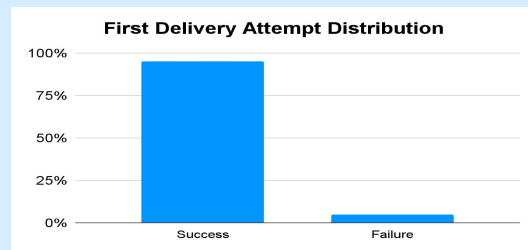
First delivery attempt is **heavily imbalanced**, with about 95% of the cases being success. Driver's experience, by the number of routes already taken, seem to have **relevant importance** in the outcome of a delivery

For further data exploration, **check out our dashboard!**

Modeling

Based on our explorations and business experience, **seven features** were selected for modelling

- Package declared value
- Packages per itinerary
- Route duration
- Route total distance
- Address State
- Route Cluster
- Max weight

Since False Negatives can impact logistics costs as customer satisfaction, we **maximized Recall**. Also, overall performance of the models were tracked by looking at **accuracy**.

Best results for each model

Model	Precision	Recall	Accuracy	Details
Gradient Boost	0,53	0,55	0,87	SMOTE for oversampling, 75 estimators
Logistic Regression	0,52	0,59	0,62	Using class weights, 95% for failure and 5% for success
Random Forest	0,54	0,55	0,90	SMOTE for oversampling, 10 estimators

Conclusions

There are **several aspects** that influence and impact last mile delivery success. This is a **complex problem** that should be approached by different methods. Better understanding the reasons that lead to failure as well as trying to predict them can have a huge impact on our business, both in terms of **operational costs and customer satisfaction.**