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Shipping Prediction

"Reduce the products are delivered **not on time** & customer care calls to Improve Company's Revenue"

About Us

Hunky-Dory is a Data Science Team in **Hunky,** which is a growing **e-commerce**.

Arif Romadhan

Tutor

Team

Boma Wikanthyasa I

will present about:

Problem Statement

Andriana Butar-butar

will present about:

Insight & Data Pre Processing

Reny Nur Hidayah

will present about:

Modelling & Recommendations

Contents of The Report

Problem Statement

Insight

Data Pre Processing

Modelling & Recommendations

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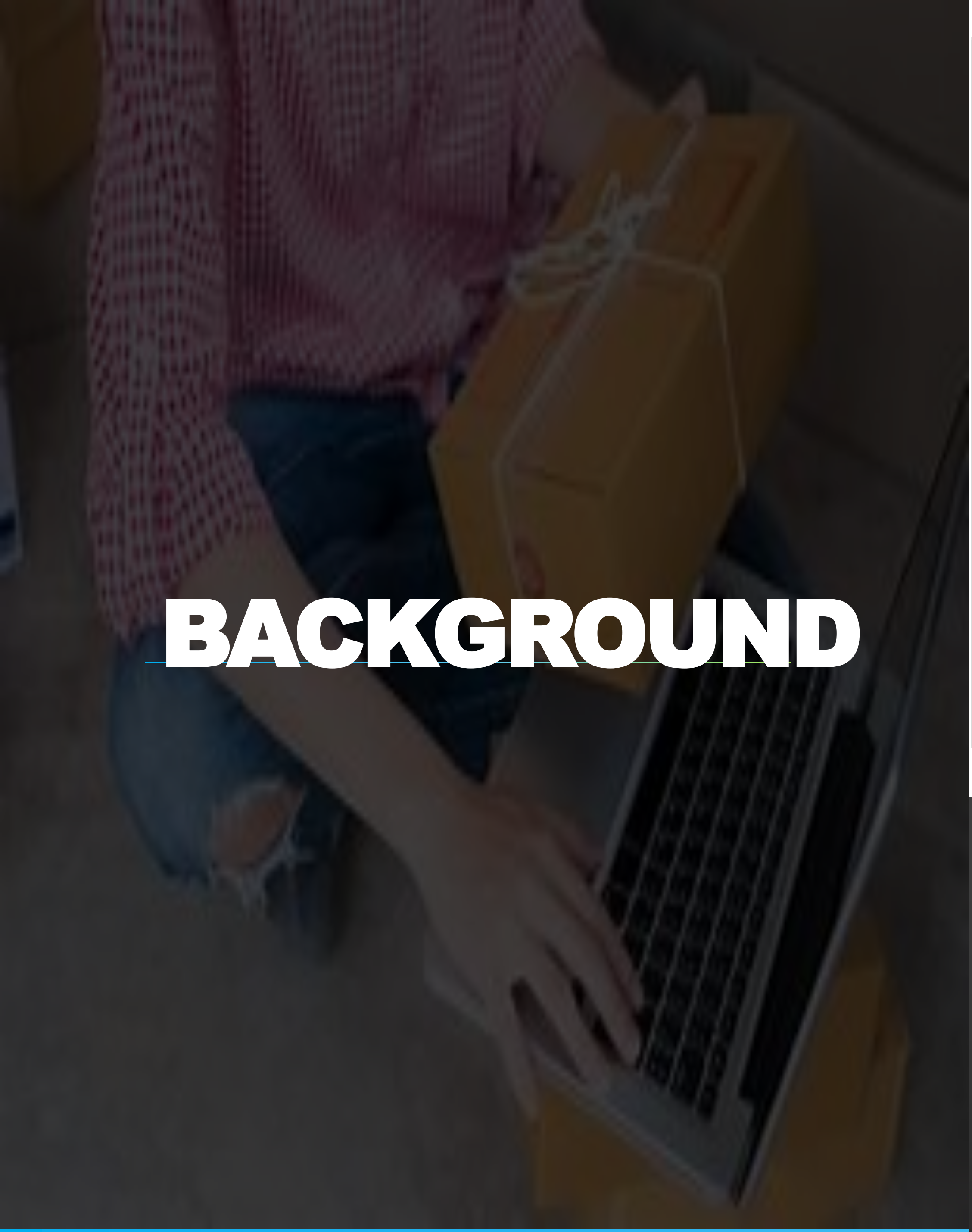
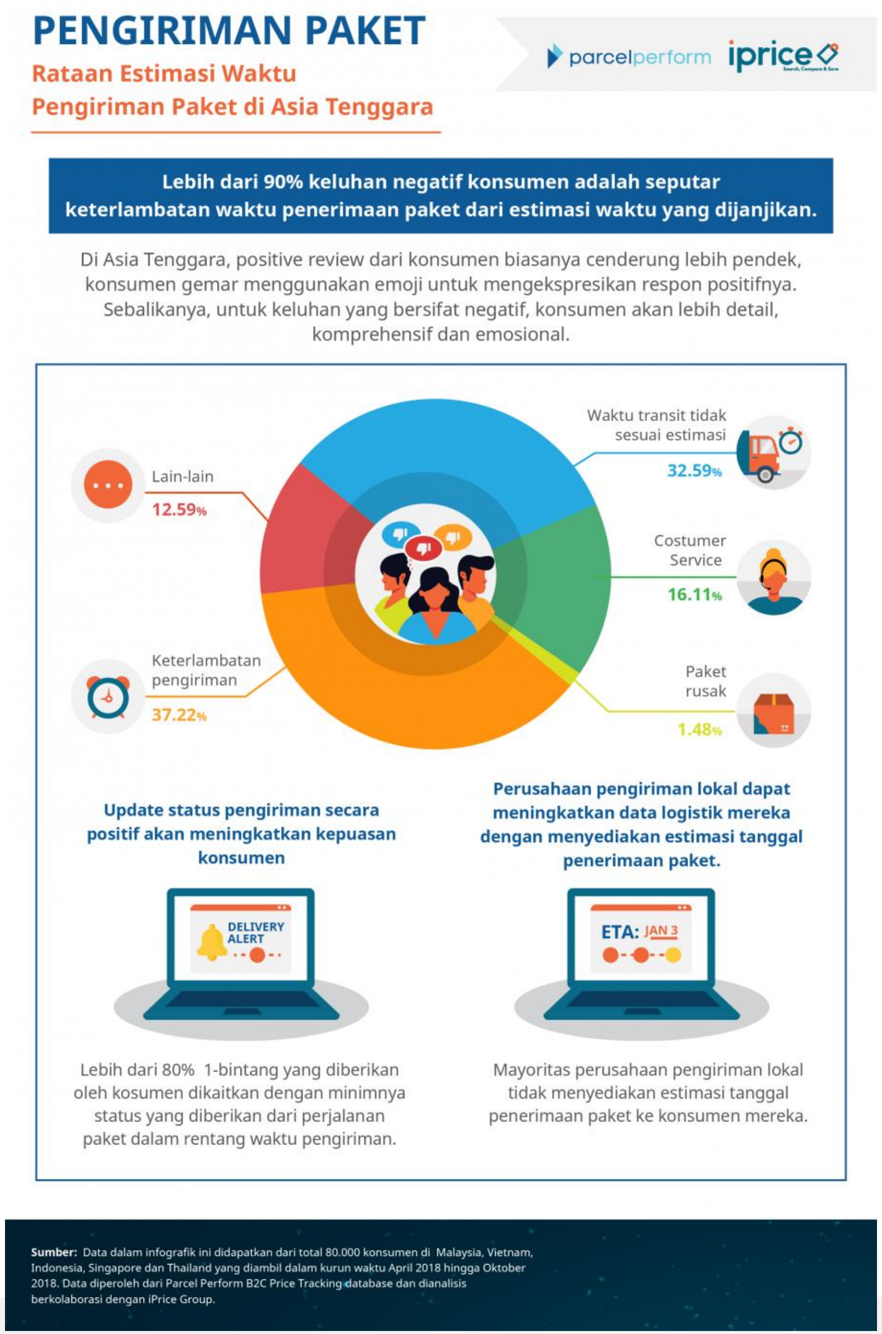
PROBLEM STATEMENT



BACKGROUND

The e-commerce business in Indonesia is increasingly promising. In the midst of a pandemic, this digital-based trading business is even projected to grow 33.2 percent from 2020, which reached IDR253 trillion to IDR337 trillion this year.

(Sumber: Katadata.co)



(Based on iprice, 2018)

Delivery service is a **biggest problem** on e-commerce

- Late shipment 37.22%
- Transit time does not match estimates 32.59%

Impact

Customer care calls

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Internal issues

Most of the Products are delivered **not on time**

Poor Delivery Performance

☹

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ShipBob

38% Customer Will not shop at the same store due to a **negative shipping experience**

https://www.shipbob.com/blog/ecommerce-shipping/

→

Potential of **4,180** customer who will not shop at our store

↓

We're going to prevent this

" Shipping Prediction "

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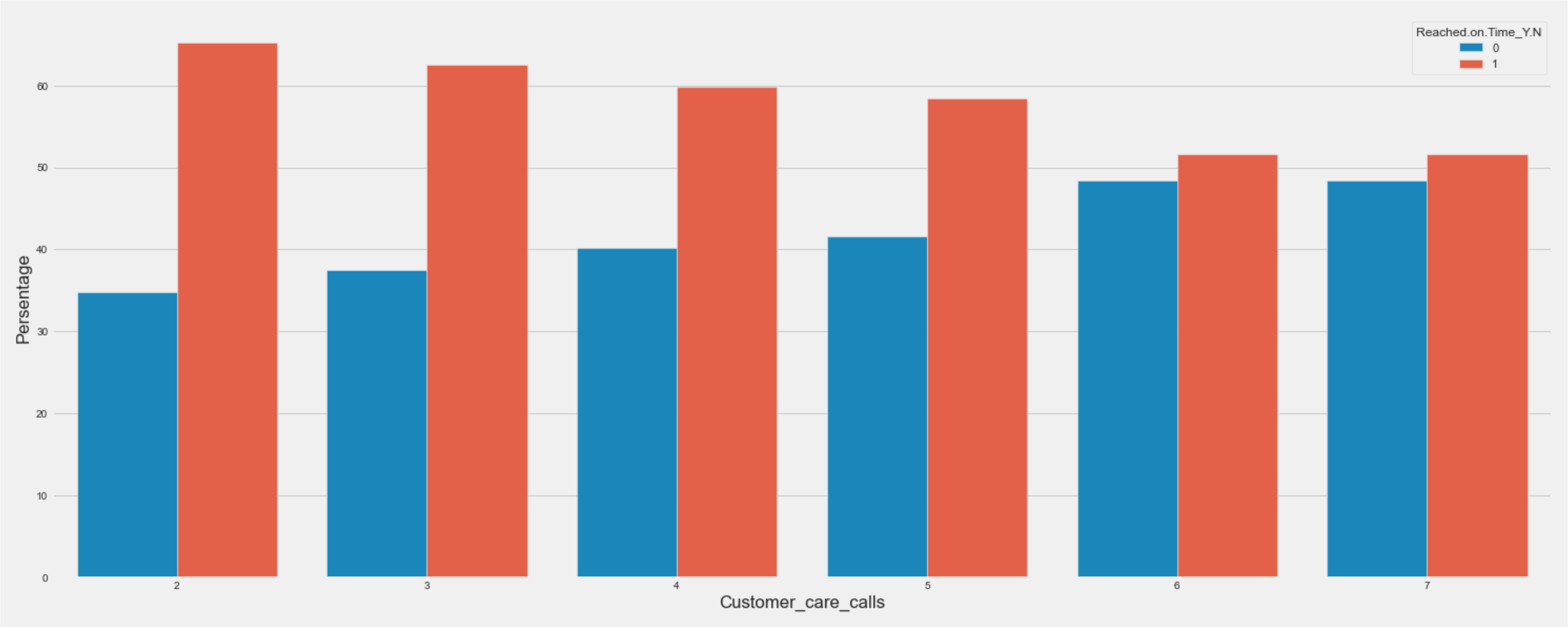
Internal issues



Customers who frequently make customer care calls tend to be more **on time**

Customers must often make customer care calls so that the products delivered on time

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Goals

Reduce the products that delivered not on time

Impact:
1. **Prevent Potential of customer who will not shop at our store**

Increase Company's revenue

Reduce customer care calls

Matrics

Late shipment rate

Customer care calls rate

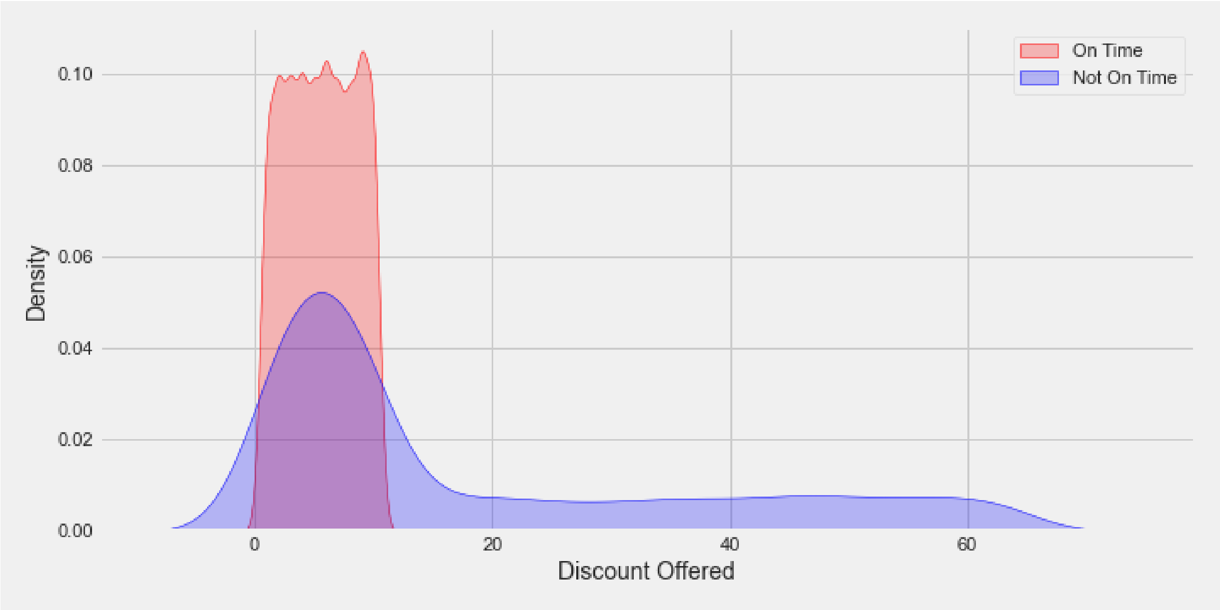
Objective

Modelling "Creating a prediction model"

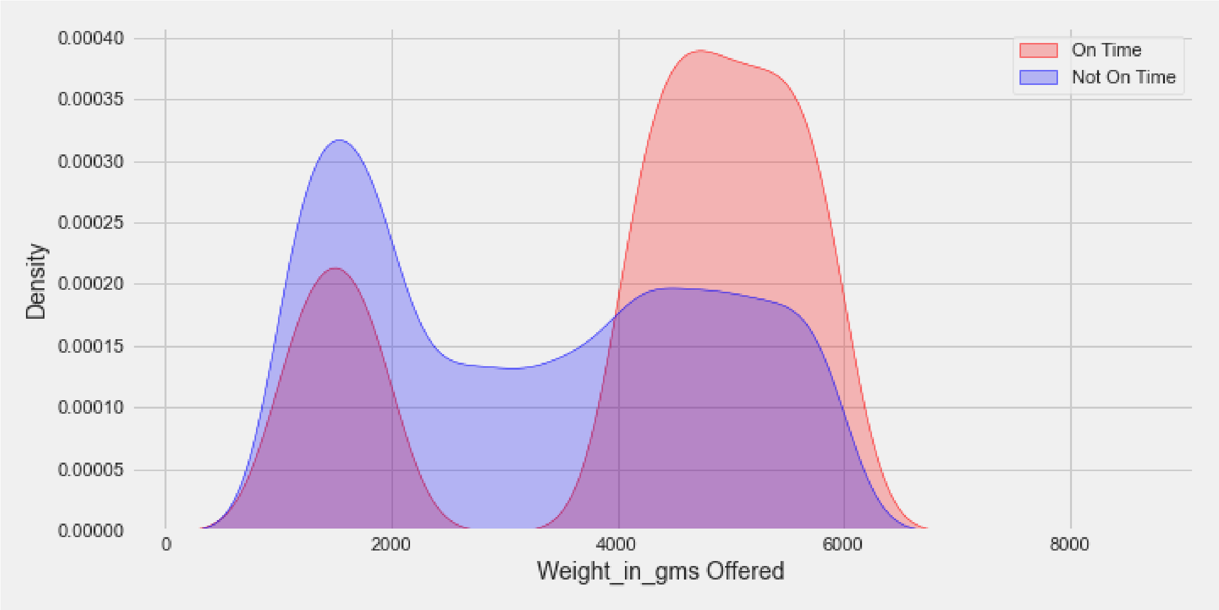
INSIGHT

INSIGHT

Discount offered



Weight



The **most On-time products have a discount in the range of 1-15 USD**, while discounts above 15 USD tend not to be on time

The **most On-time products have a weight in the range of 4-6 kg**, while **weight in the range 1-4 kg** tend not to be on time

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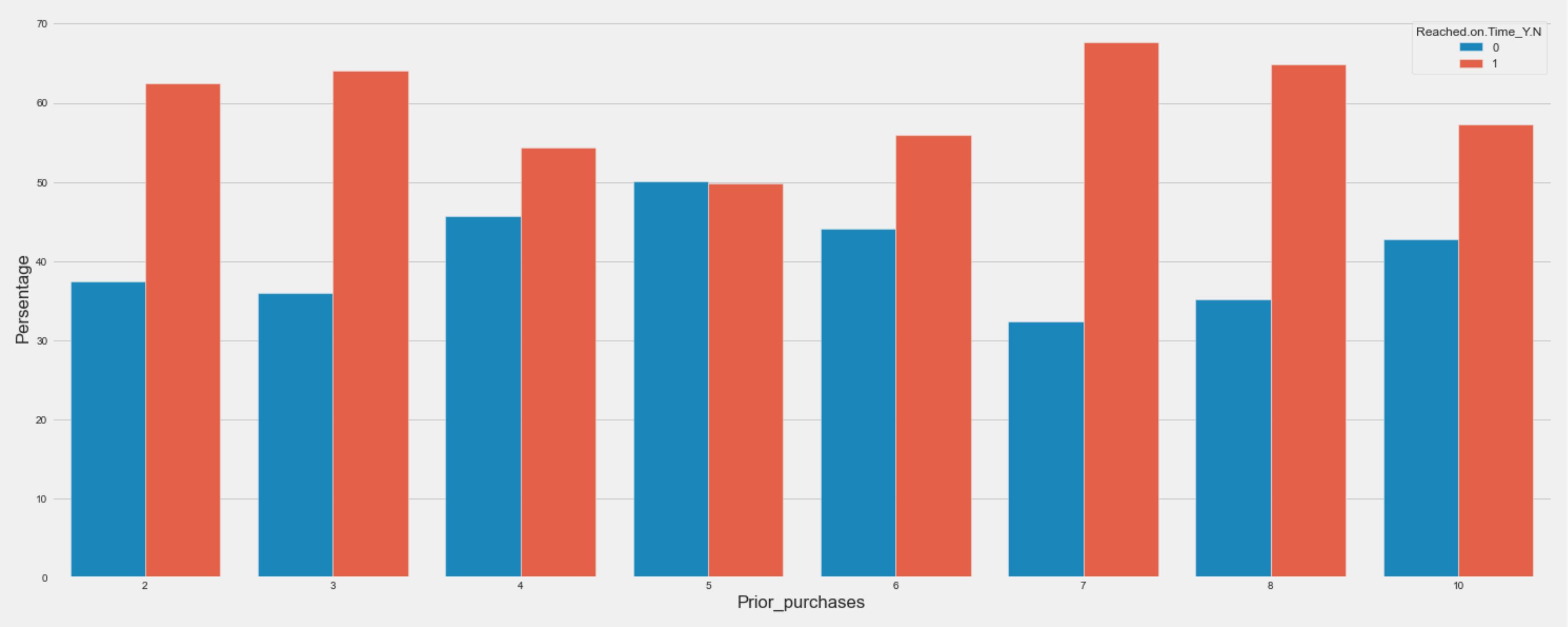
INSIGHT

Prior Purchase



Customers having prior purchases below 5 tend not to be on time and after more than 5 products ordered are no longer on time

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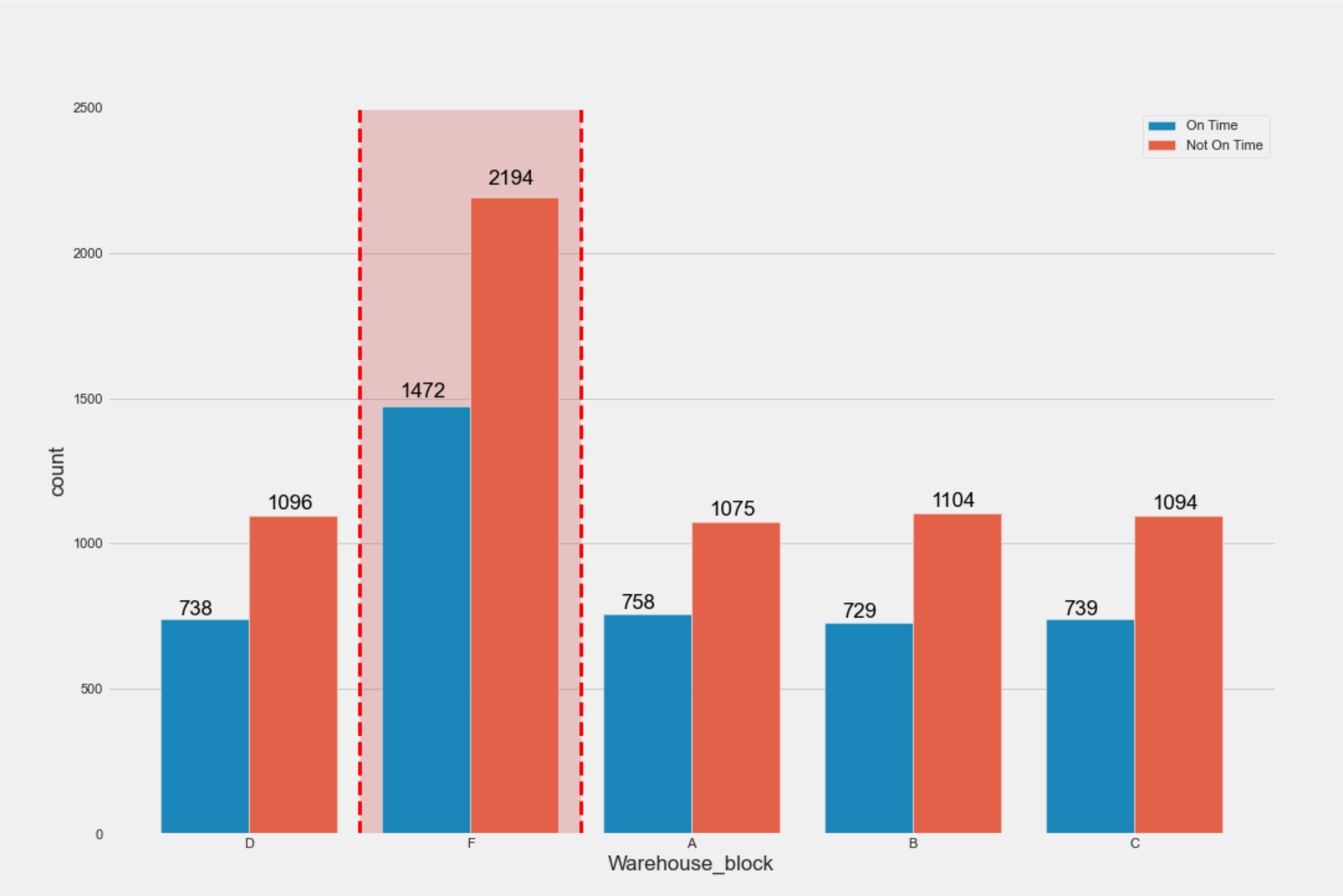
INSIGHT

Warehouse block



About **30%** of the product ships from **Warehouse F**

Evaluate each warehouse

1. Optimizing Warehouse Management System
2. Are we short on employees at every warehouse?

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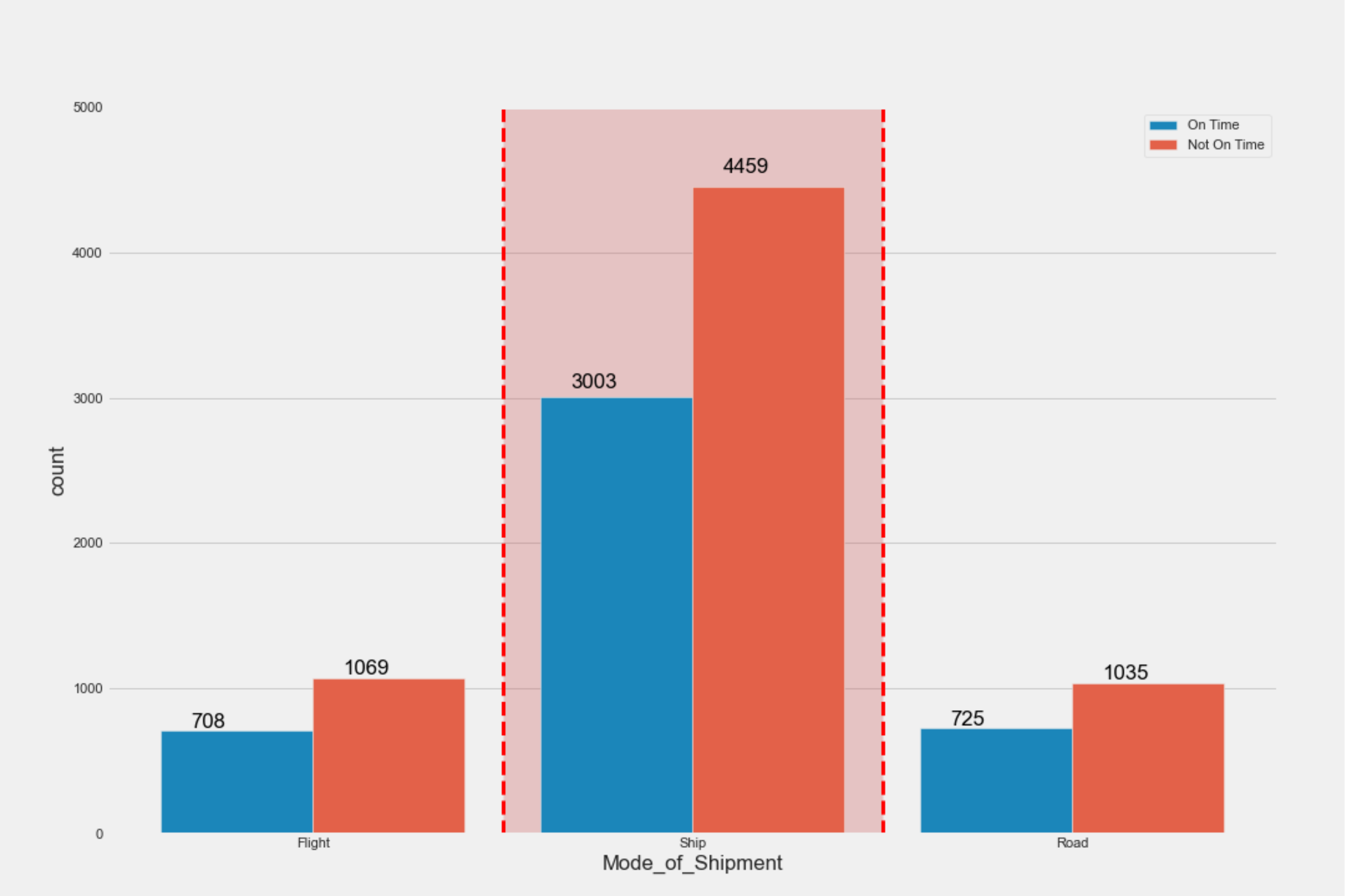
INSIGHT

Mode of Sipment



Most of the products are shipped via ship

Prioritas = Ship

WHY SHIP?

1. Efficient in terms of shipping **costs**
2. There is **More Cargo Space** in Ocean Shipping
3. **Flexible** in receiving goods sent via sea shipping

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DATA PRE - PROCESSING

Our Dataset

10,999 Rows

12 Columns

Features

- ID
- Warehouse_block
- Mode_of_Shipment
- Customer_care_calls
- Customer_rating
- Cost_of_the_Product
- Prior_purchases
- Product_importance
- Gender
- Discount_offered
- Weight_in_gms
- Reached.on.Time_Y.N

Duplicated Data

No duplicate values found

Missing Value

No missing value found

Outliers

- Discount Offered
- Prior Purchases
- But we using data whose outliers haven’t been removed, because there is no significant difference

Features Engineering

- Discount_group
- Weight_group
- Cost_group

Delete Columns

- ID
- Customer_care_calls
- Customer_rating

Label Encoding

Gender (F:0, M:1)

One hot Endcoding

- Product_importance
- Warehouse_block
- Mode_of_shipment

MODELLING & RECOMMENDATIONS

Modelling

No	Method	Accuracy	Precision	Recall	AUC
1	Logistic Regression	0.68	0.78	0.64	0.69
2	**Decision Tree Classifier**	**0.69**	**0.88**	**0.54**	**0.72**
3	Random Forest Classifier	0.68	0.86	0.55	0.71
4	XGB Classifier	0.68	0.88	0.54	0.72
5	AdaBoost Classifier	0.678	0.82	0.59	0.70
6	LGBM Classifier	0.68	0.87	0.55	0.72

Final model decision

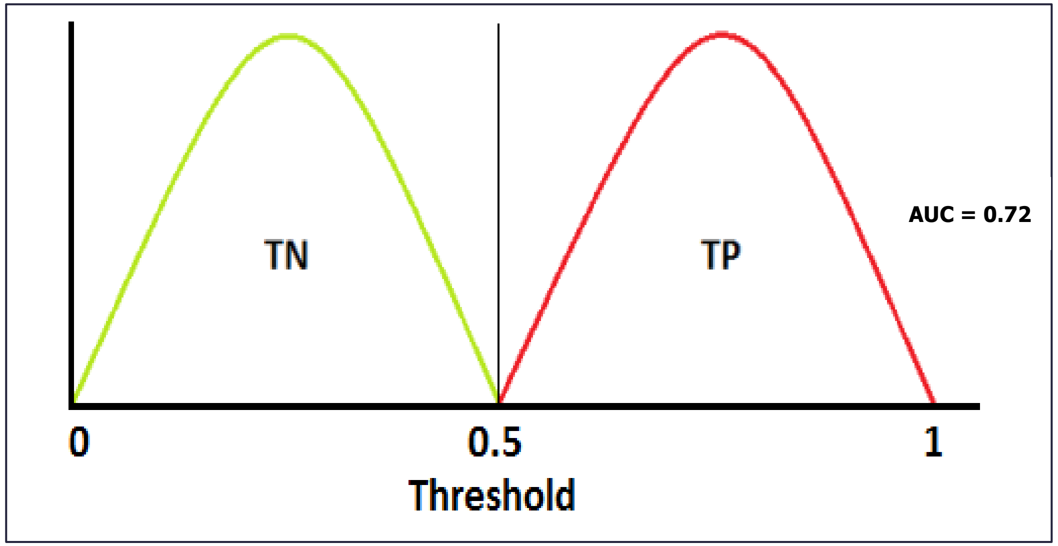
“ **Decission Tree Classifier** ”

Why?

1. AUC & Precission (Higest Score)
2. Small Data → stick to simple methods

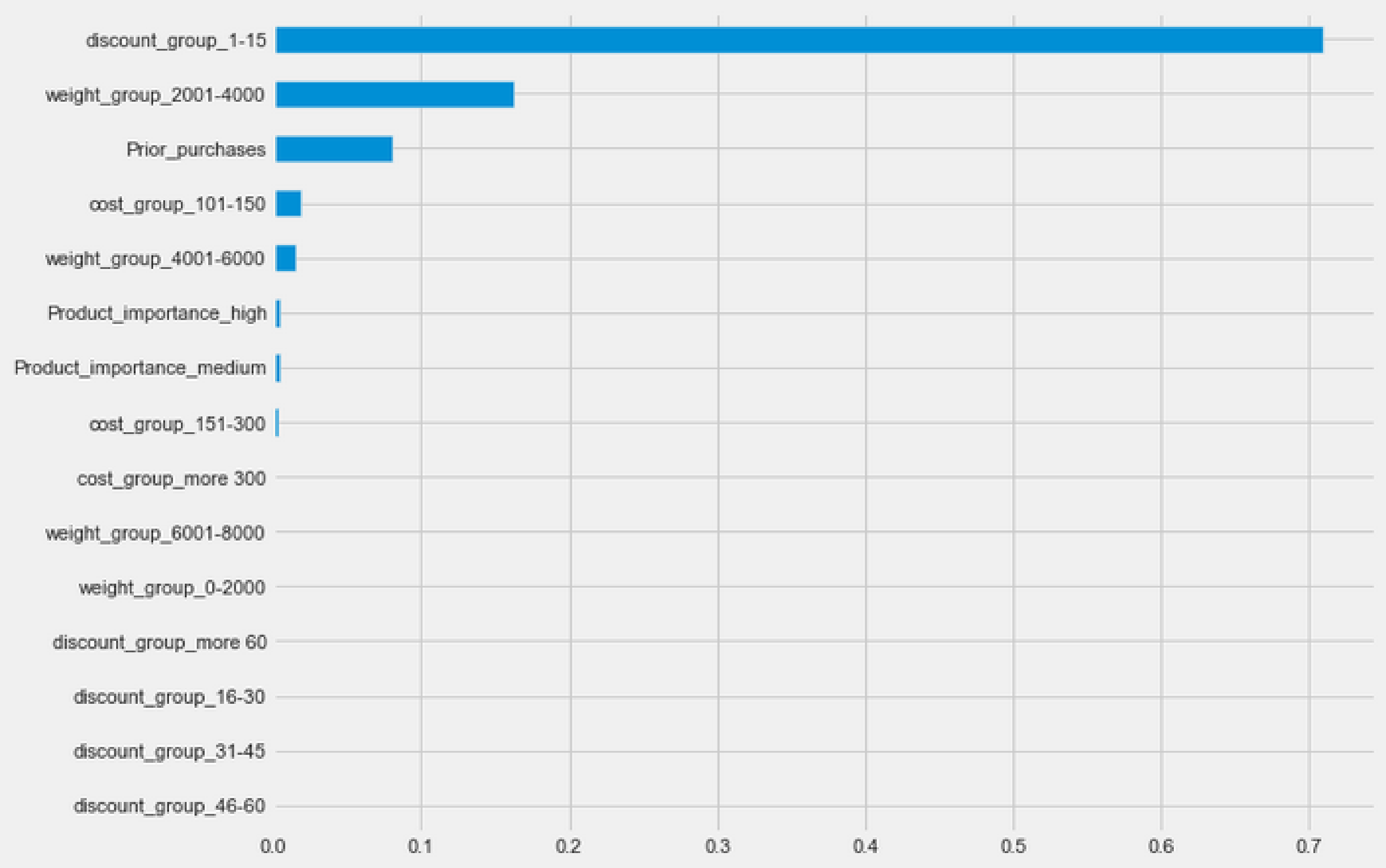
Modelling

Final model decision ⟶ **Decission Tree Classifier**



AUC Score = 0.72, which shows that the model **can predict both on-time and late shipment by 72%** (can provide a class separation correctly by 72%)

Feature Importance



Recommendations

Recommendation Actionable

1. Using the mode of shipment via Liner

- Because it has a **fixed route and schedule** so it arrives **faster** than the trump service ship
- Loading and unloading only takes 2 - 3 hours
- **Reducing** the products are delivered **not on time**

2. Notify the delivery status

- **Reducing** the number of customer care calls

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Recommendations

Recommendation Actionable

3. **Free Shipping** on the next transaction

- For those who are predict to be late
- So that customers **don't leave** the store because of a negative shipping experience

74% Free shipping may affect checkout

https://www.shipbob.com/blog/ecommerce-shipping/

ShipBob

4. **Evaluation** at each warehouse

- Evaluation at each warehouse in order to further optimize the warehouse management system, by giving importance to designing a data warehouse model.

Comparison before & after modelling

"Reduce products are delivered **not on time** & customer care calls"

- **Reduce the products are delivered "not on time"**

Before

- ❑ **6563** products are **not on time**

After

- ❑ **72%** (accurately predict) so we could Reduce **4726** the products are delivered **not on time**

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Reduce customer care calls

Before

- **Mean** of customer care calls **4**
- **37.2%** Complaint of delay (based on survey)
- 10,999 x 4 = 43,996 calls/day
- 37,2% x 43,996 = 16,367 calls (Complaint of delay calls)
- 72% x 16,367 = **11,784** calls
- 80*21 = 1,680 calls/day
- 43.996 / 1680 = **26 Customer Care**

After

- **72%** (accurately predict) so we could possibly reduce **11,784** customer care calls
- 43,996 – 11,784 = 32,212 calls/day
- 80*21 = 1,680 calls/day
- 32,212 / 1,680 = **19 Customer Care**

Reduce 7 staff customer care
1 Customer care = Rp 4.400.000 (UMR Jakarta)

Rp 30.800.000 Save/bulan

1 Customer Care = 80 calls/day
Estimating cargo = 21 days

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Thank You

LAMPIRAN

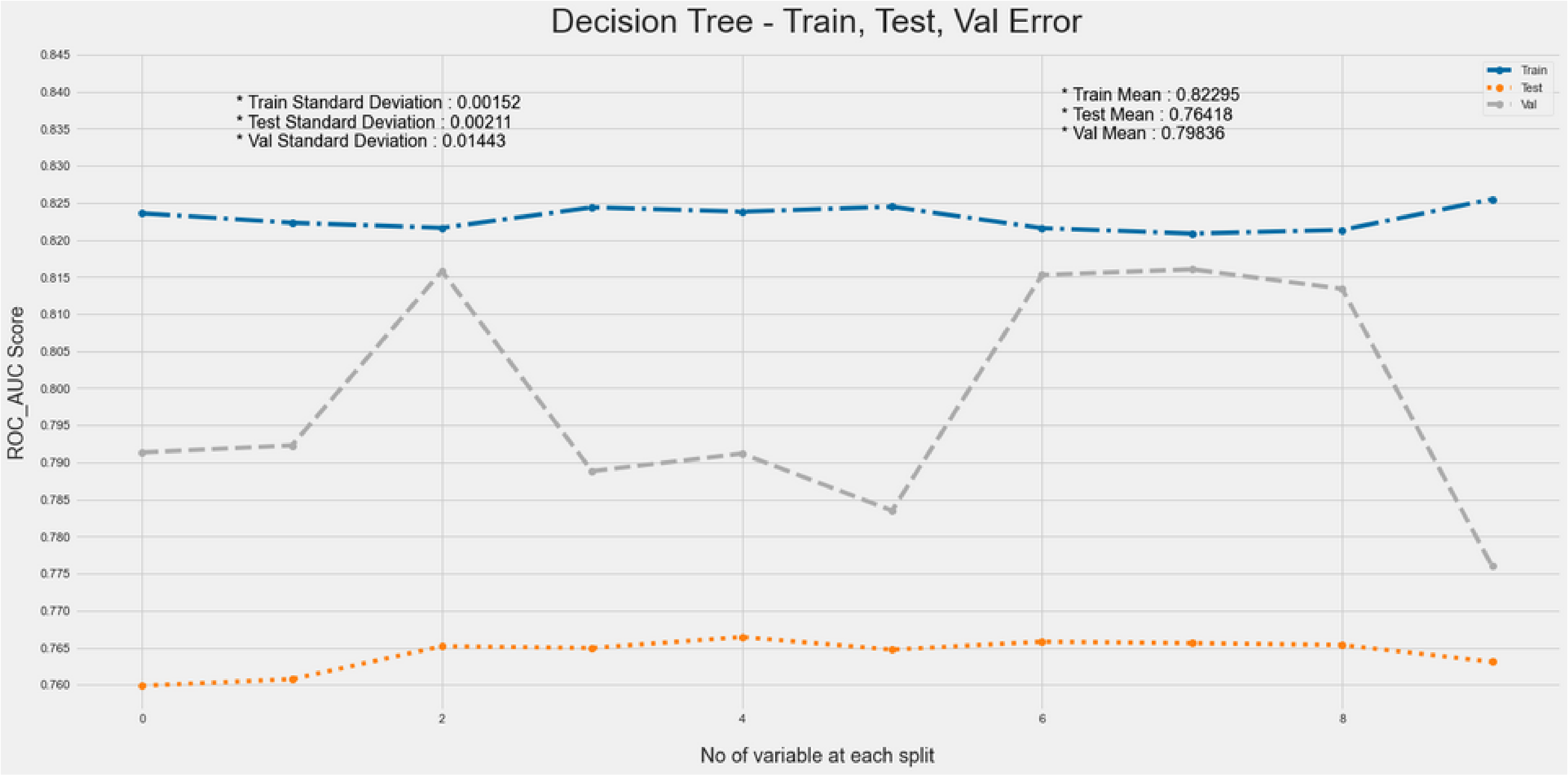
DecisionTreeClassifier Tuning

```
RandomizedSearchCV(cv=5, estimator=DecisionTreeClassifier(random_state=42),
                   param_distributions={'max_depth': [1, 4, 8, 12, 16, 19, 23,
                                                      27, 31, 34, 38, 42, 46,
                                                      49, 53, 57, 61, 64, 68,
                                                      72, 76, 79, 83, 87, 91,
                                                      94, 98, 102, 106, 110],
                                        'max_features': ['auto', 'sqrt'],
                                        'min_samples_leaf': [1, 2, 4, 10, 20,
                                                             50],
                                        'min_samples_split': [2, 5, 10, 100]},
                   random_state=42, scoring='roc_auc')
```

```
best_params = model.best_params_
best_params
```

```
{'min_samples_split': 10,
 'min_samples_leaf': 20,
 'max_features': 'sqrt',
 'max_depth': 23}
```

Cross Validation



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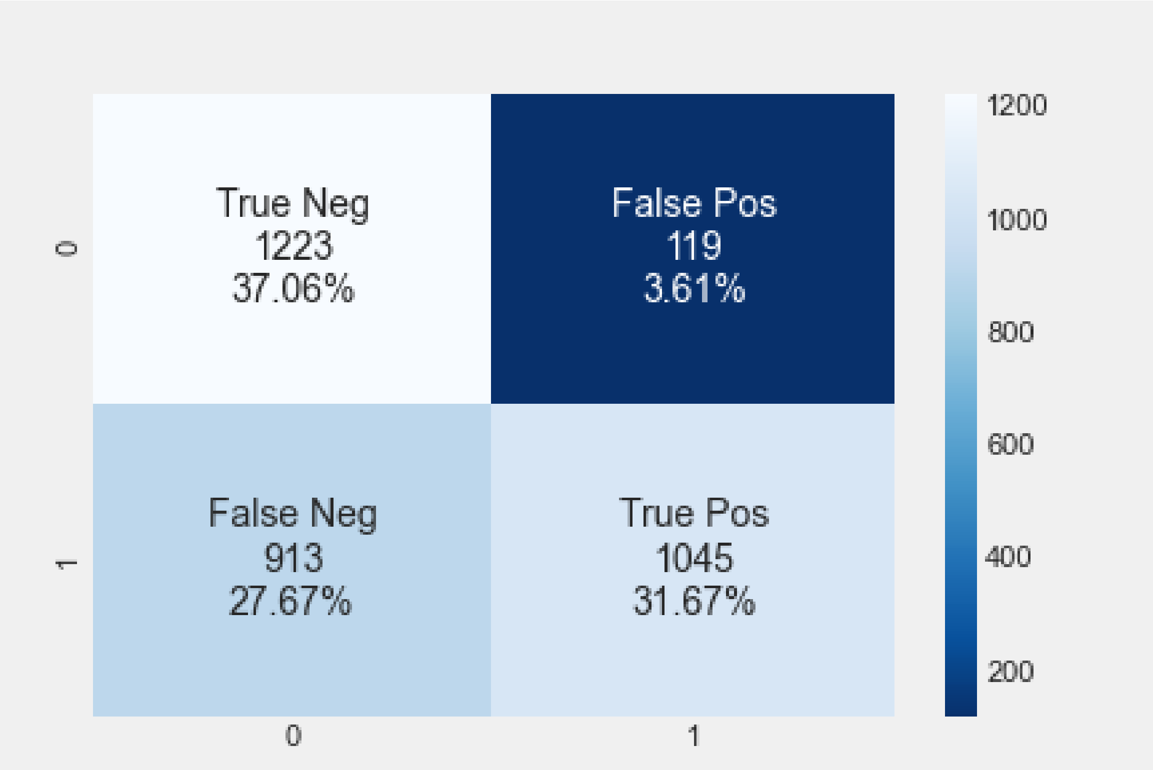
Confussion Matrics



Decision Tree Classifier

AUC : 712%