

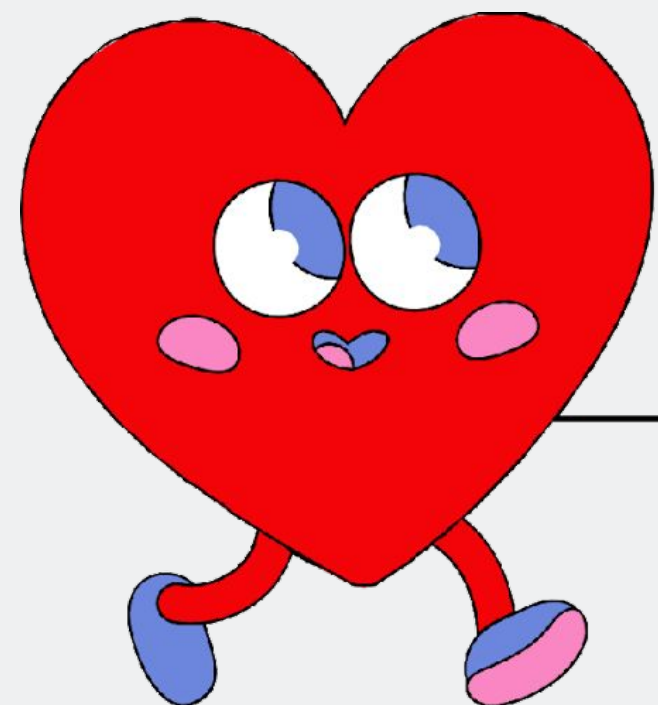


Welcome



← → 🔍 Rakamin - Data Science - Batch 22

Final Project: Marketing Campaign



Bulletproof Scouts (Group 5)



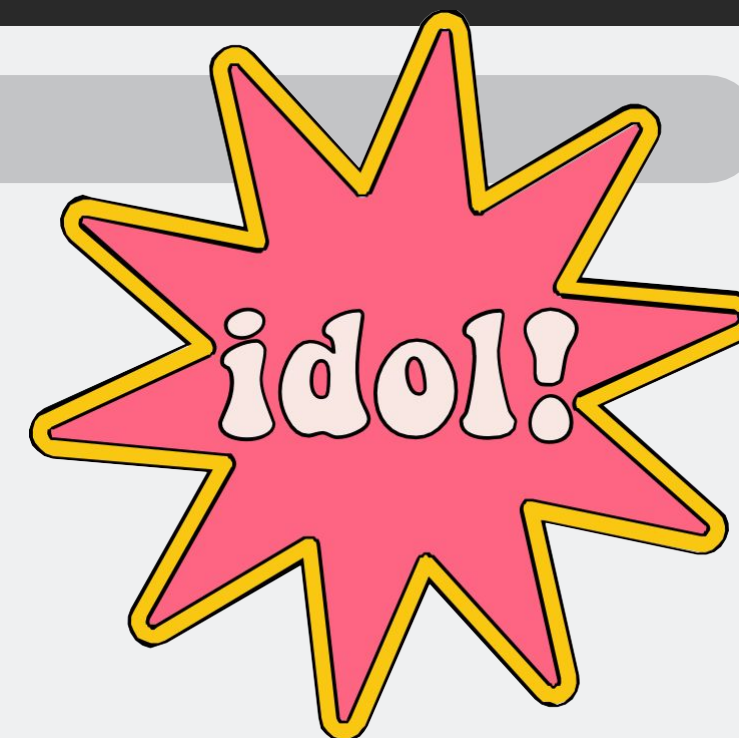
Welcome

Hello!



← → 🔍 Team Members

Group 5



Adam

Mentor



Radifan

Leader / EDA



Afrian

Data
Pre-Processing



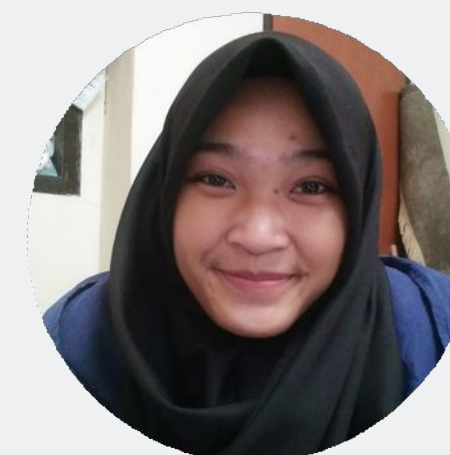
Naufal

Modelling &
Evaluation



Humairah

Background &
Model Impact



April

Business Insight



Hesti

Modelling &
Evaluation



Welcome

Hello!



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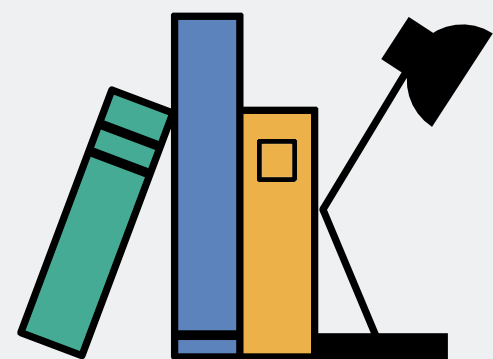


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Background
EDA (Exploratory Data Analysis)
Data Pre-Processing
Modelling and Evaluation
Business Recommendation



Welcome

Hello!

Background



← → 🔍 External Resources

Background

- Rata-rata perusahaan menghabiskan 4 - 11,2% dari *revenue* untuk marketing.
- Marketing yang tidak efektif dapat menyebabkan kerugian bagi perusahaan.
- PT. BTS hanya memiliki 15% *acceptance rate*.

(Source: Hook Agency; Brafton/Gardner CMO)





Welcome

Hello!

Background



← → 🔍 Goal, Objective, & Metrics

Background



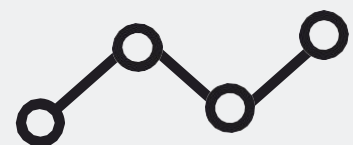
Goal

Meningkatkan *revenue* perusahaan melalui peningkatan jumlah respon pada campaign.



Objective

- Memprediksi respon customer terhadap *campaign* selanjutnya.
- Mencari faktor yang berkaitan dengan kesuksesan *campaign*.



Business Metrics

ROI



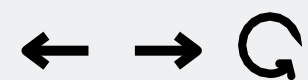


Welcome

Hello!

Background

EDA



Data Understanding



Exploratory Data Analysis





Welcome

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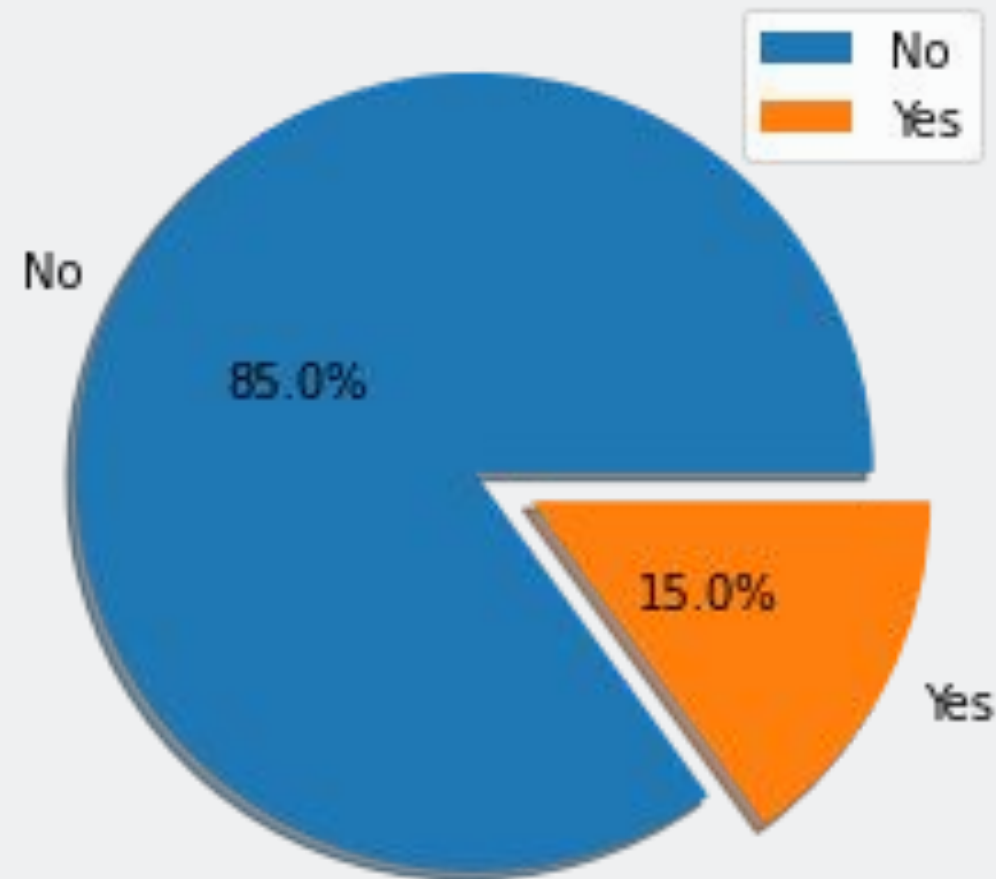
Background

EDA



← → 🔍 Data Understanding

EDA (Exploratory Data Analysis)



Data Understanding

- Sebaran data target 'Response', 85% yang 'No' dan hanya 15% untuk 'Yes'.
- Akan dilakukan *handling class imbalance* ketika *split data train* dan *test*.





Welcome

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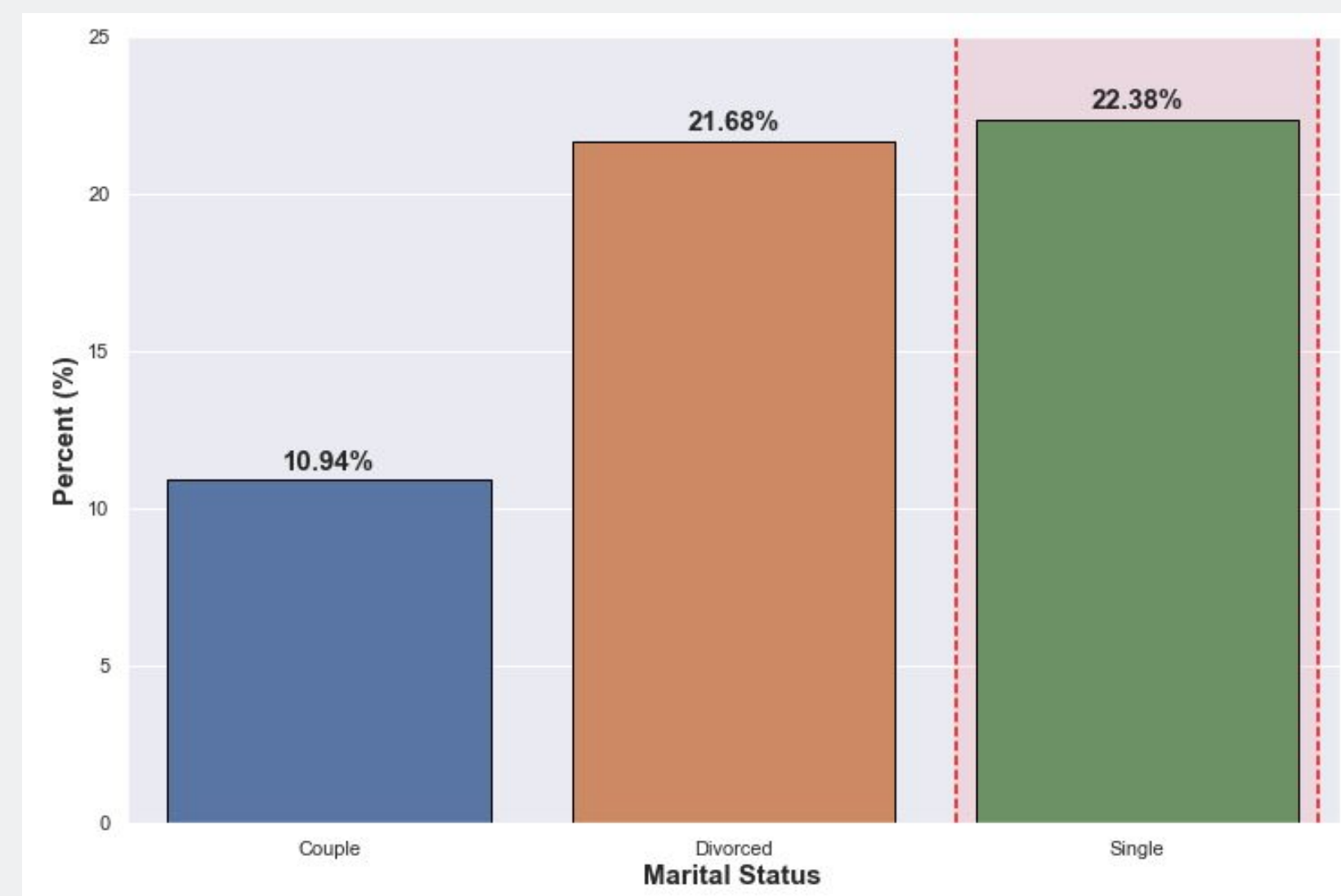
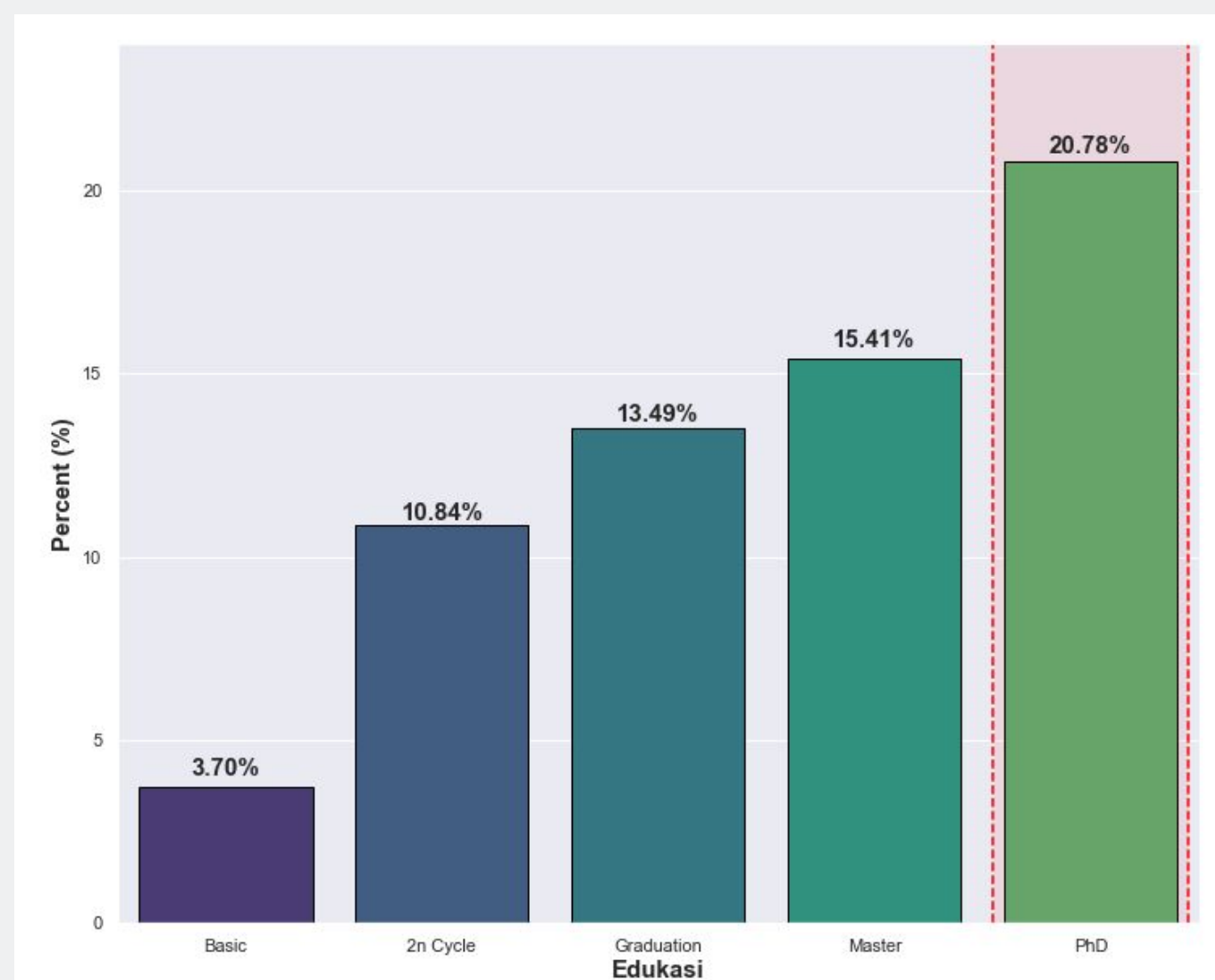
Background

EDA



← → ↺ 🔍 Data Understanding

EDA (Exploratory Data Analysis)



Rasio customer yang merespon terhadap campaign berdasarkan kategori **`Education`** dan **`Marital_Status`**



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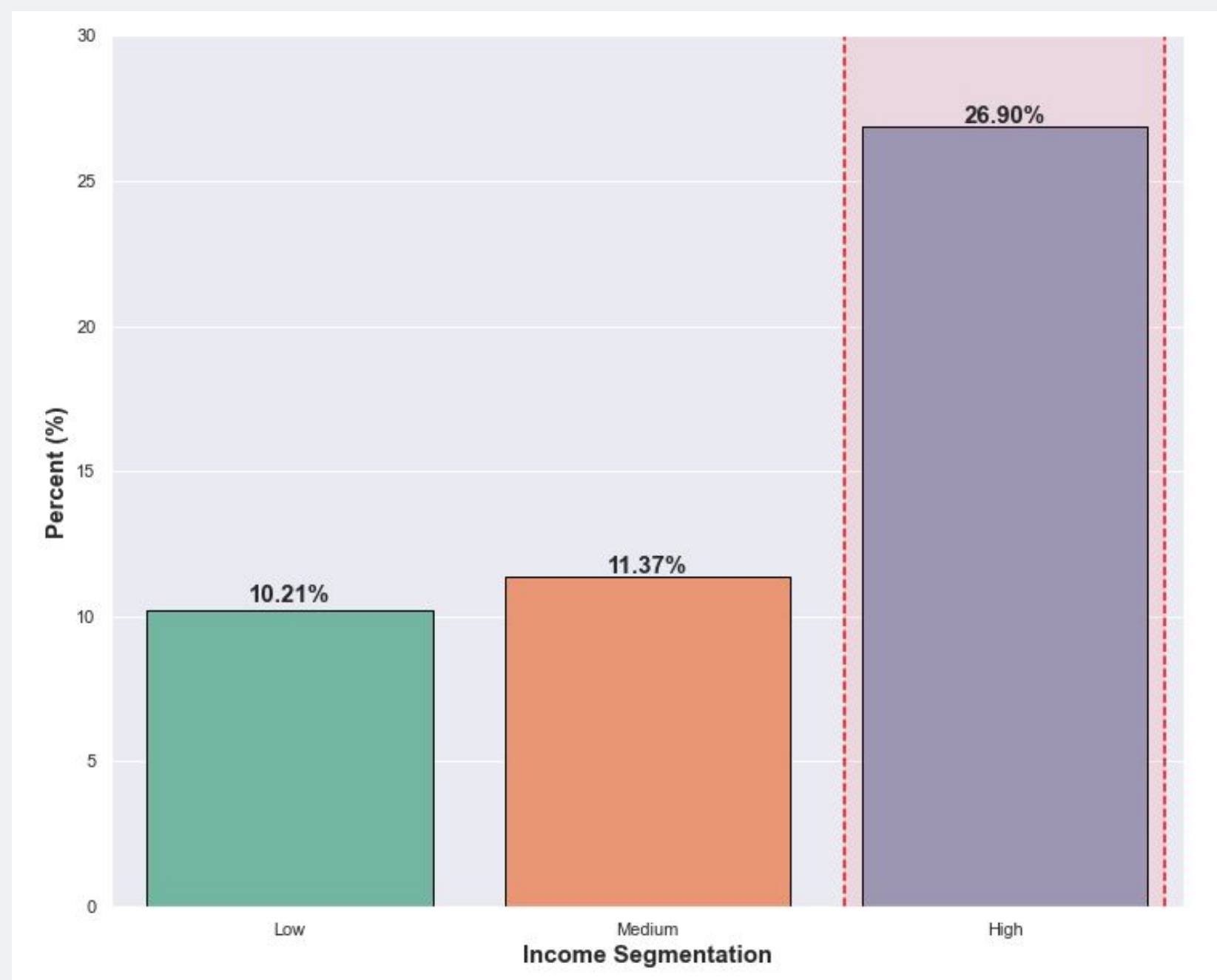
Background

EDA



← → ↺ 🔍 Data Understanding

EDA (Exploratory Data Analysis)



Pembagian segmentasi income berdasarkan Q3, apabila lebih dari Q3 maka dia 'High', dan kurang dari Q1 maka dia 'Low'





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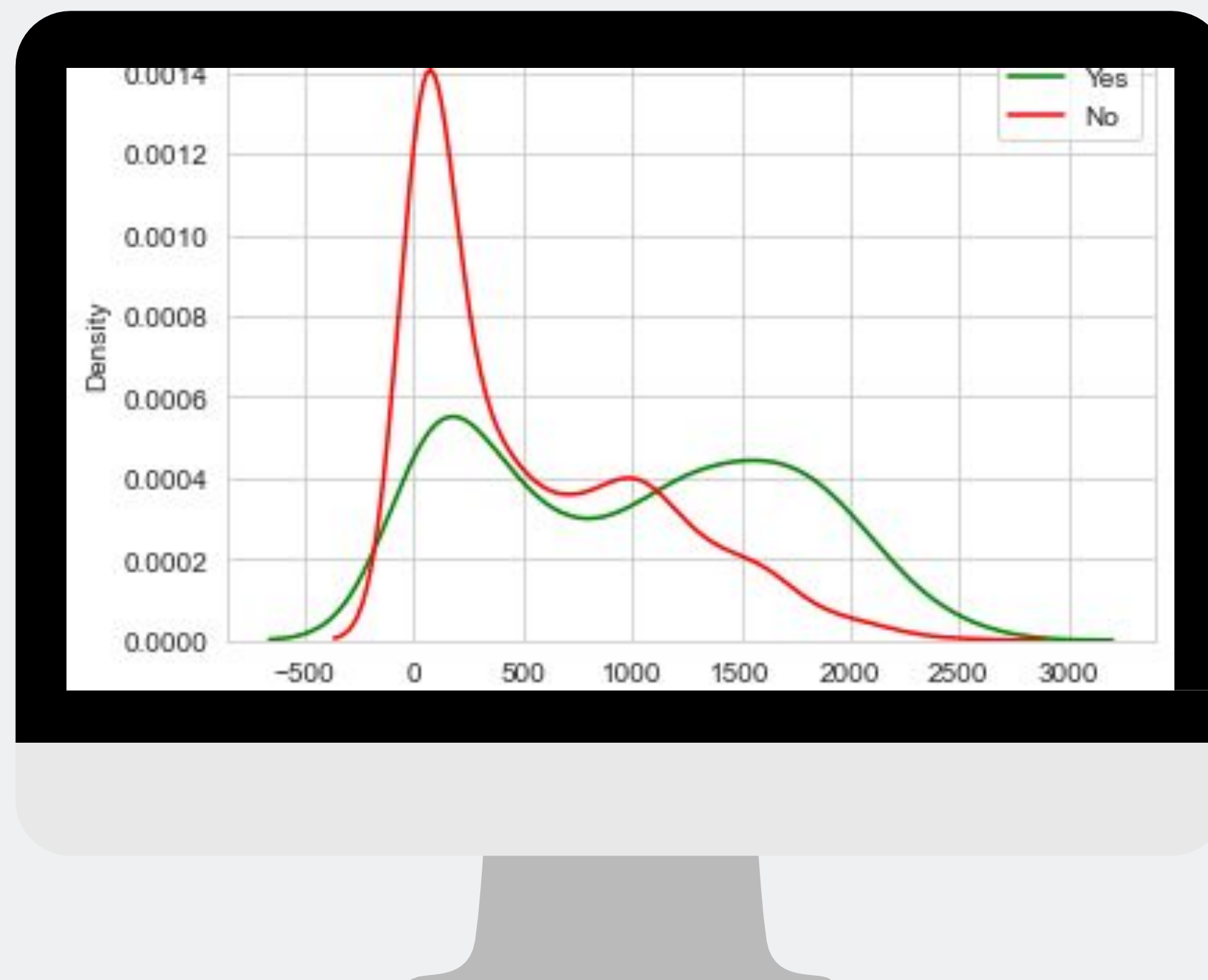
EDA



← → 🔍 Data Understanding

EDA (Exploratory Data Analysis)

Total spent yang customer keluarkan untuk pembelian semua produk.





Welcome

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Background

EDA

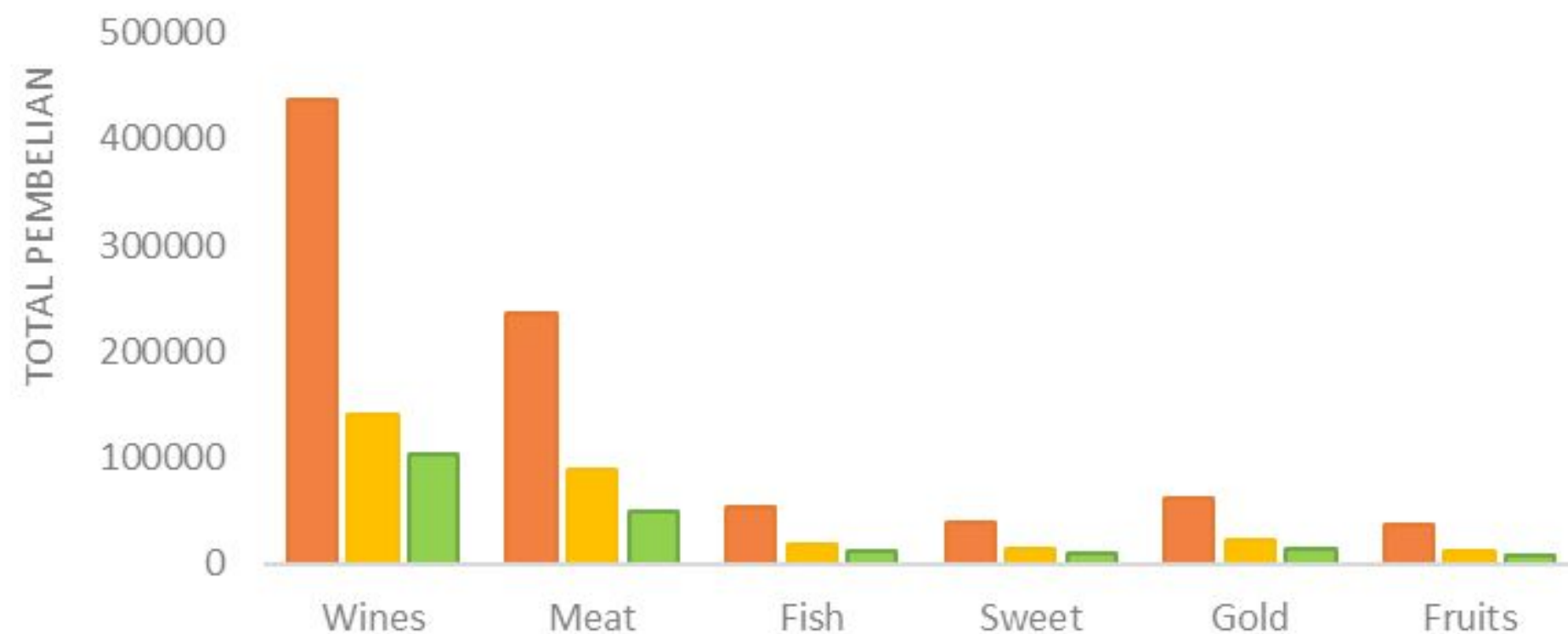


← → 🔍 Data Understanding

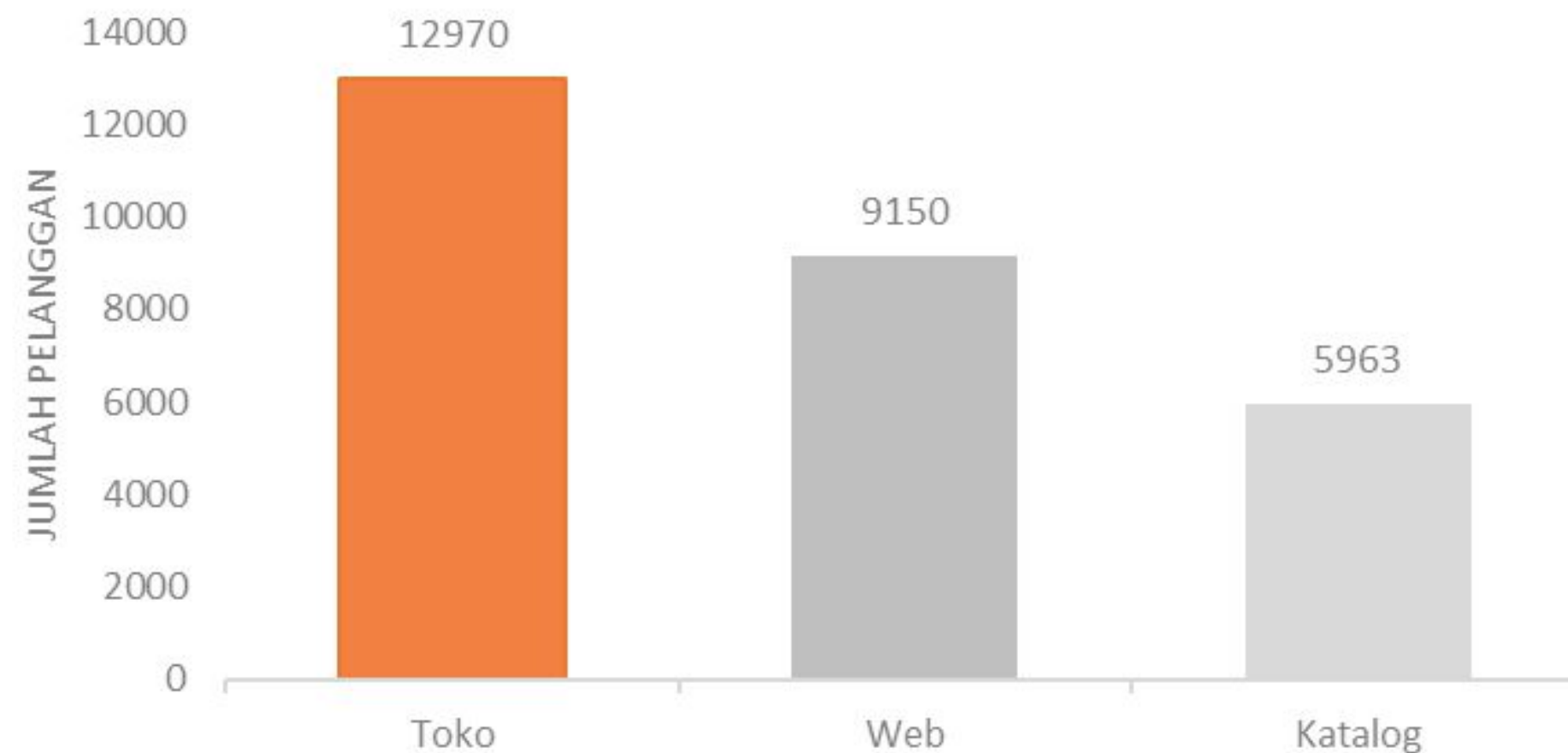
EDA (Exploratory Data Analysis)

TOTAL PEMBELIAN PRODUK
BERDASARKAN STATUS PERNIKAHAN

Couple Single Divorced



JUMLAH PELANGGAN
BERDASARKAN TEMPAT PEMBELIAN





Welcome

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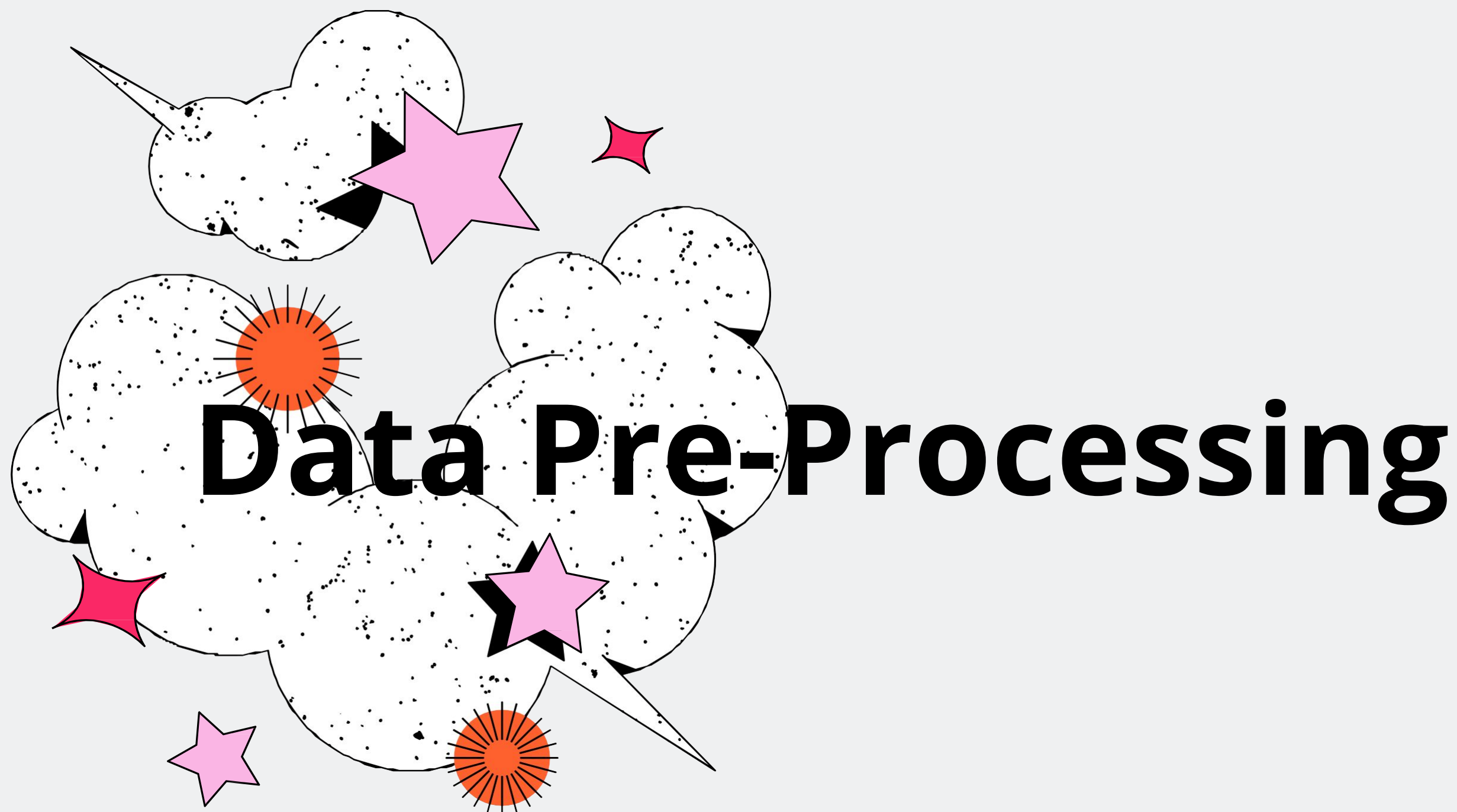
Background

EDA

Pre-Processing



← → ↺ 🔍 Data Pre-Processing





Data Pre-Processing



| Variable | Data Type |
|----------------|-----------|
| Response | int64 |
| ID | int64 |
| Year_Birth | int64 |
| Education | Object |
| Marital_Status | Object |
| Income | Float64 |
| Kidhome | int64 |
| Teenhome | int64 |
| Dt_Customer | Object |
| Recency | int64 |
| MntWines | int64 |

| Variable | Data Type |
|---------------------|-----------|
| MntFruits | int64 |
| MntMeatProducts | int64 |
| MntFishProducts | int64 |
| MntSweetProducts | int64 |
| MntGoldProducts | int64 |
| NumDealPurchases | int64 |
| NumWebPurchases | int64 |
| NumCatalogPurchases | int64 |
| NumStorePurchases | int64 |
| NumWebVisitsMonth | int64 |
| AcceptedCmp1 | int64 |

| Variable | Data Type |
|---------------|-----------|
| AcceptedCmp2 | int64 |
| AcceptedCmp3 | int64 |
| AcceptedCmp4 | int64 |
| AcceptedCmp5 | int64 |
| Complain | int64 |
| Z_CostContact | int64 |
| Z_Revenue | int64 |

Total Columns : 29

Total Rows : 2240



Welcome

Hello!

Background

EDA

Pre-Processing



← → 🔍 Data Pre-Processing

Data Pre-Processing



HANDLING MISSING
VALUE

Drop 26 Rows

HANDLING
DUPLICATED DATA

0 Duplicated Data

FEATURE ENCODING

- a. Label Encoding : [Education], [Has Child], [Segmentasi]
- b. One Hot Encoding : [Marital Status]

TRAIN - TEST SPLIT

Data train : 70% (1551 rows)
Data test : 30%(665 rows)

FEATURE SELECTION

- a. Drop Irrelevant Features
- b. Feature Importances

HANDLING IMBALANCE
TARGET

SMOTE 50%



Welcome

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EDA

Pre-
Processing

Modelling



← → ↺ 🔍 Modelling & Evaluation



Modelling and Evaluation





Welcome

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Modelling



← → ↺ 🔍 Feature & Model

Feature

- Education
- Marital_Status
- Income
- Recency
- MntWines
- MntFruits
- MntMeatProducts
- MntFishProducts
- MntGoldProds
- NumDealsPurchases
- NumCatalogPurchases
- NumStorePurchases
- NumWebVisitsMonth

- AcceptedCmp1
- AcceptedCmp2
- AcceptedCmp3
- AcceptedCmp4
- AcceptedCmp5
- Complain
- month_Customer
- Spending
- Total_Cmp
- Has_child
- Segmentasi
- MS_couple
- MS_Divorced
- MS_single

Model

- KNN
- Logistic
- Regression
- Decision Tree
- Random Forest
- AdaBoost
- XGBoost

Target

Response





Welcome

Hello!

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EDA

Pre-
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Modelling



Modeling

70 %

Train Data

30 %

Test Data

Hyperparameter Tuning

Best n_estimators: 1500

Best learning_rate: 0.05831

Best algorithm: SAMME.R

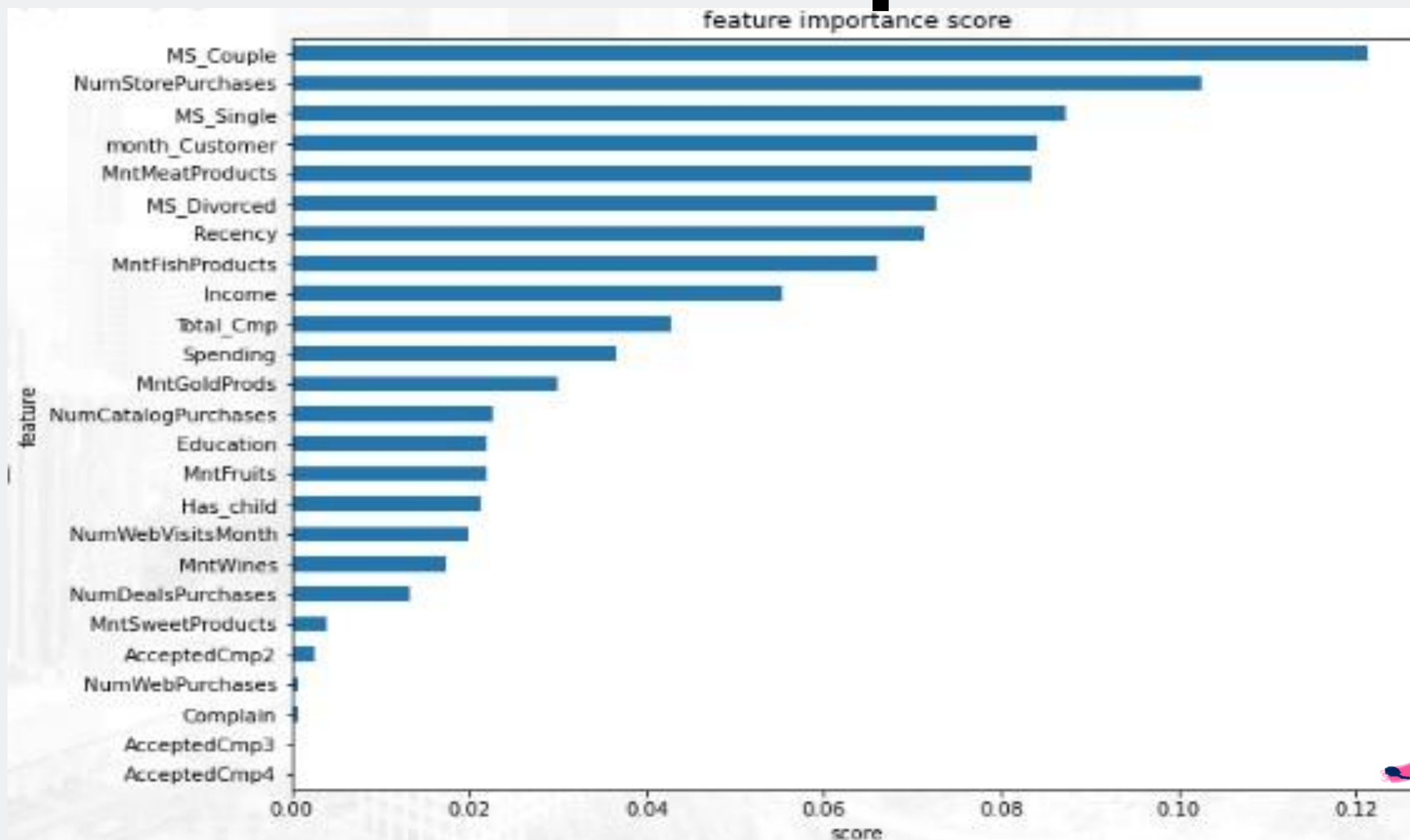
Scoring : AUC



| JENIS MODEL | Accuracy | Precision | Recall | F1-Score | AUC |
|---------------------|----------|-----------|--------|----------|-----|
| KNN | 84% | 43% | 42% | 43% | 76% |
| LOGISTIC REGRESSION | 83% | 40% | 36% | 38% | 77% |
| DECISION TREE | 82% | 42% | 60% | 50% | 81% |
| RANDOM FOREST | 90% | 68% | 59% | 63% | 92% |
| ADABOOST | 91% | 69% | 65% | 67% | 94% |
| XGBOOST | 88% | 59% | 55% | 57% | 92% |

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Feature Importance



Top 5 Features:

- MS_Couple
- NumStorePurchases
- MS_Single
- month_Customer
- MntMeatProducts





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Feature Selection

Feature NumDealsPurchases, MntSweetProducts, AcceptedCmp2, NumWebPurchases, Complain, AcceptedCmp3 & AcceptedCmp4 di drop, kemudian iterasi model dengan best parameter model.

| Metrics | Tuned AdaBoost (%) |
|-----------|--------------------|
| Accuracy | 90% |
| Precision | 65% |
| Recall | 65% |
| F1-Score | 65% |
| AUC | 94% |





Welcome

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EDA

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Modelling Insight



← → 🔍 Business Insight & Reccomendations

Bussiness Insight and Recommendation





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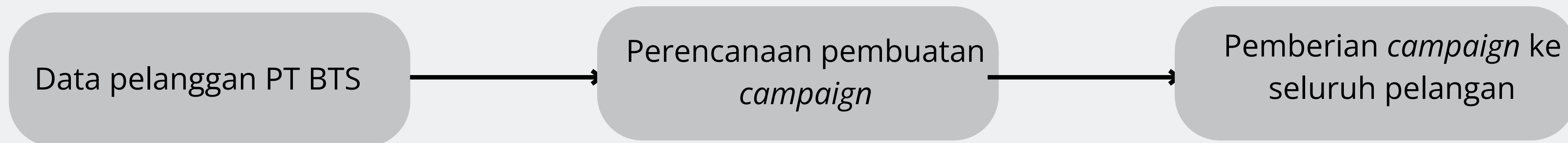
Modelling

Insight

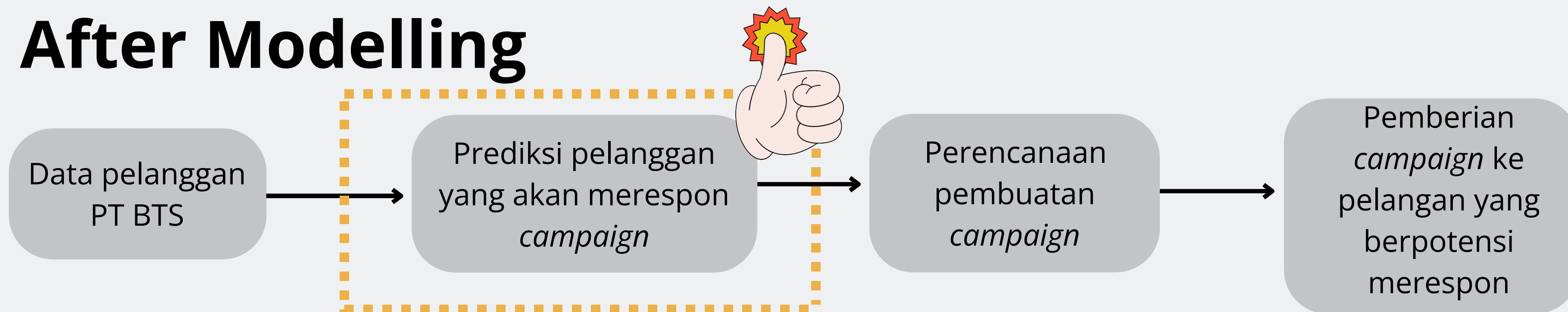


← → 🔍 Model Application Flow

Before Modelling



After Modelling



Machine Learning



Welcome

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← → 🔍 Business Recommendation

Business Recommendation



Memberikan diskon *wine*



Memberikan *flyer* berisi penawaran diskon *special wine* kepada pelanggan yang datang ke *store*.



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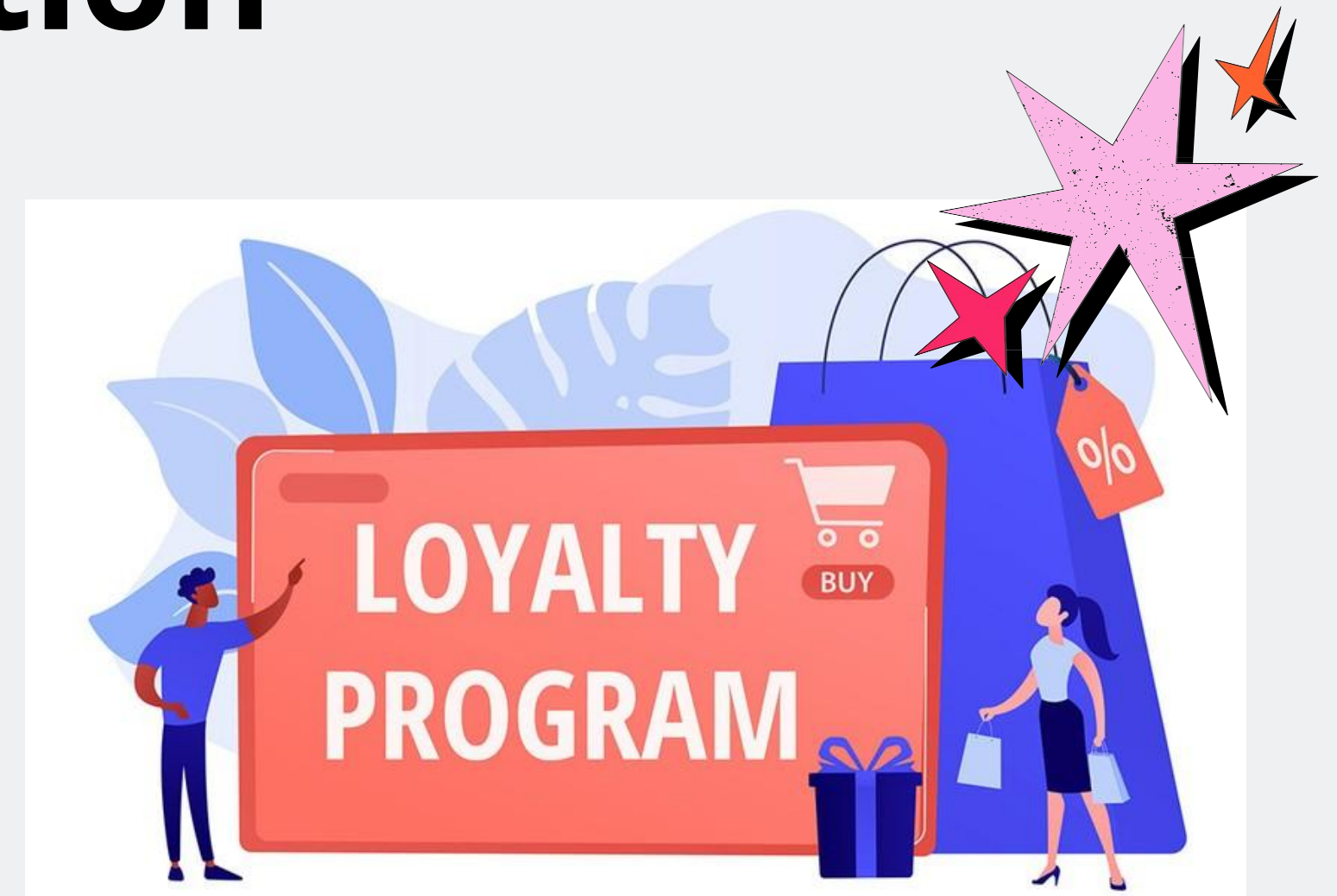


← → ↺ 🔍 Business Recommendation

Business Recommendation



Penawaran paket bundling daging dengan produk lain



Pembuatan program 'loyalty reward' berdasarkan lama keanggotaan dan total belanja



Welcome

Hello!

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EDA

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← → ↺ 🔍 Marketing Cost

*Kurs USD to IDR per 5/8/2022 = 14,948.10

Marketing Cost

Total Pendapatan secara Keseluruhan
Total penjualan produk \$1.356.988,00

Rata-rata Pendapatan per *Campaign*
Total pendapatan / Jumlah campaign (=6) \$226.164,67

Rata-rata Pendapatan per *Customer*
Total pendapatan / Jumlah *customer* (=2240) \$100,97

Marketing Cost per Customer \$10,09

Asumsi 10% dari Rata-rata Pendapatan per *Customer*

Marketing Cost per Campaign \$22.601,60

Marketing Cost per Customer * Jumlah Customer (=2240)





Welcome

Hello!

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EDA

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← → ↺ 🔍 Simulation

*Kurs USD to IDR per 5/8/2022 = 14,948.10

Model Impact

per Campaign

Before

15% Acceptance Rate

After

65% Acceptance Rate

ROI

50%



550%

↑ **1000,0%**

$((\text{Revenue} - \text{Marketing Cost}) / \text{Marketing Cost}) * 100$

Revenue

\$ 33,6K



\$ 145,7K

↑ **333,6%**

$\text{Pendapatan per Customer} * \text{Total Customer}$

Net Profit

\$ 11,2K



\$ 123,4K

↑ **1001,8%**

$\text{Pendapatan Campaign} - \text{Cost Campaign}$



Welcome

Hello!

Background

EDA

Pre-
Processing

Model

Insight

End



← → ↺ 🔍 Finish

Thank You!

