



SANTANDER BANK

The right products for the right customer

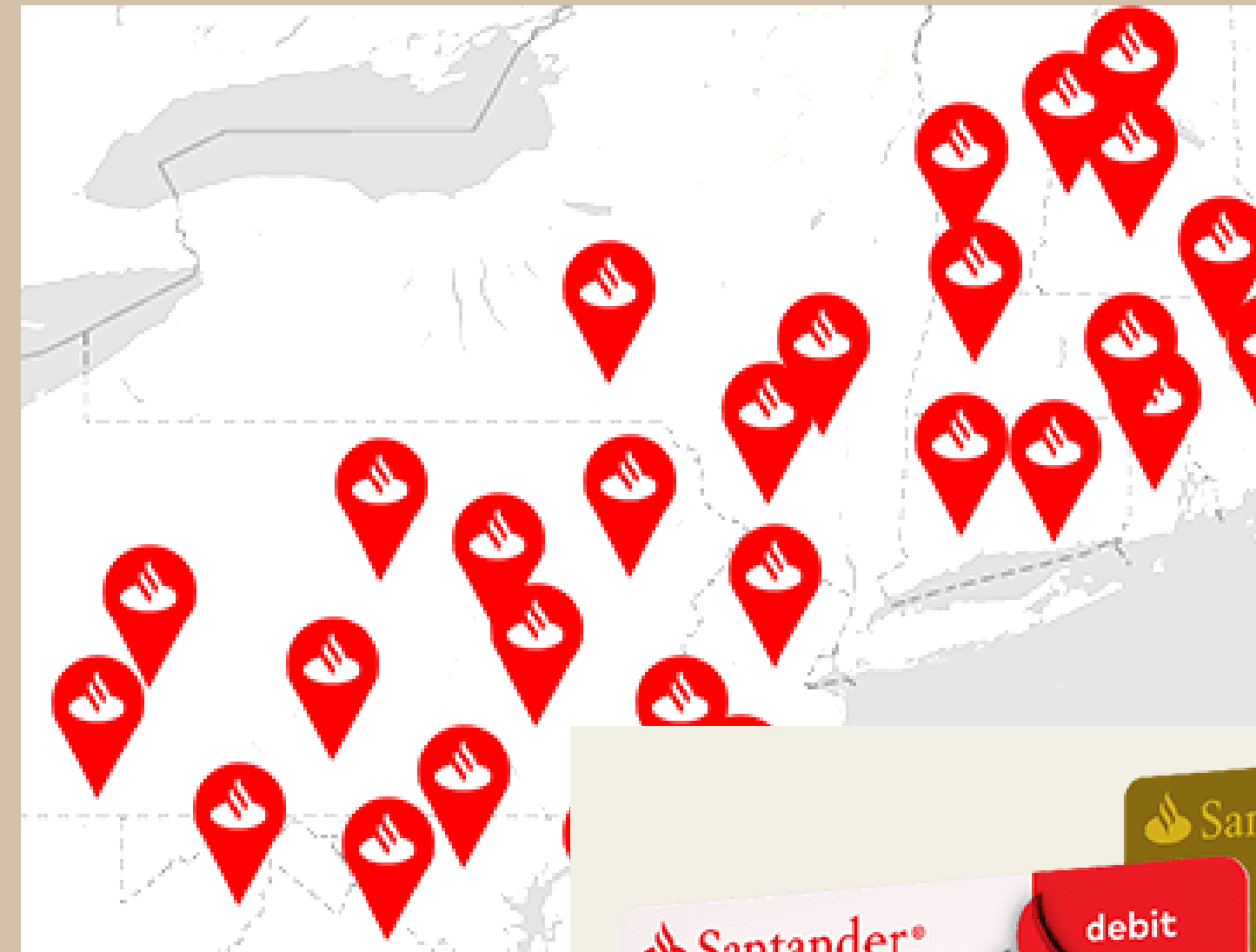
Agenda



BACKGROUND
PURPOSE
DATA ANALYSIS
MODELING
RECOMMENDATIONS
NEXT STEPS

BACKGROUND

- Started in Spain 1857 and since 2013 it has expanded to serve customers in the Northeast
- It has over 575 branches and more than 2,000 ATMs across the Northeast
- The bank has a diversified portfolio of financial products such as credit cards, mortgage, pensions, savings accounts and many others.



PURPOSE

A SMALL NUMBER OF CUSTOMERS RECIEVE
MANY RECOMMENDATIONS WHILE MANY
OTHERS RARELY SEE ANY
RECOMMENDATIONS.

FOR EACH CUSTOMER RECOMMEND THE TOP 7 PRODUCTS THAT THEY ARE MORE LIKELY TO PURCHASE

Saving Account, Guarantees, Current Account, Derivada Account, Payroll Account, Junior Account, More Popular Account, Particular Account, Particular Plus Account, Short-term Deposits, Medium-term Deposits, Long-term Deposits, e-account, funds, mortgage, Pensions, loans, taxes, credit card, securities, home account, payroll, pensions2, direct debit

APPROACH

**Data
Analysis**

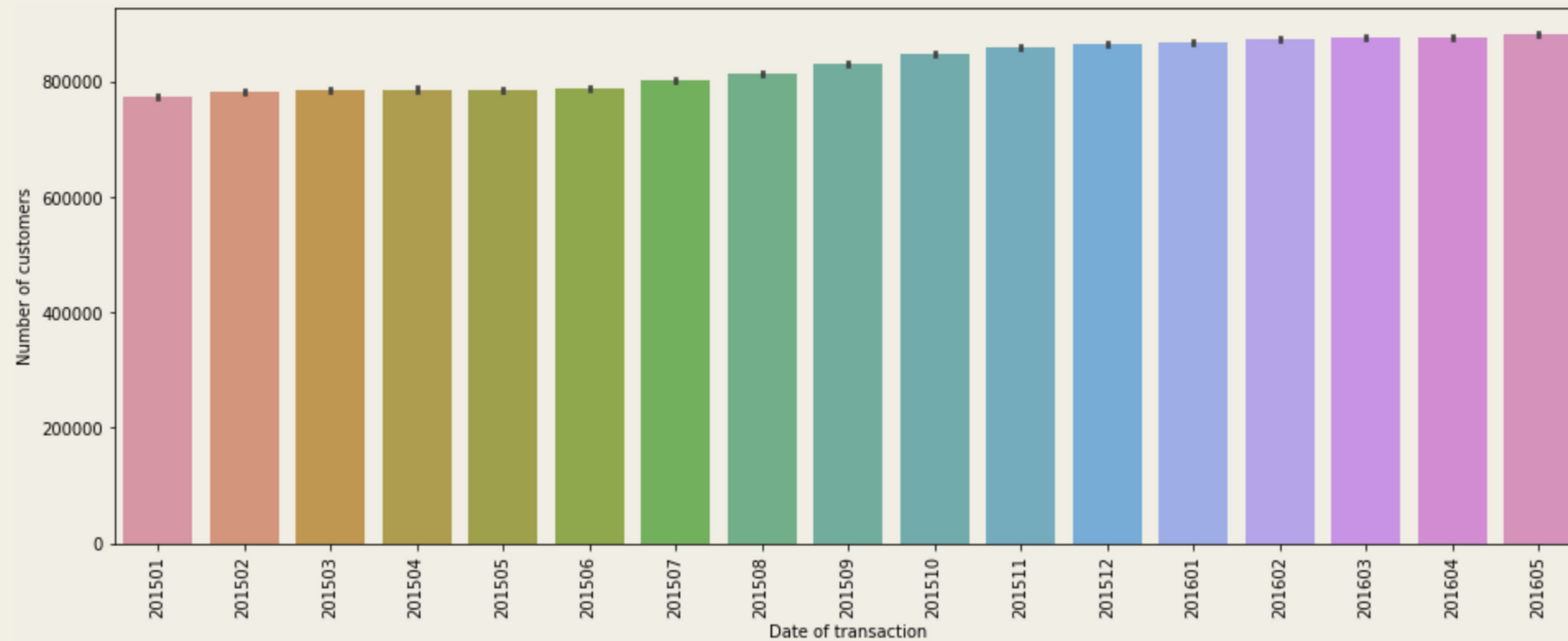
**Feature
Engineering**

Modeling

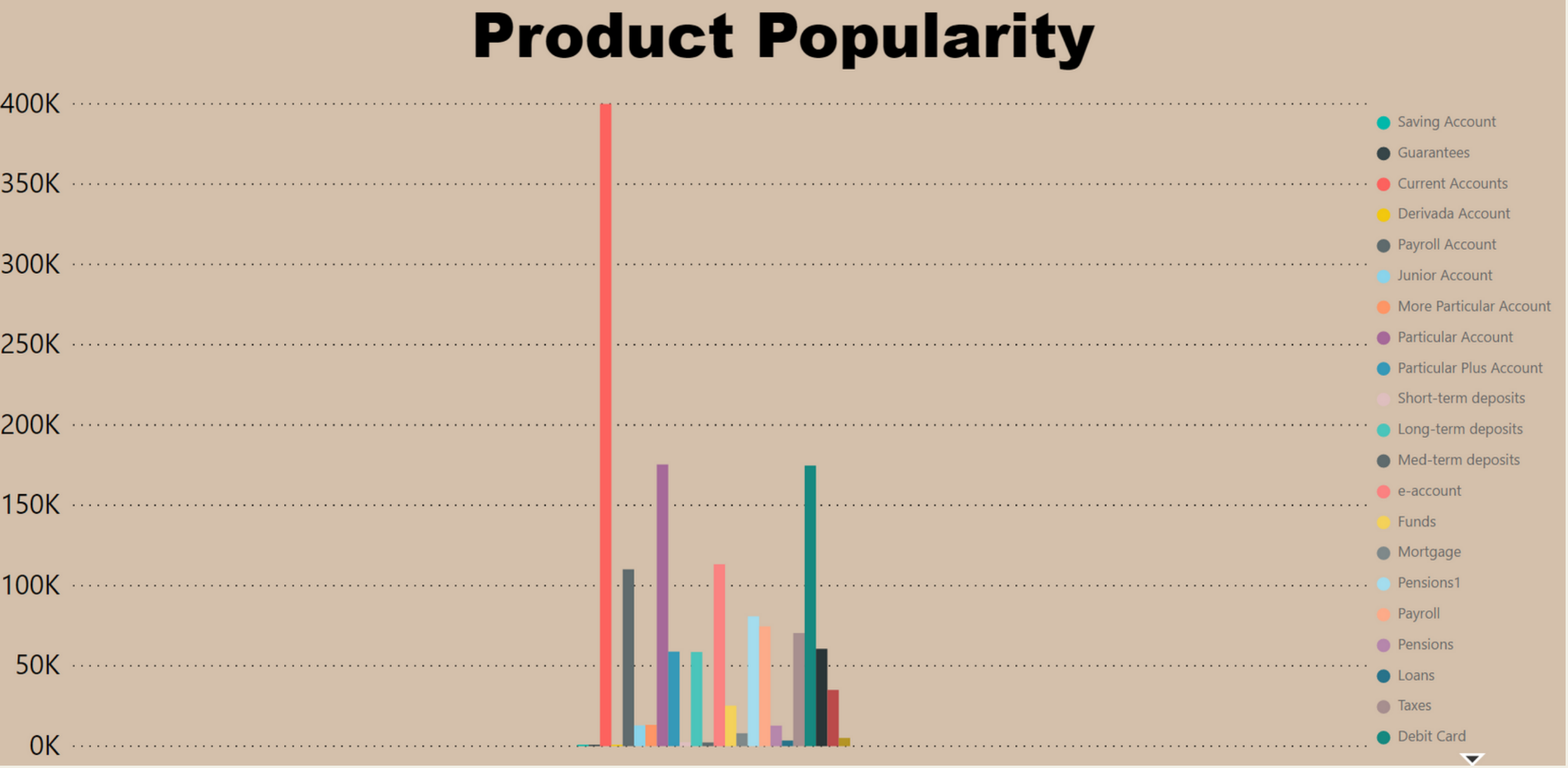
**Product
Recommendation**

Data Analysis

- 1.5 years of customer transactions
- Customer profile: age, gender, country of residency, household income



DATA ANALYSIS



FEATURE ENGINEERING

- Missing values
- Some were imputed with the most frequent value
- Others such as household income, did the average per code area

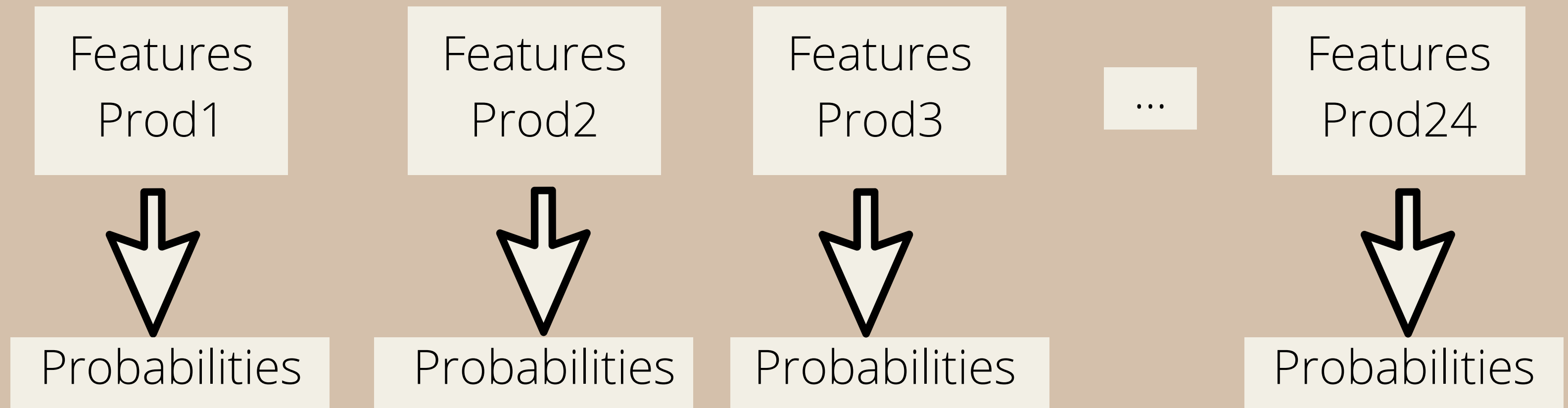


```
d.iloc[:,0:24].isnull().sum()
```

fecha_dato	0
ncodpers	0
ind_empleado	27734
pais_residencia	27734
sexo	27804
age	0
fecha_alta	27734
ind_nuevo	27734
antiguedad	0
indrel	27734
ult_fec_cli_1t	13622516
indrel_1mes	149781
tiprel_1mes	149781
indresi	27734
indext	27734
conyuemp	13645501
canal_entrada	186126
indfall	27734
tipodom	27735
cod_prov	93591
nomprov	93591
ind_actividad_cliente	27734
renta	2794375
segmento	189368

Model Training

- Features: customer profile



- XGBoost
- Rank from high to lowest
- Suggest the top that the customer does not have

SCORING

- ROC_AUC
- Depends on the product
- Some 50% while others 99%



NEXT STEPS

Use Neural Networks to see if I can get better results.

Research, more feature engineering, and see what other technologies that can be helpful.

