CatchPhish

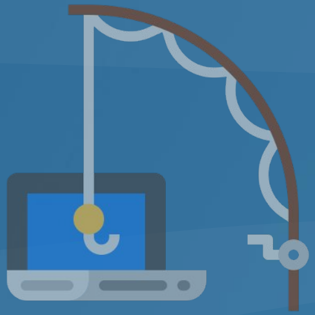
An ML Approach to URL Phishing Detection

Omar Kreidie
February 25th, 2025

The Problem

- Cybercrime is on the rise.
- Small to Medium Businesses (SMB’s) account for 43% of all cyber attacks.
- 95% of all cyber breaches are attributed to human error.

What is Phishing?



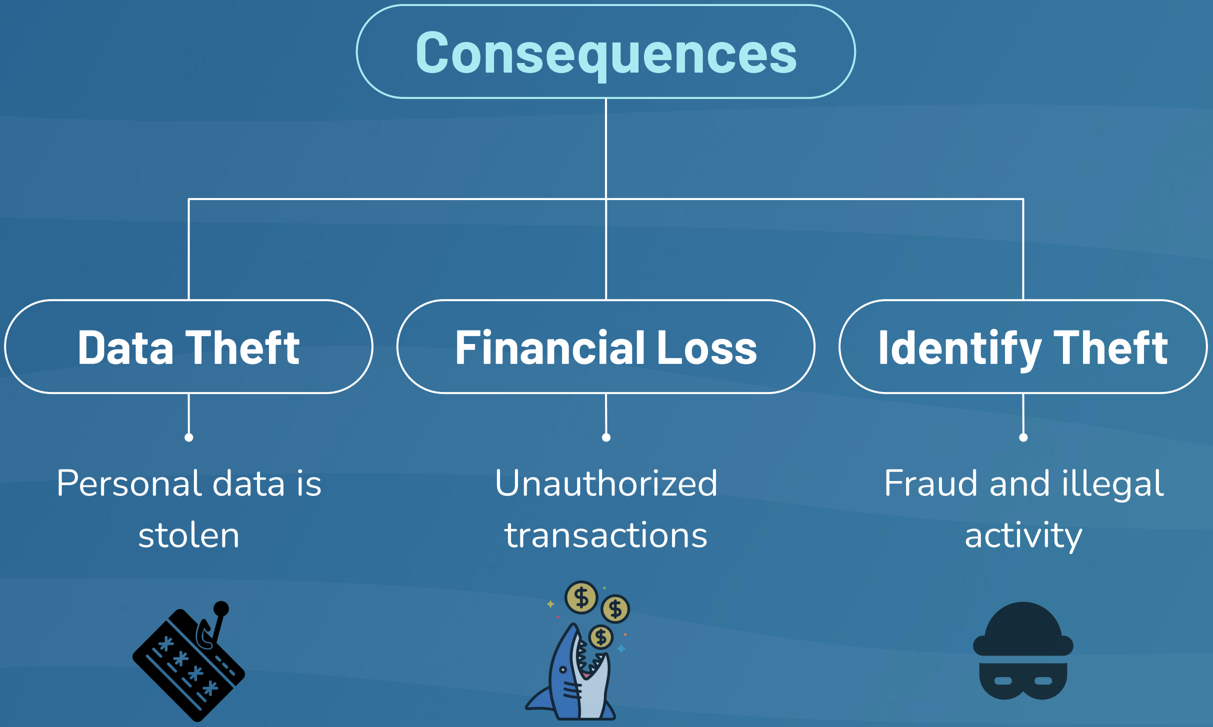
Don’t We Already Have a Solution For This?

- More layers more protection

- SMB’s struggle to adopt effective security
  - Lack of education
  - Cost
  - Optimism Bias

- SMB’s are the best phish!

Impact of a Phishing Attack



Consequences

Data Theft

Personal data is stolen

Financial Loss

Unauthorized transactions

Identify Theft

Fraud and illegal activity

The Impact of The Solution

- Financial Protection.
- Preservation of Reputation and Customer Trust.
- Reduce Downtime and Improve Productivity.

The Data Science Solution

- Relying on humans is outdated & ineffective.
- Building a model for the URL.
- The 3 Part Process
  - Data Wrangling + Preliminary EDA
  - Data Pre-processing + EDA
  - Predictive Modelling

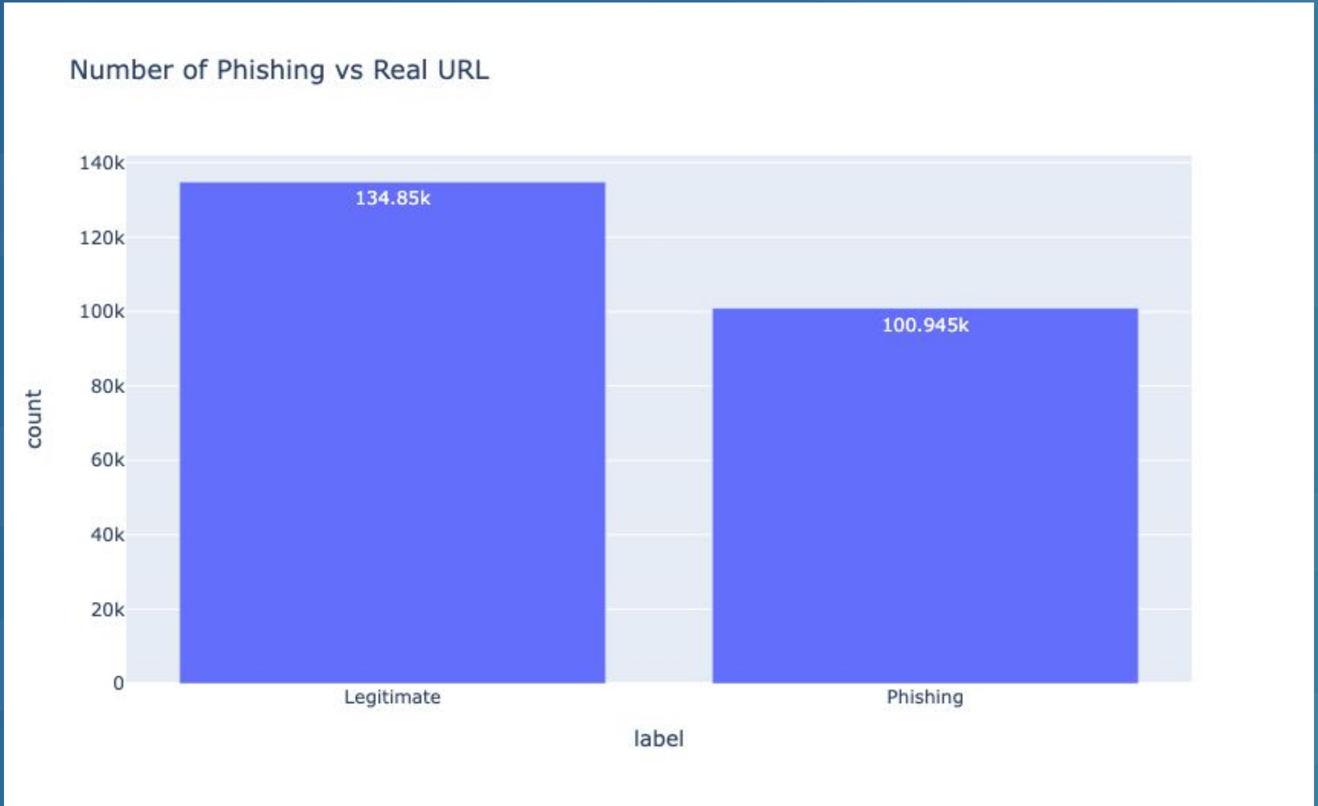
The Dataset

- Found on UCI Machine Learning Repository.
- The dataset contains 235,795 rows and 56 features.
- Data Types
    - Object
    - Int64
    - Float64

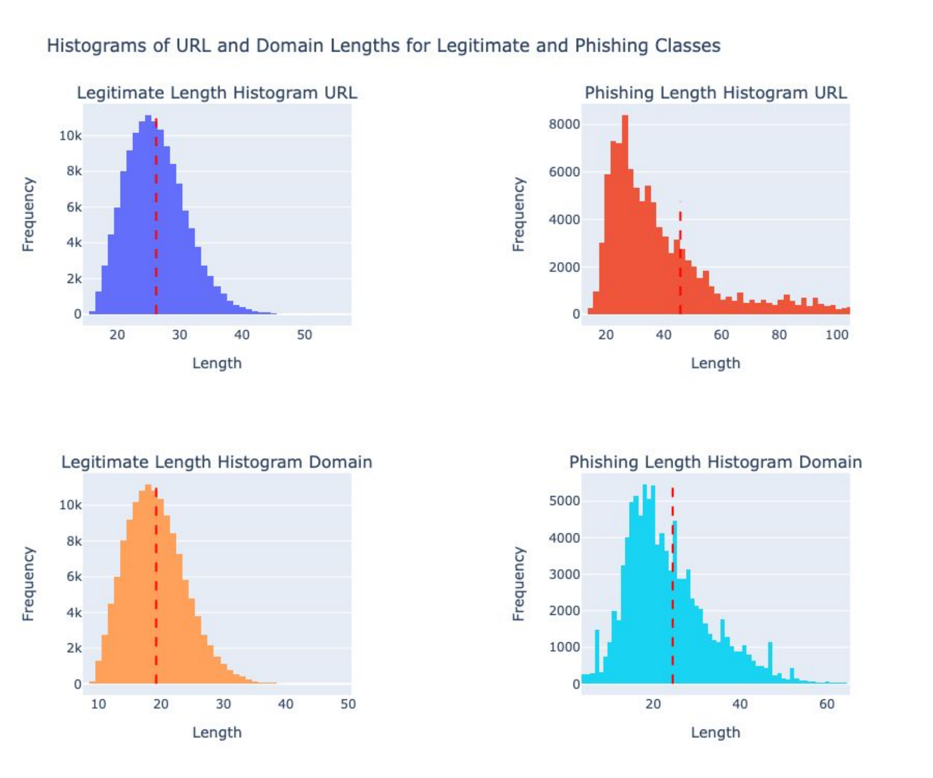
Data Cleaning & Feature Engineering

- 56 Features, 21 features where collected, 35 engineered.
- The Dataset has 0 null values & 0 duplicate values.
- Need to understand the 56 features before the full EDA.

Understanding The Data



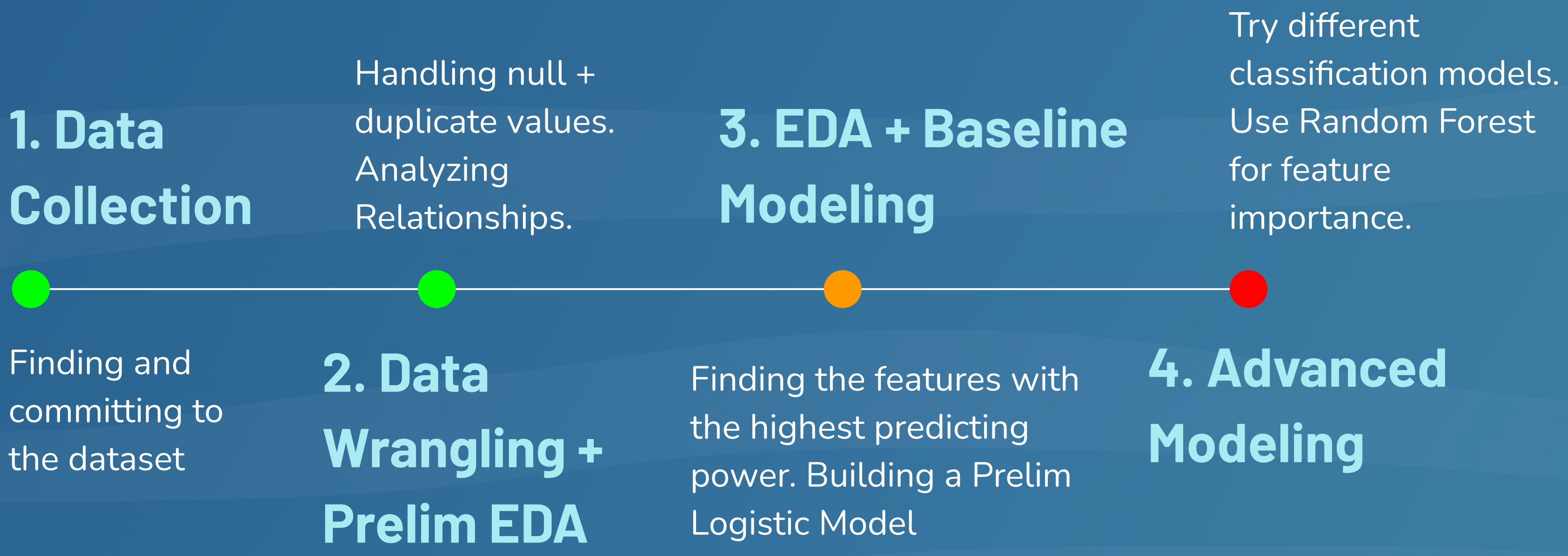
Findings from Preliminary EDA



Findings from Preliminary EDA

- Building an efficient model will be crucial.
- There will be a significant amount of collinearity
- Need to understand the 56 features before the full EDA.

What's Next?



1. Data Collection

Finding and committing to the dataset

2. Data Wrangling + Prelim EDA

Handling null + duplicate values. Analyzing Relationships.

3. EDA + Baseline Modeling

Finding the features with the highest predicting power. Building a Prelim Logistic Model

4. Advanced Modeling

Try different classification models. Use Random Forest for feature importance.

References

- [1]https://smallbiztrends.com/small-business-cybersecurity/
- [2]https://www.ibc.ca/news-insights/news/small-businesses-are-underestimating-their-cyber-risk-despite-increased-threats
- [3]https://www.forbes.com/sites/edwardsegal/2022/03/30/cyber-criminals/

Thank You