Using Decision Trees to Identify Phishing Sites

Lherisson Medina

Using Decision Trees to Identify Phishing Sites

- Every day more and more people are susceptible to phishing attempts through email and sites they may visit.
- The affects of a successful phishing attempt are long term, and can ruin an individual’s economic and social life for years.

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The New York Times

TECHNOLOGY

Hackers Hide Cyberattacks in Social Media Posts

By SHEERA FRENKEL MAY 28, 2017

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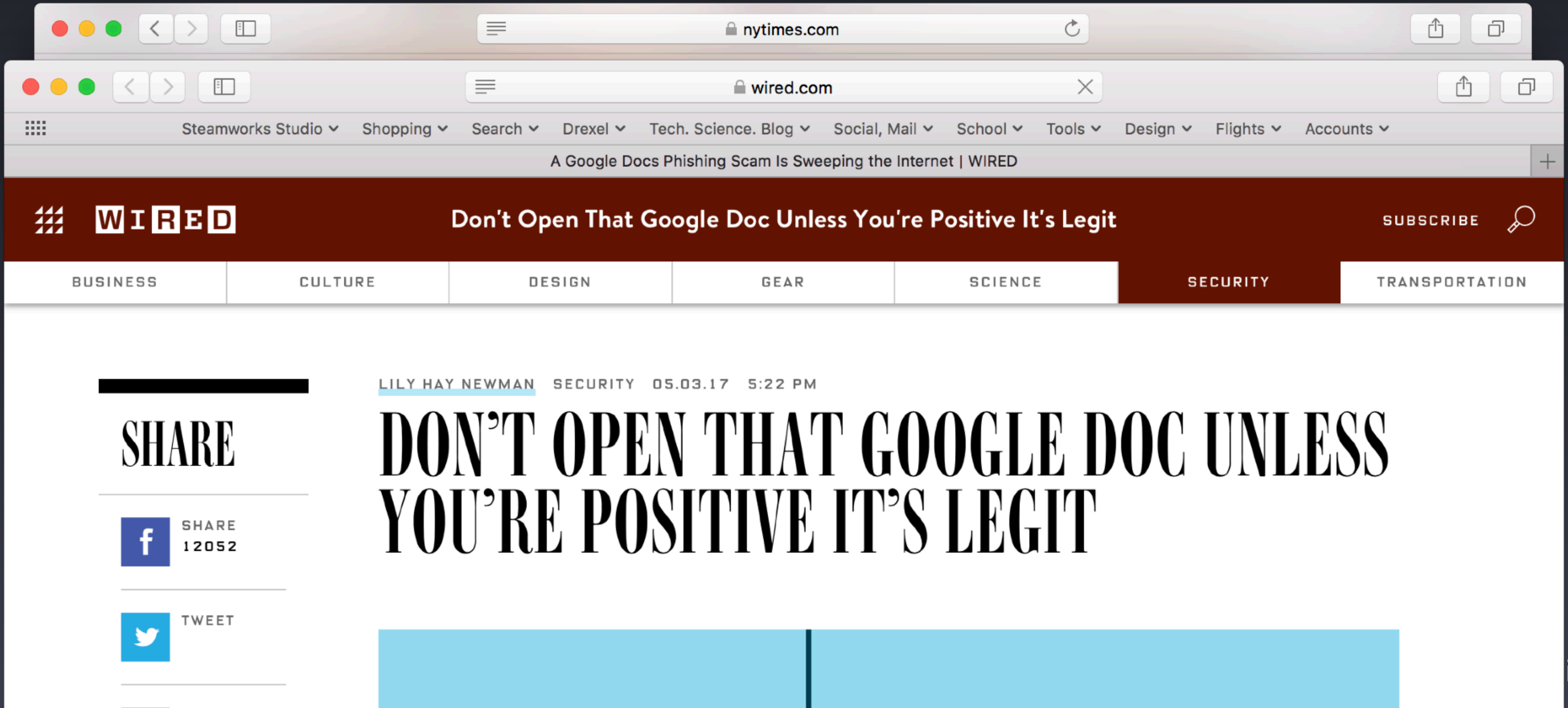
Using Decision Trees to Identify Phishing Sites

- In May, millions of Google Gmail users were hit with a sophisticated phishing attack which took all day to identify and fix
- Estimated 85% of companies are hit with phishing attacks in recent years



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LILY HAY NEWMAN SECURITY 05.03.17 5:22 PM

DON'T OPEN THAT GOOGLE DOC UNLESS YOU'RE POSITIVE IT'S LEGIT

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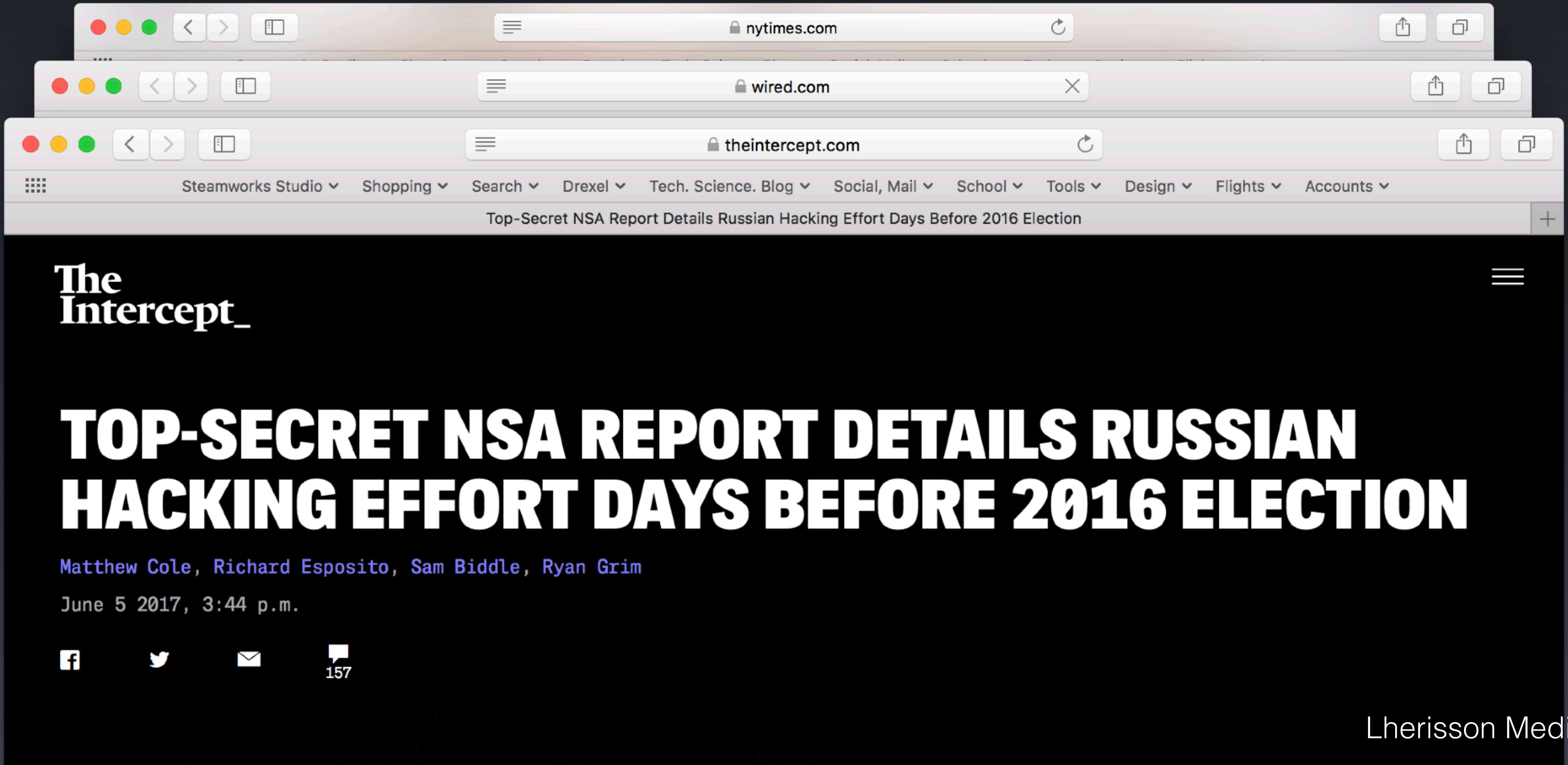
Using Decision Trees to Identify Phishing Sites

- Because of its consequences, it is important to recognize when a site may be attempting to phish data
- These sites are the subject of my term project



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TOP-SECRET NSA REPORT DETAILS RUSSIAN HACKING EFFORT DAYS BEFORE 2016 ELECTION

Matthew Cole, Richard Esposito, Sam Biddle, Ryan Grim

June 5 2017, 3:44 p.m.

Lherisson Medina

The Data

- The data was downloaded form the Machine Learning Repository at UC Irvine

- Based on attributes gathered by Auckland Institute of Studies

9 Available Features

SFH	HasPopUp	SSL	Request URL	Anchor URL
Web Traffic	URL Length	Domain Age	IP Address in URL	

- Feature values have been normalized to [-1, 0, 1] where

  -1 - Phishy
  0 - Suspicious
  1 - Legitimate

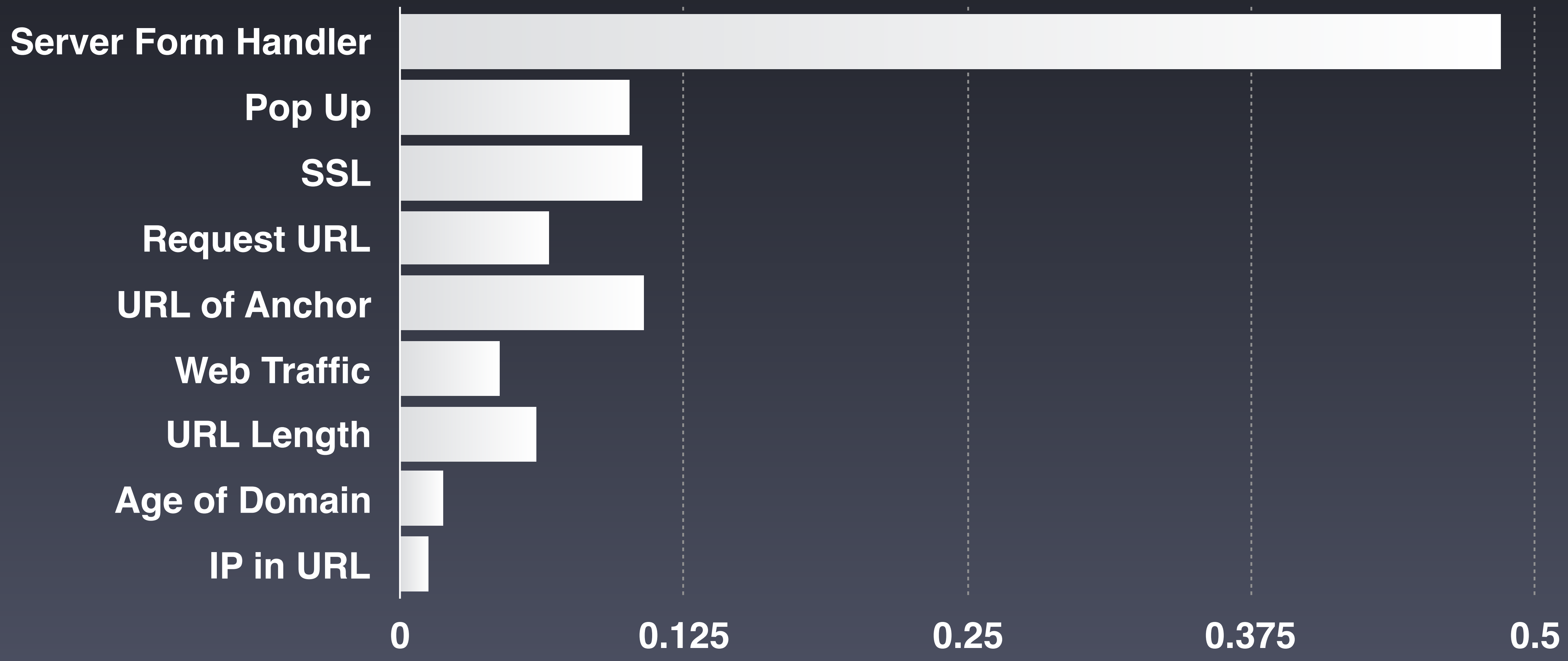
Approach

- I used a supervised learning approach
- Decision Trees used to create a predictive model based on the data
- Out of 1,353 Data Points, a random 25% used as test size
    - 75% used for training

Approach (Feature Selection)

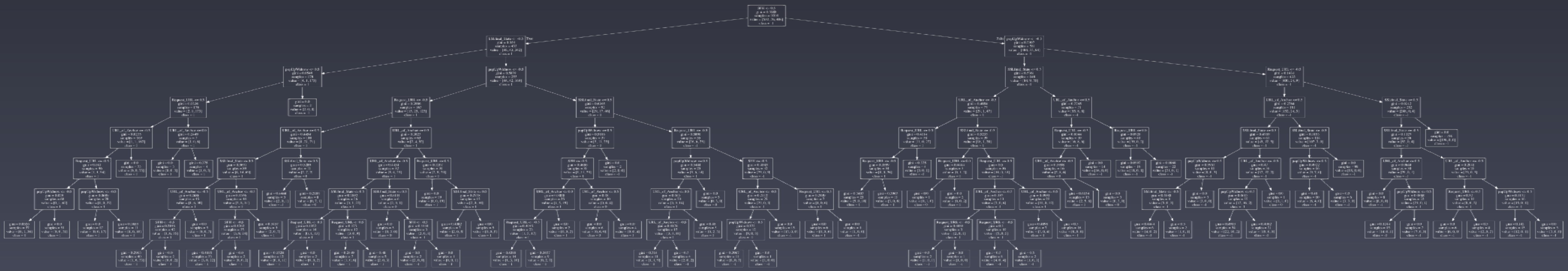
- The Server Form Handler is the most informative feature
- ‘Domain age’ and ‘IP in URL’ are the least informative

Feature Importance



Results

- With top 5 most informative features selected
  - ~87% Accuracy
- Can be improved
  - Encountered overfitting
- Regression Trees also tested



Further Work

- Classification Trees only one approach
- Consider comparing with other approaches
  - Neural Net, Nearest Neighbor, etc
- Optimize tree (Pruning?) to increase Accuracy and decrease overfitting

Similar Work

- Black-Lists and White-Lists are more generally used to track Phishing and Legitimate Sites
- Norman Sadeh et al. looked at Emails and URLs to try and classify whether they are Phishing or Legitimate using Random Forest Classifier
- May 31st Google started delaying and flagging emails having predictable patterns to Phishing emails
  - No info on Algorithm

Questions

Thank You