Disributed System for SMishing Detection

Ala' Eshmawi & Suku Nair
Department of Computer Science, Southern Methodist University

Introduction

- What is SMishing?
  - Unsolicited messages to trick the receiver into giving information to unwanted parties
  - It is a type of SMS spam (premium rate, win scams...)

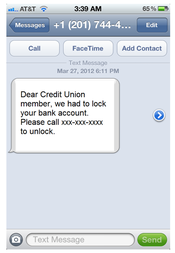

Figure : SMishing Example

- SMS spams are more prevalent than email spam
- 500% annual increase
- SMishing in particular is increasing drastically

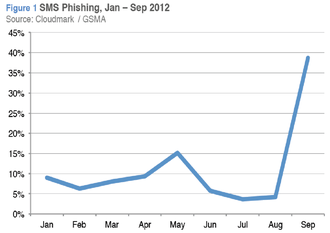

Figure : SMishing Numbers

Email vs. SMS

- How is SMS different than Emails?

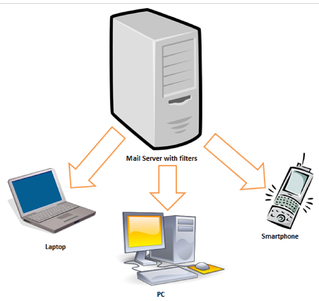

Figure : Email and SMS Path

- Less text to work with
- Scarcity of data
- Different Paths

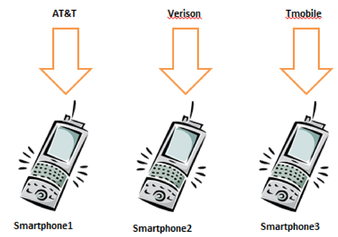

Figure : SMS Path

Spear SMishing Scenario

- A phone Directory of a certain company was exposed by phishers
- A phisher sends a message to all of the exposed cell numbers asking them to call a specific number or to visit a website
- Not like the emails where the company can block or prevent such an attack, the Smishing in this case can go undetected

The Proposed Solution

- General goal
  - To give smartphones in the company the ability to detect the ***latest*** trends of Smishing with the ***least*** amount of features and with high accuracy.
- Server side
  - Data to train the classifier with: Distance Supervision
  - Feature Selection
- Client side
  - Simple classifier with a small set of features (most important ones)

Data Used

A total of 5574 text messages tagged as ham and spam. The corpus is available from recent published work.

Table : Summary of the SMS Spam Corpus

	Ham messages	Spam messages
Count	4827	747
Percentage	86%	14%

Feature Engineering

- Term Frequencies: Bag of Words model
- Capitalized Words Ratio
- Misspelled Words Ratio
- Number of Tokens
- Part of Speech Tagging
- The presence of a phone number or a code
- The presence of a link

All of the above features except for the BoW and the number of tokens were studied in the literature. The rest of the features were introduced according to the following statistics on the spam SMS data.

Features Statistics

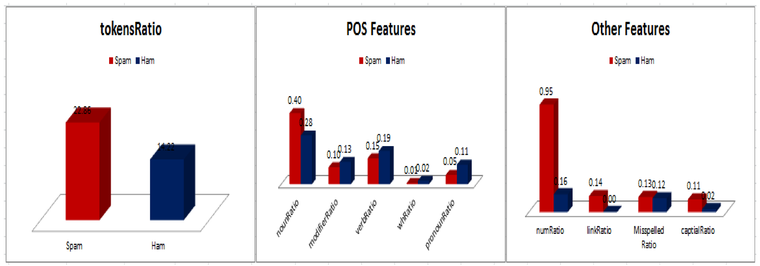

Figure : Features Statistics

Experimental Results

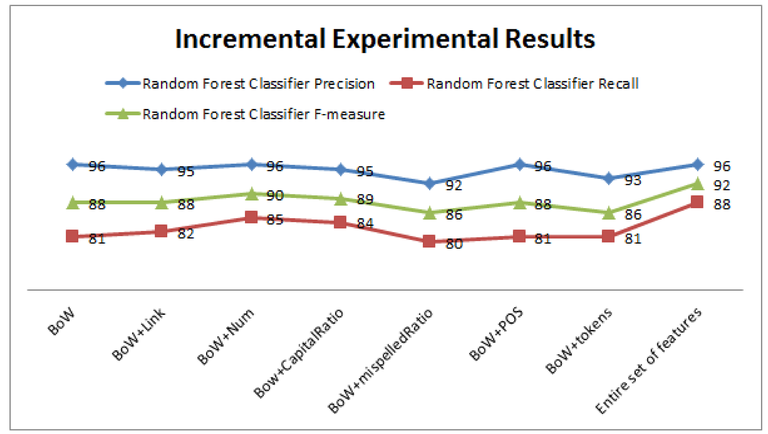

Figure : Incremental Results

As can be seen from the graph, the addition of the features did improve the results of the classification by 4%.

Feature Selection

Running the feature selection Algorithm *InfoGainAttributeEval*

Table : The Five Most Important Features

Feature	Rank
CapitalRatio	1
number	2
tokens	3
call	4
text	5

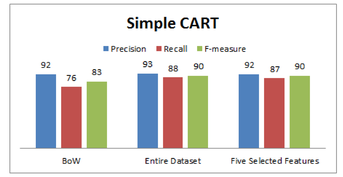

Figure : Simple CART with Different Datasets

Conclusion

- One of the main goals when designing a solution for smartphones is preserving the limited resources.
- The gain from using a light weight classifier such as CART with a small set of features in smartphones can definitely help achieving this goal.
- The server will automatically update this set of features with training on new datasets and conveying the results to clients.
- Future work is to fetch new data in the server to continue updating the set of selected features.

Southern Methodist University, Dallas, Texas
Mail: aeshmawi@smu.edu
WWW: http://faculty.smu.edu/snair