

Spam filter technique study

Yitao Jiang

CS 558 Advanced computer security

Spam

- unsolicited messages sent in bulk by email
Appending, image spam, blank spam, backscatter spam

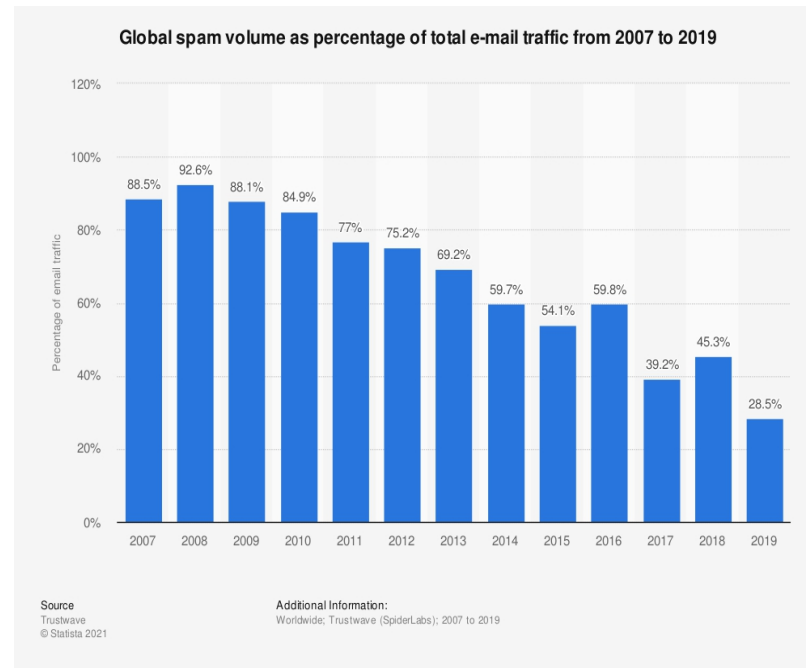


Figure 1 Global spam volume as percentage of total e-mail traffic from 2007 to 2019

How to detect spam

- Features

- sent to many people at once

- same behaviors of spammers

- spammers seldom communicate with each other

- high-frequency vocab in its content

- Goal

- build a personalized, reliable spam filter with own code

Spam detection techniques

- content-based
- network-based
- static keyword
- machine learning
- black /grey list
- social interaction-based
- reputation system

1. Clustering

2. Naive Bayes
Classifiers

3. Neural
Network

4. Firefly
Algorithm

5. Rough Set
Classifiers

6. Support
Vector machine
(SVM)
Classifiers

7. Decision Trees (NBTree,
C4.5/ J48 and Logistic Model
Trees Classifiers)

8. Ensemble
Classifiers

9. Random Forests

10. Deep Learning

Spam detection techniques

- Motivation
 - Can we combine different techniques to achieve better performance?
- Method
 - machine learning :
Extract features of email content, train a filter that can categorize future emails into two classes.
 - social network
Build a social network graph. Nodes stand for email addresses of users, edges stand for email communications. This graph provides additional information to help detecting spammers.

Implementation and Evaluation

- Implementing two or more kinds of spam filtering techniques
- Find a feasible way to combine them.
- Dataset
 - publicly available spam filter training dataset
- Evaluation Metrics
 - Accuracy
 - false positive rate
 - false negative rate
 - Performance
 - execution time
 - Compare with other tools

Related Works

- Tools
 - Spamassassin: open-source program using a variety of spam-detection techniques
 - Gmail spam filter
 - Yahoo spam filter
- Papers
 - Machine learning for email spam filtering: review, approaches and open research problems
 - MailRank: Using Ranking for Spam Detection
 - SOAP: A Social Network Aided Personalized and Effective Spam Filter to Clean Your E-mail Box