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Impact of E-mail Spam on the Economy and Legal countermeasures: Using SocNetV Analysis Tool

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Abstract: In this paper we will analyze data for a group of users of the email service using the SocNetV analysis tool. The purpose of this analysis is to know the percentage of email spam incoming to the user, the economic harm to individuals, countries and companies, and what the legal countermeasures.

Introduction

In recent years, internet commerce has been very active. Especially with the development of the speed of the Internet greatly through the technologies of optical cables and wireless Internet connections. [1] [9]

The technological development of the Internet is revealing people's emotional desires and their psychological tendencies and anticipating their reactions while using the computer and the Internet. [2].This makes it easier for merchants to display their products via the Internet in line with people's desire, sentiments and emotions.

The development of social networks using deep learning algorithms, anticipating people's desires to buy marketers' products, and publishing product advertisements and electronic stocks in social networks, greatly boosting e-commerce. [3]

The development of search engines on the Internet made it much easier for the online shopper to e-shop and e-commerce using any language that the user can be fluent in. Putting words in search engines and facilitating access to the goods and stocks offered for sale. [4]

Computer and Internet technologies are now reducing the losses of insurance companies, for example reducing traffic accidents by using techniques to detect driver fatigue and reducing accidents by more than 30%, and this is reflected in reducing the losses of insurance companies. [5] [6]

Internet of things technologies have a great impact on the development of the medical field in early detection of diseases, which led to the revitalization of the economy in the health field. [18]

The agricultural sector and the revival of agricultural technologies using the Internet of things. It directly affected the revival of the e-commerce sector. [7]

The use of the Internet of things to support e-learning has increased universities, improved universities, and solved the problem of education during the quarantine period for Covid-19. [17]

The real estate sector has recovered a lot with the development of e-commerce, with the availability of high technologies to protect people's real estate in the databases. [8]

All the economic and humanitarian benefits that we mentioned it is provided by the Internet service. But there are many problems, and the most important of these problems is E-mail Spam.

Email Spam costs billions each year. By 2010, an estimated 107 trillion pieces of spam email were being sent each year, costing around $130 billion per year in terms of lost productivity, energy costs and increased equipment cost.

A report by the UK government finds that in 2016, fraudulent emails cost citizens an estimated £10 billion, with almost 700,000 cases on cyber fraud recorded that year. The report says there could have been as many as 1.9 million incidents. [10]

Analysis Tool

Social Network Visualizer (SocNetV) is an open-source program to build a flexible and user-friendly, cross-platform tool for social network analysis, and electronic relationships between individuals and visualization, targeting primarily the social researcher. The application computes standard graph theory and network cohesion metrics, such as density, diameter, geodesic distances (shortest path lengths), clustering coefficient, walks, connectedness, eccentricity, etc. Read details in: Cohesion measures. It also offers structural statistics, such as Node and network centrality and prestige metrics, i.e. betweenness, eigenvector and closeness centrality, proximity and PageRank prestige. [11]

Dataset & Analysis

A. Dataset

The network was generated using email data from a large European research institution. For a period from October 2003 to May 2005 (18 months) we have anonymized information about all incoming and outgoing email of the research institution. For each sent or received email message we know the time, the sender and the recipient of the email. Overall we have 3,038,531 emails between 287,755 different email addresses. The network have 265214 Nodes and 420045 Edges. [12]

B. Analysis

The E-mail Spam originate from people and companies that are intended to display counterfeit products and shares intended to steal the user's money. The most prominent of countries from which spam emails are issued are in the following list: - [13]

Countries	The rate of sending spam email to the world
USA	19.8%
China	9.9%
Russia	6.4%,
Brazil	6.3%
Turkey	8.2%
South Korea	6.5%
Germany	4.2%
Poland	4.8%
United Kingdom	2.8%
Italy	2.8%
India	2.5%

Table 1: The rate of sending e-mails spam by country

The other side is the users who receive email spam at a very high rate. When we analyzed the dataset by using SocNetV Analysis Tool. Shown in Figure 1 the large quantities of messages contained in the email for each user. As 90% of these messages are spam, unwanted and fraudulent messages. [14]

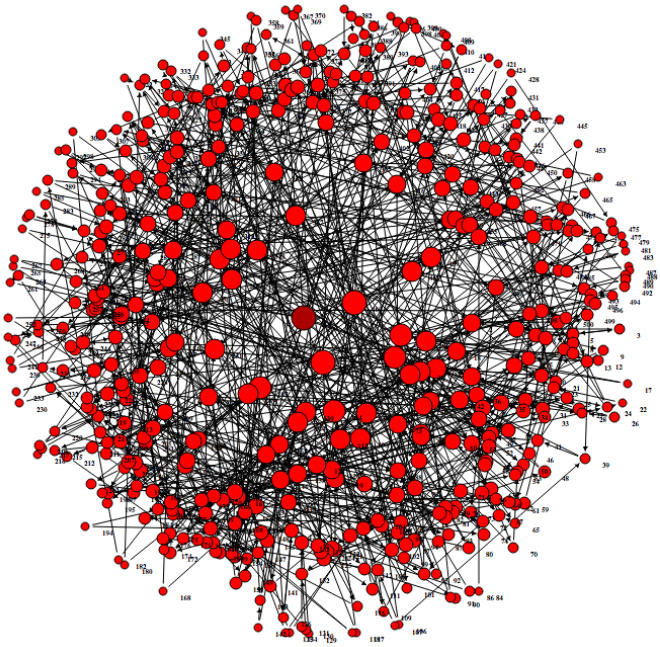

Figure 1. Dataset Visualization

As shown in the Figure 2, the Node 1, which represents an email user in a dataset. Enters to the Node 249 Edges. This means that the user has received more than 224 spam emails out of a total of 249 emails. And only 25 real emails.

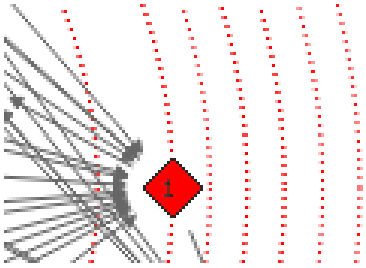

Figure 2. The Edges inside the Node 1

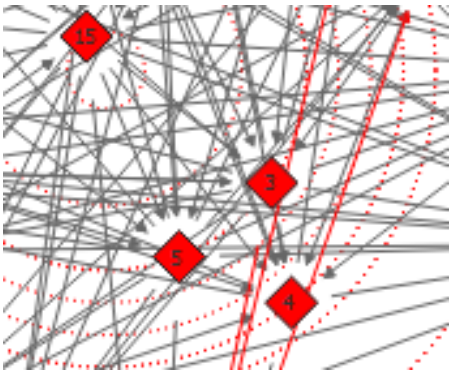

Figure 3. The Edges inside the Node 3

Figure 3, the same is the case in Node 3, the user receives 256 spam emails out of a total of 285 emails.

Impact of E-mail Spam on the Economy

Email Spam has a direct impact on individuals, governments, and companies. The first impact is on individuals, where individuals are exposed to fraud, theft, buying counterfeit products, counterfeit commercial shares, and dealing with fake companies.

As for the second impact on governments, it is how to combat this crime and the work of the security services to eliminate this type of criminals, in addition to the economic cost that the government bears to eliminate this type of crime.

The third effect that companies bear is the impersonation of the company's commercial name and address by criminals, and the marketing of counterfeit products in the names of companies. Which affects the company with the quality of its products. In addition to the fictitious persons with whom companies may deal directly. In 2009, companies lost $ 130 billion due to email spam. [15]

The majority of spam emails are fraudulent banking and advertisements for sex pharma products and sex blackmail criminals. Therefore, it is difficult to know the economic damage to the user as they do not file a lawsuit against these crimes. Other losses and damages are also recorded for spam, including electronic damage to the computer and mobile phone as a result of spam e-mail that carries virus programs that harm these devices.

Legal countermeasures

Most countries in the world do not set a specific law to deter the crime of email spam. For example, the countries of the Middle East and North Africa consider the email spam is a one of computer and internet crime. [16]

Some countries consider email spam a one of crime of forgery of corporate trademarks and intellectual theft according to the content of messages sent via e-mail.

Some countries enacted some laws and took some measures regarding email spam. Table2. [15]

Countries	Email Spam laws
European Union	European Union Directive on Privacy and Electronic Communications.
Canada	Fighting Internet and Wireless Spam law.
Australia	The Spam Act 2003.
United States	CAN-SPAM Act

Table2: Email Spam laws

Conclusion & Future work

In this paper, we mentioned the economic harms of spam to individuals, countries, and companies. We mentioned the measures taken by some countries to curb this crime. We recommend that there be stricter laws to reduce this cybercrime. Programmers should also develop technology to limit the transmission of spam to users.

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