AUTOMATIC DETECTION OF CYBER SECURITY EVENTS FROM TURKISH TWITTER STREAM AND TURKISH NEWSPAPER DATA

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# ABSTRACT

AUTOMATIC DETECTION OF CYBER SECURITY EVENTS FROM TURKISH TWITTER STREAM AND TURKISH NEWSPAPER DATA

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Thesis Abstract – max 250 words

Internet contains a wealth of timely information, however staying on top of breaking events requires that an information analyst constantly scan many sources, leading to information overload. For example, a user might wish to be made aware whenever an infectious disease outbreak takes place, when a new smartphone is announced or when a distributed Denial of Service (DoS) attack might affect an organization's network connectivity. There are many possible event categories an analyst may wish to track, making it impossible to anticipate all those of interest in advance. We therefore propose a weakly supervised approach, in which extractors for new categories of events are easy to de ne and train, by specifying a small number of seed examples. We cast seedbased event extraction as a learning problem where only positive and unlabeled data is available. Rather than assuming unlabeled instances are negative, as is common in previous work, we propose a learning objective which regularizes the label distribution towards a user-provided expectation. Our approach greatly outperforms heuristic negatives, used in most previous work, in experiments on real-world data. Significant performance gains are also demonstrated over two novel and competitive baselines: semi-supervised EM and one-class support-vector machines. We investigate three security-related events breaking on Twitter: DoS attacks,data breaches and account hijacking.

Everyday, security experts face a growing number of security events that affecting people

well-being, their information systems and sometimes the critical infrastructure. The sooner they

can detect and understand these threats, the more they can mitigate and forensically investigate

them. Therefore, they need to have a situation awareness of the existing security events and their

possible effects. However, given the large number of events, it can be difficult for security analysts

and researchers to handle this flow of information in an adequate manner and answer the following

questions in near real-time: what are the current security events? How long they last?

Turkish!!!

In this thesis,

we will try to answer these issues by leveraging social networks that contain a massive amount

of valuable information on many topics. However, because of the very high volume, extracting

meaningful information can be challenging. For this reason, we propose: an automatic,

self-learned framework that can detect, geolocate and categorize cyber security events in near real

time over the Twitter stream. SONAR is based on a taxonomy of cyber security events and a set

of seed keywords describing type of events that we want to follow in order to start detecting events.

Using these seed keywords, it automatically discovers new relevant keywords such as malware

names

to enhance the range of detection while staying in the same domain.

SONAR could efficiently and effectively detect, categorize and monitor cyber security related

events before getting on the security news, and it could automatically discover new security

terminologies with their event. Additionally, SONAR is highly scalable and customizable by

design; therefore we could adapt SONAR framework for virtually any type of events that experts

are interested in.

Keywords: xx, yy, zz… (max 5 keywords)

# ÖZ\_\_

TÜRKÇE TWITTER AKIŞI VE TÜRKÇE GAZETE VERİLERDEN SİBER GÜVENLİK OLAYLARININ OTOMATİK TESPİT EDİLMESİ

Ural, Özgür

Yüksek Lisans, Siber Güvenlik Bölümü

Tez Yöneticisi: Yrd. Doç. Dr. Cengiz Acartürk

Mayıs 2019, XX sayfa

Tez özeti – en fazla 250 kelime

Sizinle yaptığımız son görüşmemizde belirlemiş olduğumuz kelimelerin (siber saldırı, ddos, hacklendi gibi) Türkçe tweetlerde kullanım sıklığı frekansını belli periyotlarda karşılaştırarak kelimelerin kullanım sıklığının artması ile siber güvenlik olayları arasında bir korelasyon olup olmayacağının araştırılması ile ilgili geliştirdiğim yazılımın demosunu yapmıştım.

Anahtar Sözcükler: xx, yy, zz… (en fazla 5 anahtar kelime)

# DEDICATION

To My Family

# ACKNOWLEDGMENTS

First of all, I would like to express …..

Besides my supervisor, I would like to thank …..

I would also like to thank all of colleagues from …..

To my wife, …..

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# LIST OF ABBREVIATIONS

|  |  |
| --- | --- |
| **DDOS** | Distributed Denial of Service |
| **DOS** | Denial of Service |

**CHAPTER 1**CHAPTER

# INTRODUCTION

## Motivation

## Problem Definition

### Initial Subject Definition

## Objectives

## Contributions of the Thesis

## Use Cases

## Outline

**CHAPTER 2**

# BACKGROUND INFORMATION

## What is anInformation Security Analyst?

An information security analyst is someone who takes measures to protect a company's sensitive and mission-critical data, staying one step ahead of cyber attackers. They do this by coming up with innovative solutions to prevent critical information from being stolen, damaged or compromised by hackers.

Note the differences between a Security Analyst and a Security Administrator:

* Security Analysts - are responsible for analyzing data and recommending changes to higher ups, but do not authorize and implement changes. Their main job is keeping attackers out.
* Security Administrators - ensure that systems are working as designed by making changes, applying patches and setting up new admin users. Their main job is keeping systems up.

## What does an Information Security Analyst do?

## What is Natural Language Processing?

## Why do we need Natural Language Processing?

## Sample Tweets Related with a Security Incident

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# APPENDICES

# APPENDIX A

**TITLE**

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# APPENDIX B

**TITLE**

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