شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

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AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
Computer and Systems Engineering

Intelligent Analysis of Textual Content for Spam Detection

A Thesis submitted in partial fulfillment of the requirements of
Master of Science in Electrical Engineering
(Computer and Systems Engineering)

by

Mokhtar Ashour Ibrahim

Bachelor of Science in Electrical Engineering
(Computer and Systems Engineering)
Faculty of Engineering, Ain Shams University, 2013

Supervised By

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Cairo, 2019

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Date: 26 October 2019

Statement

This thesis is submitted as a partial fulfillment of Master of Science in Electrical Engineering, Faculty of Engineering, Ain shams University. The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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Abstract

Twitter popularity made it an important and instantaneous source of news and trending events around the world. It has attracted the attention of spammers who post malicious content embedded in tweets and in their profile pages. Spammers use different and evolving techniques to evade traditional security mechanisms, and that creates the need to develop robust solutions that adapt with these techniques. In this thesis, we focus on exploring different natural language processing methods to detect spam from tweets textual content.

One of the models that we propose in this thesis is the character n-gram model, which has an advantage of being robust to spamming techniques that depend on word manipulations. Another set of models we explore, are the word embedding models built with popular word embedding techniques. Finally, we study the character embedding model, which is built using deep learning techniques.

Using publicly available datasets, we evaluate the performance of multiple machine learning classifiers with the proposed models. Our experiments show that the result of some of our character n-gram models is achieving an F-measure of nearly 80%, which is an enhancement over the approaches that use the classical word n-grams from tweet tokens. We also show that our technique can detect spam tweets with low latency which is crucial in a real-time environment like Twitter.

Summary

Many researchers have been working on methods to detect spam on social media and especially on Twitter and they have been using different techniques to approach the problem. The techniques range from manual, rule-based, to machine learning techniques that use different approaches for feature extraction and building models.

In this work, a machine learning approach that uses tweets text to classify if a tweet is spam or not is used with different set of models that are built using different features.

For training and evaluation purposes, we build our models using publicly available datasets and reserve a test portion to test our models and compare them with previous studies.

This thesis introduces a novel model that uses character n-grams features to detect spam from tweet text. We also experiment the usage of promising techniques such as word embedding representations and character embeddings with deep learning networks.

The thesis is divided into five chapters as listed below, along with a list of figures, list of tables, appendixes, and a bibliography.

Chapter 1 is introducing the problem by giving a background about the problem, we present the motivation for this research work, the main objectives of the thesis, the challenges facing the research and a brief description of the approach we are following in our work. The chapter ends with a roadmap for the rest of the thesis.

Chapter 2 is presenting some concepts and techniques we studied and explored during our literature survey phase. The chapter is categorized according to the different techniques presented in related studies while discussing the advantages and disadvantages of each technique.

Chapter 3 is describing in detail the approach we are proposing to solve the problem and presenting different models of different text features.

Chapter 4 is presenting several experiments that evaluate the different models we proposed and evaluating these models using multiple datasets. It also compares our results with a previous study, and shows that some of our models are outperforming their models, and discusses the results we obtained from each model.

Chapter 5 is drawing some conclusions from the research and experiments we carried out and listing the main thesis contributions. The chapter also presents some ideas for future work.

Keywords: Twitter, spam, natural language processing, classification, machine learning, neural networks, character n-gram, word embedding