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Rumors Detection on Social Platforms Using NLP Methods

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By:
Nsrin Ashraf

B.Sc., Computer Science.

Supervised By:

Ass. Prof. Dr. Mohamed Taha

Assistant Professor, Computer Science
Department, Faculty of Computers and
Artificial Intelligence - Benha
University, Egypt

Dr. Hamada Ali Nayel

Lecturer, Computer Science
Department, Faculty of Computers and
Artificial Intelligence - Benha
University, Egypt

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وَقُل رَّبِّ زِدْنِي عِلْمًا

Dedication

First of all, To my parents I want to express my heartfelt gratitude and feeling for your support and unlimited motivations throughout my master's journey. Your constant love, guidance and belief in me have been a source of strength and motivation. Your sacrifices, both emotional and financial, have made it possible for me to achieve my dreams and make my goals a real thing. I am truly blessed to have parents like you, i cannot thank you enough for all that you have done for me. Your selflessness and dedication to my well-being have been an inspiration, and i will always be grateful for the sacrifices you made for me and always proud of me.

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Abstract

Social media platforms have grown rapidly in recent years, with billions of people worldwide using them for communication, entertainment, and information. Social media development has dramatically impacted society, affecting how people interact, communicate, and consume information. While social media has numerous advantages, it has also prompted worries about privacy, misinformation, and the influence on mental health, especially among young people. The dissemination of rumors has been significantly impacted by social media platforms. The major platform that has been used for spreading news regarding the Covid-19 pandemic is Twitter. The Covid-19 pandemic has spread a considerable deal of false material on social media. Artificial intelligence proposed several methods to relieve the spread of fake news.

In this study, we proposed a model that can discriminate between "fake" and "true" news tweets capable of working with any up-to-date problem. To address this issue, this research explored various learning approaches to detect fake news. We compare different deep learning and machine learning methods for fake news detection, such as CNN, LSTM, Naïve Bayes, and Support Vector Machine. The efficiency of these models was evaluated on benchmark datasets and self-collected dataset. This research aims to improve the model used in classifying rumors by utilizing various techniques for text representation such as Word Embedding and TF-IDF. It involves extracting the underlying meanings in texts by searching for semantic relationships between words, phrases, and texts. These processes help in analyzing and understanding texts. The efficiency of these models was tested by training data on a set of tweets. New tweets were collected using Snscrape to track different writing methods and build a model capable of detecting errors with all the changes that occur in a word and returning to the origin of the word. The results of the first model using TF-IDF algorithms and machine learning algorithms showed the superiority of Multi-Layer Perceptron algorithm, achieving an accuracy of 93.8% and an F-score of 93.6% when applied to the English language. The results of the Arabic language models showed the superiority of the Support Vector Machine algorithm, achieving an accuracy of 82.90%, while the K-Nearest Neighbor achieved better results with

an F-score of 57.5%. The results showed the superiority of Uni-gram text vectorization over Bi-gram. GloVe word embedding was used with deep learning algorithms to improve text understanding and discover relationships between words. Recurrent neural networks achieved the best results for the English language with an accuracy of 99%, but the ensemble learning model achieved better results in terms of F-score achieved 97%. The Convolutional Neural Network achieved the best results with the Arabic language achieved an accuracy of 83% using the Accuracy measure, while the Ensemble learning model achieved better results using the F-score at a rate of 81.7%.

The second step was to test the model on a new test set that had not been tested before. A significant decline of about 25% was found in the English language model, achieving an accuracy of 74%. The experiments showed that adding some modifications to the evidence processing stage to develop the model made it capable of dealing with all the changes that occur in a word and showed an improvement of about 8% achieving an accuracy of 83%.

As for the proposed model for the Arabic language, there was a decline of about 5%, achieving an accuracy of 70%. The results vary between deep learning models, but the BI-LSTM showed the difference between the differences in the data. With some modifications to the word processing stage to develop the model and make it capable of dealing with all the changes that occur in a word, there was an improvement of about 8% achieving an accuracy of 78%.

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ملخص الرسالة

إن جائحة فيروس كوفيد-١٩ هي الأزمة الصحية العالمية الحاسمة في عصرنا. تعد كوفيد-19 أكبر تحد واجة البشرية الحرب العالمية الثانية. منذ ظهوره في أوائل ديسمبر ٢٠١٩ في الصين، انتشر الفيروس في كل مكان، وزاد معدل استخدام منصات التواصل الاجتماعي بشكل كبير وذلك بسبب الحجر الصحي الوبائي ونتج عن ذلك كميات مهولة من المعلومات المتولدة كل ثانية؛ ومع ذلك، قد يصدر العديد من المستخدمين بعض الإشاعات التي لم يتم التحقق منها والتي تعرف أيضاً بالأخبار المزيفة. كان لها تأثير سلبي على العديد من جوانب الحياة اليومية للناس مثل الأمن القومي والاقتصاد. لذا، أصبح من الضروري استخدام تقنيات حديثة لتحليل وتأكيد حقيقة الأخبار.

تقدم هذه الدراسة نموذجا يعتمد على القواعد للكشف عن انتشار الأخبار الكاذبة باللغة العربية والإنجليزية خلال جائحة كوفيد-19. تم تطبيق أساليب معالجة اللغات الطبيعية في التحقق من الشائعات وذلك باستخدام نماذج التعلم المختلفة مثل التعلم العميق وتعلم الالة.

هذه الرسالة تقوم بتحسين النموذج المستخدم في تصنيف الشائعات عن طريق استخدام تقنيات مختلفة لتمثيل النصوص (Word Embedding, TF-IDF)، وتشمل استخراج المعاني الكامنة في النصوص من خلال البحث عن علاقات معنوية بين الكلمات والجمل والنصوص و هذه العمليات تساعد في تحليل النصوص و فهمها و تم اختبار كفاءة هذه النماذج عن طريق تدريب البيانات على مجموعة من التغريدات المنشورة على الموقع الشهير Twitter, تم تجميع نصوص جديدة باستخدام Snscrape لتجميع التغريدات و ذلك لتتبع طرق الكتابة المختلفة و بناء نموذج قادر على اكتشاف الأخطاء مع جميع التغيرات التي تحدث على الكلمة و الرجوع الى اصل الكلمة.

وقد أشارت نتائج النموذج الأول باستخدام TF-IDF وخوارزميات تعلم الآلة الى تفوق الخوارزميات Multi-Layer Perceptron محققاً دقة مقدارها 93.8% وF-score بمقدار 93.6% عند تطبيقها على اللغة الإنجليزية. وأظهرت نتائج النماذج اللغة العربية تفوقاً لخوارزمية Support Vector Machine محققاً دقة مقدارها 82.90% وحقق K-Nearest Neighbor نتائج أفضل مقدارها 57.5F-score% واثبتت النتائج تفوق Unigram text vectorization على Bi-gram. تم استخدام GLOVE word embedding مع خوارزميات التعلم العميق لتحسين فهم النصوص واكتشاف العلاقات بين الكلمات بشكل أكبر فقد حققت الشبكات العصبية التكرارية أفضل النتائج للغة الإنجليزية بدقة مقدارها 99% ولكن

نموذج Ensemble learning حقق نتائج أفضل باستخدام مقدار ال F-score 97%. وحقق Convolutional Neural Network أفضل النتائج مع اللغة العربية بنسبة 83% باستخدام مقياس ال Accuracy وحقق نموذج Ensemble learning نتائج أفضل باستخدام مقياس ال F-score بنسبة 81.7%.

الخطوة الثانية كانت اختبار النموذج على مجموعة جديدة من البيانات التي لم يتدرب عليها من قبل تم اختبار النموذج الحالي على البيانات الجديدة، وجد تراجع كبير مع نموذج اللغة الإنجليزية بنسبة 25% تقريباً محققاً دقة مقدارها 74%. وأظهرت التجارب ان إضافة بعض التعديلات على مرحلة معالجة الأدلة لتطوير النموذج وقد جعلته قادراً على التعامل مع جميع التغيرات التي تقع على الكلمة وأظهرت تحسناً بنسبة 8% تقريباً محققاً دقة مقدارها 83%.

اما عن النموذج الثاني للغة العربية وجد تراجع بنسبة 5% تقريباً محققاً دقة مقدارها 70%. وجد ان النتائج متفاوتة بين نماذج التعلم العميق، ولكن أظهر BI-LSTM الفرق بين الاختلافات في البيانات ومع 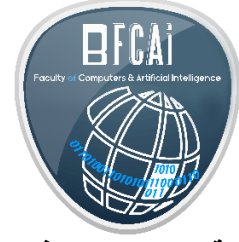إضافة بعض التعديلات على مرحلة معالجة الكلمات لتطوير النموذج وجعله قادر على التعامل مع جميع التغيرات التي تقع على الكلمة تحسن بنسبة 8% تقريباً محققاً دقة مقدارها 78%.

وقل رب زدني علما

كلية الحاسبات والذكاء
الاصطناعي

جامعـة بنهــا

اكتشاف الشائعات في منصات التواصل الاجتماعي باستخدام طرق معالجة اللغات الطبيعية

مقدمة من:
نسرين أشرف إبراهيم
بكالوريوس علوم الحاسب

تحت إشراف:

د/حمادة على نايل

مدرس بقسم علوم الحاسب
كلية الحاسبات والذكاء الاصطناعي
جامعة بنها

أ.م.د/ محمد طه عبدالفتاح

أستاذ مساعد بقسم علوم الحاسب
كلية الحاسبات والذكاء الاصطناعي
جامعة بنها

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