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**IDENTIFYING FAKE NEWS IN FACEBOOK**

Project Documentation Submitted

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# Abstract

This document circles around fake news on the internet. In this research the researchers will create a model that identifies if a link posted on Facebook leads to an article that is fake or not. The researchers will use SVM algorithm for classifying the link and it will be implemented through a web extension that will only run on Facebook. Considering that there are various ways in identifying fake news, this document will be providing the characteristics of fake news and how accurate is the SVM algorithm in identifying fake news.

KEYWORDS: Fake news, SVM, classification

# Introduction

## **Project Context**

Fake news is a deliberate misinformation or hoax that spreads via traditional print, broadcast news media or online social media (Novotny, 2017). It misleads people and make the world less informed. It harms the community and the industry in an alarming level (Stecula, n.d.).

Eric Trump, the son of Donald Trump, tweeted an article about paid protestors from the domain “abcnews.com.co” that reinforced right wing conspiracy theories. The article was completely fabricated, but it resembled the real ABC News enough to fool those who weren’t paying attention (Palmisano, 2016). With the way on how fake news is spreading, it would be ideal to have application that help identify fake news online.

## **Purpose and Description**

The main purpose of this project is to prevent online users from being tricked by fake news. The proponents will be using Support vector machine algorithm for classifying. SVM is a supervised machine learning algorithm for classification or regression problems where the dataset teaches SVM about the classes so that SVM can classify any new data. It works by classifying the data into different classes by finding a line (hyperplane) which separates the training data set into classes. As there are many such linear hyperplanes, SVM algorithm tries to maximize the distance between the various classes that are involved and this is referred as margin maximization. If the line that maximizes the distance between the classes is identified, the probability to generalize well to unseen data is increased.

## **Objectives**

The objectives of this study are:

1. To create a classification model that determine whether a link leads to a fake news article or not.
2. To create a web extension for Facebook that can identify whether a link clicked by a user leads to a fake news article or not.

## **Scope and Limitations**

The study is about identifying fake news in Facebook. The researchers will use JavaScript programming language to create a web extension for identifying fake news. The gathered datasets will come from three online websites (Kaggle.com, cbcpwebsite.com, Primer.com). The web extension will only work on the latest and upcoming versions Google Chrome and it will not work on any other browsers.

This study is only limited on identifying fake news in Facebook and will not cover any microblogging sites. The researchers will not use any classifier algorithm other than SVM.

# Review of Related Literature

In this chapter, the researchers will be presenting an articles and related readings about this study. Moreover, this chapter suggests about fake news, web extension or plugin and support vector machines (SVM). Furthermore, this chapter will also inform that the researchers aims to create a web extension for Facebook that will scan the user’s news feed for fake news.

The researchers had read about the article on Pubmed. The researchers Rey et al. (2012) developed an open-source web browser extension to integrate electronic health record (EHR) features in biomedical literature retrieval approaches. Users can use CDAPubMed to load patient clinical documents and identify relevant terms for scientific literature. Which advanced users can optimize to adapt to each specific situation, and generate and launch literature search queries to a major search engine, example: PubMed, to retrieve citations related to the EHR under examination (Re y et al., 2012).

Rey et al. (2012), Developed a web browser extension named CDAPubmed, providing a natural and configurable tool to enhance PubMed results based on patient features. The tool will provide new possibilities to identify relevant retrieval terms within more structured documents. Using the tool, users can select relevant keywords. Each keyword would retrieve if added to the query, is displayed next to each relevant term to facilitate keyword selection. The researchers, Rey et al. (2012 ) used this tool to help them to their study on web extension that will apply to integrate (EHR). This article is not exactly about fake news but still it will help researchers to know more about web extensions.

According to Conroy et al. (2015), classifiers are useful for automated numerical analysis. One common example of classifiers is Support Vector Machines (SVM). It shown high accuracy results in classification. It provides a basis for the design of a comprehensive fake news detection tool. Using classifier the accuracy which measures the number of articles correctly classified as real or fake.

Support Vector Machines and Kernels for Computational Biology (Ben-Hur et al., 2008) the researchers of this article introduced the concepts of large margin classification as implemented by SVM, an idea that is supported by theoretical results in statistical learning theory. The SVM algorithm lets the use of kernels, which are effective by means of computing scalar products in nonlinear feature spaces. According to the researchers support vector machines and related kernel methods are good at solving problems. SVMs are widely used in computational biology due to their high accuracy, their ability to deal with high-dimensional and large datasets, and their flexibility in modeling diverse sources of data.

Rodríguez-Martín et al. (2017) Used SVMs for Home detection of freezing of gait through a single waist-worn triaxial accelerometer. Martin et al. described that using SVM the method is evaluated through the acceleration signals in an outpatient setting gathered from 21 PD patients at their home and evaluated under two different conditions. First, a generic model is tested by using a leave-one-out approach and, second, a personalized model that also uses part of the dataset from each patient. It showed a significant improvement in the accuracy of the personalized model compared to the generic model, it also showed enhancement in the specificity and sensitivity.

Ahlrichs et al. (2011) used Support Vector Machines (SVM) for detecting freezing of gait (FoG) in 8 patients with PD at their own homes. The method included tests in different motor states and used a single accelerometer at the waist, achieving accuracies of over 90%. However, specificity was only computed with non-FoG patients, which could lead to unreliable predictions since the models were not tested with PD patients with FoG who move slightly differently to those patients without FoG. Furthermore, the evaluation was performed over a single minute, which is considered too long if cueing is desirable.

Gruss et al. (2015) the researchers measured the pain intensity in patients via Biopotential Feature Patterns with the help of support vector machine that could provide valuable information for a clinical team and thus support the treatment assessment. According to Brown et al. (2011) SVM could be trained on one set of individuals, and used to accurately classify pain in different individuals.

Rebentrost et al. (2013) showed that the support vector machine, a classifier, can be implemented on a quantum computer, with complexity logarithmic in the size of the vectors and the number of training examples. In cases when classical sampling algorithms require polynomial time, an exponential speed-up is obtained. At the core of this quantum big data algorithm is a non-sparse matrix exponentiation technique for efficiently performing a matrix inversion of the training data inner-product (kernel) matrix. SVM can be used for classification for big data.

According to Ruchansky et al. (2017), they study about the problems of fake news detection. The researchers read several articles that addressed the problem by focusing on either the text, the response an article receives, or the users who source it. They claim that it is important to combine all three. They propose the CSI model which is composed of three modules. Œfirst module, Capture, captures the abstract temporal behavior of user encounters with articles, as well as temporal textual and user features, to measure response as well as the text. The second is score; it estimates a source suspiciousness score for every user, which is then combined with the first module to produce a predicted label for each article. The separation into modules allows CSI to output a prediction separately on users and articles, incorporating each of the three characteristics, resulting into combining the information for classification. The model demonstrated the accuracy of CSI in classifying fake news articles.

Badaskar et al. (n.d.) focused on the topic about fake news. The researcher measures the accuracy of number of articles that are classified correctly as real or fake and the log-probability that measures the classification decision, the researchers used a classification-task based formalism for evaluating various features with the objective of improving conventional language models. Features that perform well in the task for classifying real and fake articles. These features are syntactic, semantic and empirical. The semantic features contribute significantly to the classification task accuracy.

The researchers will conclude that these articles will help them to learn more about web browser extensions and SVMs that will apply to the study about identifying fake news in Facebook using web extension. The articles showed that SVM has more efficiency for correct classification of data, and SVM offers best classification performance accuracy on data.

# Technical Background

**Support Vector Machine**

SVM offers best classification performance (accuracy) on the training data and renders more efficiency for correct classification of the future data (Dezyre, 2017). It is used computational biology due to their high accuracy, the ability to deal with large datasets, and the flexibility in modeling different sources of data. These are controlled learning models used for analyzing data and for its classification and regression analysis using sorting algorithms. Suppor

t vector machines use its ability to create forecasts based of the given set of data (Ben-Hur et al., 2008). It is also used for specific tasks such as classification of data and analysis. SVM used for sentiment analysis of opinion mining is directly focused on two things: classifying and forecasting. The support vector machine will be able to identify new inputs to the model and then designate each input to its rightful category just as how it processes previous ones. The application of SVM ranges from text categorization, image segmentation, hand-written character recognition (Jadav et al., 2016). The researchers will use SVM to identify fake news and real news in Facebook and it will prove its accuracy.

# Design and Methodology

A web extension is a plug-in that extends the functionality of a web browser. The researchers will create a web extension that can identify fake news and will only run if the link is clicked in Facebook. When the link is clicked, the system will compare the news link article from the list of fake news links and from the list of authentic news gathered by the team. The data for fake and authentic news list will be gathered from kaggle.com, CBCP (Catholic Bishops' Conference of the Philippines,Primer.com) and it will be saved in a database.If the link is not in the list, the system then will get the data from the link to compare the following:

* **author**: if there is an author
* **title**: unusual formatting
* **site\_url** : link
* **likes**: number of Facebook likes
* **comments**: number of Facebook comments
* **shares**: number of Facebook shares



Figure 1 System

After comparing the link and classifying it the data will be saved to database for future preference. If the author is unknown the system will automatically flagged it as fake. If the link is confirmed fake the system will notify the user with a dialog box popped up, but if the link article is authentic the system will also notify the user.

The extension will be developed using HTML, CSS, PHP and JavaScript and it will be compatible to Google Chrome.

# Conclusions and Recommendation

Fake news can be lessened or better yet eliminated, since people keep falling prey for such posts; it needs to be stopped. This paper is meant to do just that; the program we are proposing is meant to detect if the news posted in your social media websites, which would literally get marked as a fake if it is one. To identify a fake news one must check the author, URL, title, number of likes, number of shares and number of comments. This program will be a plugin for the users’ internet browsers, but will only work for Facebook, and will not detect if posted news are fake from other websites. If this program could be implemented, there will definitely be a big change in how news would be spread, since users will no longer fall for faulty news articles and posts.

The researchers will use SVM algorithm for classifying whether the news is fake or not. SVM uses a technique called the kernel trick to transform the data and then based on these transformations it finds an optimal boundary between the possible outputs. Simply put, it does some extremely complex data transformations, then figures out how to separate your data based on the labels or outputs you've defined. What differentiates it from other classifier is that SVM focus only on the points that are the most difficult to tell apart, whereas other classifiers pay attention to all of the points.

To help increase the accuracy of the extension, the researchers recommend to add more features for classifying data and to work not only in chrome but also on other browsers

# Appendices

The steps to perform data classification using Support Vector Machine algorithm are as

follows:

Step1: Define a set of n data points in an array say

X= array([[x11, x21], [x12, x22], ....... [x1n, x2n]])

Step2: Define class of each data point in a vector of list type say Y = [-1, -1, -1 .....1, 1, 1]

Step3: **F**it the SVM model using the statements

clf = svm.SVC(kernel='linear') and clf.fit(X, Y)

Step4: Get the separating hyperplane xx as x1 coordinates anf yy as x2 coordinates

w = clf.coef\_[0]

a = -w[0]/w[1]

xx = np.linspace(-1, 8, 10, 1)

yy = a\*xx - (clf.intercept\_[0])/w[1]

Step5: Get the parallels to the separating hyperplane that pass through the support vectors

b = clf.support\_vectors\_[0]

yy\_down = a\*xx + (b[1] - a\*b[0]) (positive support plane)

b = clf.support\_vectors\_[-1]

yy\_up = a\*xx + (b[1] - a\*b[0]) (negative support plane)

Step6: Plot the line, the points, and the nearest vectors to the plane using appropriate python commands

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