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FAKE MESSAGE DEDUCTION USING MACHINE LEARINING

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Abstract - *This Project comes up with the applications of NLP (Natural Language Processing) techniques for detecting the 'fake news', that is, misleading news stories that comes from the non-reputable sources. Only by building a model based on a count vectorizer (using word tallies) or a (Term Frequency Inverse Document Frequency) tfidf matrix, (word tallies relative to how often they're used in other articles in your dataset) can only get you so far. But these models do not consider the important qualities like word ordering and context. It is very possible that two articles that are similar in their word count will be completely different in their meaning. The data science community has responded by taking actions against the problem. There is a Kaggle competition called as the "Fake News Challenge" and Facebook is employing AI to filter fake news stories out of users' feeds. Combatting the fake news is a classic text classification project with a straight forward proposition. Is it possible for you to build a model that can differentiate between "Real "news and "Fake" news? So a proposed work on assembling a dataset of both fake and real news and employ a Naive Bayes classifier in order to create a model to classify an article into fake or real based on its words and phrases.*

1. INTRODUCTION

The main objective is to detect the fake news, which is a classic text classification problem with a straight forward proposition. It is needed to build a model that can differentiate between "Real" news and "Fake" news. Fake news and lack of trust in the media are growing problems with huge ramifications in our society. Obviously, a purposely misleading story is "fake news "but lately blathering social media's discourse is changing its definition. Some of them now use the term to dismiss the facts counter to their preferred view points. The importance of disinformation within American political discourse was the subject of weighty attention, particularly following the American president election. The term 'fake news' became common parlance for the issue, particularly to describe factually incorrect and misleading articles published mostly for the purpose of making money through page views. In this paper, it is seemed to produce a model that can accurately predict the likelihood that a given article is fake news. Facebook has been at the epicenter of much critique following media attention. They have already implemented a feature to flag fake news on the site when a user sees it; they have also said publicly they are working on to distinguish these articles *in* an automated way. In addition, the question of legitimacy is a difficult one. However, in order to solve this problem, it is necessary to have an understanding on what Fake News is.

1.1 Scope

Now any people can write any opinion text or review, this can draw the individual's attention and organizations to give undeserving spam opinions to promote or to discredit some target products. So there is a need to develop a smart system which automatically mine opinions and classify them into spam and non-spam category. Proposed opinion spam analyzer will automatically classify user opinions into spam or non-spam. This automatic system can be useful to business organization as well as to customers. Business organization can monitor their product selling by analyzing and understand what the customers are saying about products. Customers can make decision whether he/she should buy or not buy the products. This can helpful to people to purchase valuable product and spend their money on quality products.

1.2 Objective

The main objective is to detect the fake news, which is a classic text classification problem with a straight forward proposition. It is needed to build a model that can differentiate between "Real" news and "Fake" news. Fake news and lack of trust in the media are growing problems with huge ramifications in our society. Obviously, a purposely misleading story is "fake news "but lately blathering social media's discourse is changing its definition. Some of them now use the term to dismiss the facts counter to their preferred view points. The importance of disinformation within American political discourse was the subject of weighty attention, particularly following the American president election. The term 'fake news' became common parlance for the issue, particularly to describe factually incorrect and misleading articles published mostly for the purpose of making money through page views. In this paper, it is seemed to produce a model that can accurately predict the likelihood that a given article is fake news. Facebook has been at the epicenter of much critique following media attention. They have already implemented a feature to flag fake news on the site when a user sees it; they have also said publicly they are working on to distinguish these articles *in* an automated way. Certainly, it is not an easy task. A given algorithm must be politically unbiased –

since fake news exists on both ends of the spectrum – and also give equal balance to legitimate news sources on either end of the spectrum. In addition, the question of legitimacy is a difficult one. However, in order to solve this problem, it is necessary to have an understanding on what Fake News is. Later, it is needed to look into how the techniques in the fields of machine learning, natural language processing help us to detect fake news.

2. LITERATURE SURVEY

2.1 Per. A. Nematzadeh, E. Ferrara, A. Flammini, Y. Y. Ahn, "Optimal network modularity for information diffusion", *Phys. Rev. Lett.*, vol. 113, no. 8, pp. 088701, 2014

With the widespread of social networks, the risk of information sharing has become inevitable. Sharing a user's particular information in social networks is an all-or-none decision. Users receiving friendship invitations from others may decide to accept this request and share their information or reject it in which case none of their information will be shared. Access control in social networks is a challenging topic. Social network users would want to determine the optimum level of details at which they share their personal information with other users based on the risk associated with the process. In this paper, we formulate the problem of data sharing in social networks using two different models: (i) a model based on \emph{diffusion kernels}, and (ii) a model based on access control. We show that it is hard to apply the former in practice and explore the latter. We prove that determining the optimal levels of information sharing is an NP-hard problem and propose an approximation algorithm that determines to what extent social network users share their own information. We propose a trust-based model to assess the risk of sharing sensitive information and use it in the proposed algorithm. Moreover, we prove that the algorithm could be solved in polynomial time. Our results rely heavily on adopting the super modularity property of the risk function, which allows us to employ techniques from convex optimization. To evaluate our model, we conduct a user study to collect demographic information of several social networks users and get their perceptions on risk and trust. In addition, through experimental studies on synthetic data, we compare our proposed algorithm with the optimal algorithm both in terms of risk and time. We show that the proposed algorithm is scalable and that the sacrifice in risk is outweighed by the gain in efficiency.

2.2. S. Della Vigna, E. Kaplan, "The Fox News effect: Media bias and voting", *Quart. J. Econ.*, vol. 122, no. 3, pp. 1187-1234, 2007.

We investigate the complex relations existing within news content in the 27 countries of the European Union (EU). In particular we are interested in detecting and modelling any biases in the patterns of content that appear in news outlets of different countries. We make use of a large scale infrastructure to gather, translate and analyse data from the most representative news outlets of each country in the EU. In order to model the relations found in this data, we extract from it different networks expressing relations between countries: one based on similarities in the choice of news stories, the other based on the amount of attention paid by one country to another. We develop methods to test the significance of the patterns we detect, and to explain them in terms of other networks we created based on trade, geographic proximity and Eurovision voting patterns. We show that media content networks are 1) stable over time, and hence well defined as patterns of the news media sphere; 2) significantly related to trade, geography and Eurovision voting patterns; 3) by combining all the relevant side information, it is possible to predict the structure of the media content network. In order to achieve the above results, we develop various pattern analysis methods to quantify and test the non-metric, non-symmetric pairwise relations involved in this data. These methods are general and likely to be useful in many other domains.

2.3. M. Karsai et al., "Small but slow world: How network topology and burstiness slow down spreading", *Phys. Rev. E Stat. Phys. Plasmas Fluids Relat. Interdiscip. Top.*, vol. 83, no. 2, pp. 025102, 2011

We investigate two competing products with network effects diffusion on heterogeneous Newman-Watts (HNW) network based on a computer simulation model. Consumerspsila behaviors in our model are determined not only by their individual preferences and purchasing resistances but also by their interactions with others. To analyze the determinant factors in products diffusion we divide network effects into two kinds - direct network effects and indirect network effects. The outcomes of simulations show that direct network effects act as a brake on the winner-take-all process, often lead to market sharing. Consumers in the market are cliquish and each faction adopts the same product when market sharing outcome occurs. Indirect network effects are great impetus on the winner-take-all process, but the winner-take-all process can be slowed for the heterogeneity of purchasing resistances among consumers.

2.4 M. Girvan, M. E. J. Newman, "Community structure in social and biological networks", *Proc. Nat. Acad. Sci. USA*, vol. 99, no. 12, pp. 7821-7826, Apr. 2002.

Social networks are merely a reflection of certain realities among people that have been identified. But in order for people or even computer systems (such as expert systems) to make sense of the social network, it needs to be analyzed with various methods so that the characteristics of the social network can be understood in a meaningful context. This is challenging not only due to the number of people that can be on social networks, but the changes in relationships between people on the social network over

time. In this paper, we develop a method to help make sense of dynamic social networks. This is achieved by establishing a hierarchical community structure where each level represents a community partition at a specific granularity level. By organizing each level of the hierarchical community structure by granularity level, a person can essentially "zoom in" to view more detailed (smaller) communities and "zoom out" to view less detailed (larger) communities. Communities consisting of one or more subsets of people having relatively extensive links with other communities are identified and represented as overlapping community structures. Mechanisms are also in place to enable modifications to the social network to be dynamically updated on the hierarchical and overlapping community structure without recreating it in real time for every modification. The experimental results show that the genetic algorithm approach can effectively detect hierarchical and overlapping community structures.

2.5 J. Yang, J. Leskovec, "Overlapping community detection at scale: A nonnegative matrix factorization approach", *6th ACM Int. Conf. Web Search Data Mining*, 2013

One of the main organizing principles in real-world networks is that of network communities, where sets of nodes organize into densely linked clusters. Communities in networks often overlap as nodes can belong to multiple communities at once. Identifying such overlapping communities is crucial for the understanding the structure as well as the function of real-world networks. Even though community structure in networks has been widely studied in the past, practically all research makes an implicit assumption that overlaps between communities are less densely connected than the non-overlapping parts themselves. Here we validate this assumption on 6 large scale social, collaboration and information networks where nodes explicitly state their community memberships. By examining such ground-truth communities we find that the community overlaps are more densely connected than the non-overlapping parts, which is in sharp contrast to the conventional wisdom that community overlaps are more sparsely connected than the communities themselves. Practically all existing community detection methods fail to detect communities with dense overlaps. We propose Community-Affiliation Graph Model, a model-based community detection method that builds on bipartite node-community affiliation networks. Our method successfully captures overlapping, non-overlapping as well as hierarchically nested communities, and identifies relevant communities more accurately than the state-of-the-art methods in networks ranging from biological to social and information networks.

3. SYSTEM DESIGN AND IMPLEMENTATION

3.1. EXISTING SYSTEM

There exists a large body of research on the topic of machine learning methods for deception, detection most of it has been focusing on classifying online reviews and publicly available social media posts. Particularly since late 2016 during the American Presidential election, the question of determining 'fake news' has also been the subject of particular attention within the literature. Conroy, Rubin, and Chen outlines several approaches that seem promising towards the aim of perfectly classify the misleading articles. They note that simple content-related n-grams and shallow parts-of-speech (POS) tagging have proven insufficient for the classification task, often failing to account for important context information. Rather, these methods have been shown useful only in tandem with more complex methods of analysis. Deep Syntax analysis using Probabilistic Context Free Grammars (PCFG) have been shown to be particularly valuable in combination with n-gram methods. Feng, Banerjee, and Choi [2] are able to achieve 85%-91% accuracy in deception related classification tasks using online review corpora. Feng and Hirst implemented a semantic analysis looking at 'object: descriptor' pairs for contradictions with the text on top of Feng's initial deep syntax model for additional improvement.

4.1.1. DISADVANTAGES

Rubin, Lukoianova and Tatiana analyze rhetorical structure using a vector space model with similar success. Ciampaglia et al. employ language pattern similarity networks requiring a pre-existing knowledge base.

4.2. PROPOSED SYSTEM

A model is build based on the count vectorizer or a tfidf. Since this problem is a kind of text classification, implementing a Random Forest classifier will be best as this is standard for text-based processing. The actual goal is in developing a model which was the text transformation (count vectorizer vstfidfvectorizer) and choosing which type of text to use (headlines vs full text). Now the next step is to extract the most optimal features for count vectorizer or tfidf-vectorizer, this is done by using a n-number of the most used words, and/or phrases, lower casing or not, mainly removing the stop words which are common words such as "the", "when", and "there" and only using those words that appear at least a given number of times in a given text dataset.

4.3. COLLECTING DATA

There must be two parts to the data-acquisition process, "fake news" and "real news". Collecting the fake news was easy as Kaggle released a fake news dataset consisting of 13,000 articles published during the 2016 election cycle. Now the later part is very difficult. That is to

get the real news for the fake news dataset. It requires huge work around many Sites because it was the only way to do web scraping thousands of articles from numerous websites. With the help of web scraping a total of 5279 articles, real news dataset was generated, mostly from media organizations (New York Times, WSJ, Bloomberg, NPR, and the Guardian) which were published around 2015 – 2016.

4.4. ARCHITECTURE

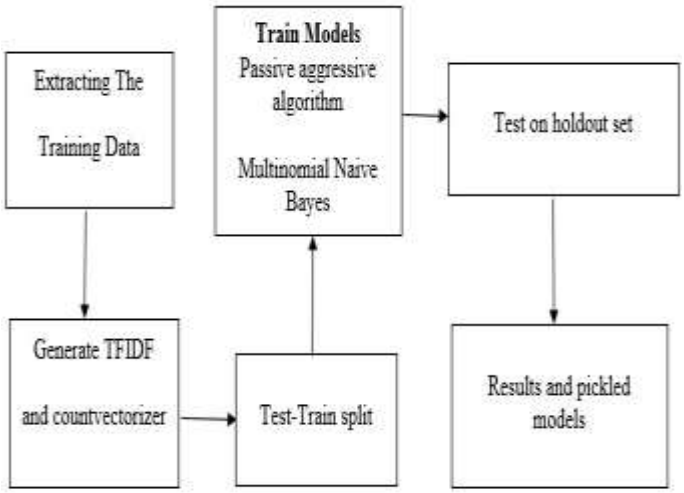

Fig -1: Architecture Diagram

4.5. WORK FLOW

For our proposed system will do the following:

IMPORT THE PACKAGES: Import the packages which contains functions needed for the preprocessing of the data.

READ THE TRAIN DATA FILES: Import the data files which contains the training data sets.

SET THE INDEX: Set the index value for the data readings.

FEATURE EXTRACTION: Feature extracted from the library function sklearn.

CHOOSING THE BEST PERFORMING MODELS: At least choose the two best classifiers model and test data.

GRAPH: Accuracy score that's the proportion of truth is displayed with best model and it is used as the best classifiers as algorithm.

4.6. MODULES

- **Data Pre-processing**
- **Feature Extraction**
- **Classification**
- **Prediction**

DATA PREPROCESSING

This file contains all the pre-processing functions needed to process all input documents and texts. First we read the train, test and validation data files then performed some pre-processing like tokenizing, stemming etc. There are some exploratory data analysis is performed like response variable distribution and data quality checks like null or missing values etc. FEATURE EXTRACTION In this file we have performed feature extraction and selection methods from sci-kit learn python libraries. For feature selection, we have used methods like simple bag-of-words and n-grams and then term frequency like tf-tdf weighting. We have also used word2vec and POS tagging to extract the features, though POS tagging and word2vec has not been used at this point in the project.

8.1. CONCLUSION

The concept of deception detection in social media is particularly new and there is ongoing research in hopes that scholars can find more accurate ways to detect false information in this booming, fake-news-infested domain. For this reason, this research may be used to help other researchers discover which combination of methods should be used in order to accurately detect fake news in social media. The proposed method described in this paper is an idea for a more accurate fake news detection algorithm. In the future, I wish to test out the proposed method of Naïve Bayes classifier, SVM, and semantic analysis, but, due to limited knowledge and time, this will be a project for the future. It is important that we have some mechanism for detecting fake news, or at the very least, an awareness that not everything we read on social media may be true, so we always need to be thinking critically. This way we can help people make more informed decisions and they will not be fooled into thinking what others want to manipulate them into believing.

8.2. FUTURE ENHANCEMENT

Future work might want to explore how hybrid decision models consisting of both fact verification and data-driven machine learning judgments can be integrated.

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