Older studies are mainly focused on lexical patterns of the language, Fend, et al. in [8] applied syntactic stylometry to text, which made it possible classify deceptive text by finding statistical or syntactic patterns. Text analysis is the major resource for fake news detection because of the well-known methods to analyze text. This linguistic-based classification is done by Veronica Perez-Rosas, et. al [9] for fake new detection and suggest that linguistic features are a major factor in the detection of fake news than real news. These approaches are heavily inclined toward language-based analysis and are somewhat limited[10] to overcome this we have to combine other features related to the news. They have combined metadata from Google and incorporated that to boost the classification by 3 % in F1-score for 6-label classification problem

**Fake News Detection Using Machine Learning Ensemble Methods**

Novel to this research, various ensemble techniques such as bagging, boosting, and voting classifier are explored to evaluate the performance over the multiple datasets. We used two different voting classifiers composed of three learning models: the first voting classifier is an ensemble of logistic regression, random forest, and KNN, whereas the second voting classifier consists of logistic regression, linear SVM, and classification and regression trees (CART). The criteria used for training the voting classifiers is to train individual models with the best parameters and then test the model based on the selection of the output label on the basis of major votes by all three models. We have trained a bagging ensemble consisting of 100 decision trees, whereas two boosting ensemble algorithms are used, XGBoost and AdaBoost. A k-fold (k = 10) cross validation model is employed for all ensemble learners.

**Fake News Detection on Social Media:**

**A Data Mining Perspective**

In this survey, we present a comprehensive review of detecting fake news on social media, including fake news characterizations on psychology and social theories, existing algorithms from a data mining perspective, evaluation metrics and representative datasets. We also discuss related research areas, open problems, and future research directions for fake news detection on social media.

**Fake News Detection Using Machine Learning**

In this work, we use the LIAR dataset which is collected from POLITIFACT.COM for fake news detection and it is publicly available for use, which provide links to source documents for each case. In all the previous works, the accuracies are all around 30 percent on this dataset. In this work, we use model ensemble techniques to have better accuracy in predicting fake news using the LIAR dataset. We have also tried to simplify the problem statement into binary classification and deployed the same ensemble techniques to have an even better realistic approach for accurate calculation.

Automatic Online Fake News Detection Combining Content and Social Signals

Thus, building on the work by [5], we present a novel fake news detection approach which, by combining content-based and social-based methods, outperforms existing approaches in the literature. Combining content-based and social-based approaches for prediction and classification tasks is a solution that has been successfully applied in other fields: in the recommender systems field, for example, the so-called hybrid recommender systems are used to overcome the limitation that collaborative filtering (i.e. social-based) methods face when an item has zero ratings [25], a situation also known as cold-start: in those cases, an additional technique based on the analysis of the item's content is combined with the collaborative filtering approach to mitigate the cold-start problem. As previously highlighted, the problem we face with fake news detection is quite similar, hence the idea of combining context-based and social-based methods to provide automatic detection tools that can work without (or with limited) social signals. This can make easier the task of early detection of fake news, that, in turns, can limit the spread of fake news as a whole.

# **Fake News Detection using Machine Learning**Published in:****[2020 IEEE International Symposium on Sustainable Energy, Signal Processing and Cyber Security (iSSSC)](https://ieeexplore.ieee.org/xpl/conhome/9358465/proceeding)

In this model, we used classification techniques such as Support Vector Machine (SVM), Naive Bayes, Passive attack classifier, etc. Using feature extraction technique as term Frequency Inversion Document Frequency (TF-IDF) and Support Vector Machine (SVM) as the classifier model output, the accuracy is 95.05%. The main motivation behind our work is to find the best classification algorithm that detects fake news and calculates its accuracy. We have studied different classification algorithms and in our model we have used SVM, passive attack classifier, Naive Bayes. Among the three, SVM provides the highest accuracy, but the time required by SVM is higher compared to passive-active, naive Bayes.

FAKEDETECTOR: Effective Fake News Detection with Deep Diffusive Neural Network

This paper makes an analysis of the research related to fake news detection and explores the traditional machine learning models to choose the best, in order to create a model of a product with supervised machine learning algorithm, that can classify fake news as true or false, by using tools like python scikit-learn, NLP for textual analysis. This process will result in feature extraction and vectorization; we propose using Python scikit-learn library to perform tokenization and feature extraction of text data, because this library contains useful tools like Count Vectorizer and Tiff Vectorizer. Then, we will perform feature selection methods, to experiment and choose the best fit features to obtain the highest precision, according to confusion matrix results.

FAKEDETECTOR: Effective Fake News Detection with Deep Diffusive Neural Network

This paper introduces a novel gated graph neural network, namely FAKEDETECTOR. Based on a set of explicit and latent features extracted from the textual information, FAKEDETECTOR builds a deep diffusive network model to learn the representations of news articles, creators and subjects simultaneously. Extensive experiments have been done on a real-world fake news dataset to compare FAKEDETECTOR with several state-of-the-art models, and the experimental results are provided in the full-version of this paper at [13].