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## WEIGHTED ACCURACY ALGORITHMIC APPROACH IN COUNTERACTING FAKE NEWS AND DISINFORMATION

### ALGORYTMICZNE PODEJŚCIE DO DOKŁADNOŚCI WAŻONEJ W PRZECIWDZIAŁANIU FAŁSZYWYM INFORMACJOM I DEZINFORMACJI

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#### Abstract

**Subject and purpose of work:** Fake news and disinformation are polluting information environment. Hence, this paper proposes a methodology for fake news detection through the combined weighted accuracies of seven machine learning algorithms.

**Materials and methods:** This paper uses natural language processing to analyze the text content of a list of news samples and then predicts whether they are FAKE or REAL.

**Results:** Weighted accuracy algorithmic approach has been shown to reduce overfitting. It was revealed that the individual performance of the different algorithms improved after the data was extracted from the news outlet websites and 'quality' data was filtered by the constraint mechanism developed in the experiment.

**Conclusions:** This model is different from the existing mechanisms in the sense that it automates the algorithm selection process and at the same time takes into account the performance of all the algorithms used, including the less performing ones, thereby increasing the mean accuracy of all the algorithm accuracies.

**Keywords:** artificial intelligence, natural language processing, machine learning algorithm, fake news, disinformation, digital revolution

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#### Streszczenie

**Przedmiot i cel pracy:** Fałszywe wiadomości i dezinformacja prowadzą do skażenia środowiska informacyjnego. Dlatego w niniejszym artykule zaproponowano metodologię wykrywania fałszywych wiadomości za pomocą połączonych dokładności ważonych siedmiu algorytmów uczenia maszynowego.

**Materiały i metody:** Artykuł ten wykorzystuje przetwarzanie języka naturalnego do analizy zawartości tekstowej listy próbek wiadomości, a następnie przewiduje, czy są one FAŁSZYWE, czy PRAWDZIWE.

**Wyniki:** Wykazano, że algorytmiczne podejście do dokładności ważonej zmniejsza nadmierne dopasowanie. Wykazano, że indywidualne działanie różnych algorytmów poprawiło się po wyodrębnieniu danych z serwisów informacyjnych i filtrowaniu danych „jakościowych” przez mechanizm ograniczeń opracowany w eksperymencie.

**Wnioski:** Model ten różni się od istniejących mechanizmów w tym sensie, że automatyzuje proces doboru algorytmów i jednocześnie bierze pod uwagę działania wszystkich zastosowanych algorytmów, w tym tych mniej wydajnych, zwiększając tym samym średnią dokładność wszystkich dokładności algorytmów.

**Słowa kluczowe:** sztuczna inteligencja, przetwarzanie języka naturalnego, algorytm uczenia maszynowego, fałszywe wiadomości, dezinformacja, rewolucja cyfrowa

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## Introduction

In this era of digital communication, it is very easy to get noticed by the public by addressing public grievances and demands regardless of the authenticity to the claim. This type of content can be termed as fake news. Fake news is written and published in order to gain readers' attention. This usually misleads readers by financially or politically sensationalist or exaggerated false headlines (Wiki 2020).

Most fake news detection systems try to predict the probability that a particular news report, editorial or some online content is intentionally produced for deceptive purposes (Chen, Conroy, Rubin 2015), for example, the fake news of Steve Jobs' heart attack had worst impact on the stock prices of Apple Inc. The detection mechanisms try to find and analyze linguistic clues based on the assertion that the language of truth is different from the language of lies (Feng, Hirst 2013; Larcker, Zakolyukina 2012; Bachenko, Fitzpatrick, Schonwetter 2008) and that liars are more psychologically prone to use emotionally driven sentences but less self-oriented pronouns.

One of the biggest reasons why fake news has thrived in society is that humans fall victim to Truth bias, Naïve Realism and Confirmation bias. The major classes and goals, along with the motive of proposing an approach to the detection system design have emerged by utilizing disparate techniques. Currently, there are two major categories of method approaches which are Linguistic and Network Approaches.

As the world is becoming more dependent on the internet for information exchange, some overzealous journalists, hackers, bloggers, individuals and organizations tend to abuse the gift of free information environment by polluting it with fake news, disinformation and pretentious content for their own agenda. Hence, there is the need to address the issue of fake news and disinformation with utmost seriousness. This paper proposes a methodology for fake news detection and reporting through a constraint mechanism that utilizes the combined weighted accuracies of seven machine learning algorithms.

## Literature review

Many experts have expressed that fake news is not just exclusive to marketing and public relations but also greatly associated with political propaganda and cultural engineering (Chen, Conroy, Rubin 2015). Traditionally, marketing, advertisement and public relations are the major departments that have been dealing with the implications arising from fake news and disinformation. Some experts have also suggested that a competitive corporate environment could be a solution for reducing the influx of fake news in the information environment (Balmas 2014).

The inception of the world wide web and advancement in information technology has also groomed a breed of perpetrators of fake news who

are motivated by attracting web traffic that has been a disastrous recipe for inflicting woes on web users. Some of the content published on these sites are intentionally coded with malware and viruses that are hidden. Companies especially have been a milky target for cyber-attacks (Messabi, Aldwairi, Al Yousif et al. 2018). Apart from the potential threat from malwares and viruses, many of the modern organizations are also concerned with employee manipulation for giving out their credentials. There is the lobby of content publishers that are using click baits to facilitate their phishing objectives (Nah 2015).

Database and data integrity are the information technology security implications associated with the practices of fake news (Pogue 2017). Data is a valuable asset in the digital era of information technology and artificial intelligence and the protection and preservation of data is of utmost importance. In some cases, fake news has been beneficial to some companies where there were reports of positive hike among various stocks of those companies as a result of fake news (Hassid 2011).

Fake news may help to enhance the marketing objective of an enterprise when the information is in the interest of the company, though in reality there might be no such extraordinary services available from these companies and their reputation could skyrocket if it goes in their favor. There could however be ramifications if the propaganda is exposed, such companies could be bound to dysfunction in the long-time frame.

Finally, there are ethical concerns regarding the whole concept of fake news propagation (which will not be further discussed in this paper). Journalists and writers are generally supposed to furnish concrete information, news and reports to the world by organizing authentic raw data materials. They are responsible for providing accurate information, this is why it is alarming that for the sake of popularity many of them ignore their code of conduct.

This paper seeks to propose a new methodology for infusing the weighted performances of different machine learning algorithms in detecting and reporting fakes news and misinformation.

## Existing fake news detection mechanisms

There are various methods proposed and/or applied for fake news detection.

Some of them are discussed below:

- a. Network mode method is a working principle of network analysis. What makes this mode different from other methods is its requirement of extensive data collection that assesses truth from new sentences (Conroy, Rubin, Chen 2015). This method checks the claims being made in the news or articles and their status of being real or fake determined with respect to authenticity of claims that are made in the report. This is the most straightforward method (Shu, Sliva, Wang et al. 2017). This method uses external data for the detection of authenticity of the

network model. This is also called fact checking method and it is further divided into three sub-categories as follows.

- Expert oriented fact checking method requires intellectual presentation for fact checking, it depends on human experts to analyze the data and claims in report as right or wrong and determine the final status of news being fake or real.
  - Crowd sourcing oriented fact checking method is a crowd sourcing method which works under the ambit of the collective wisdom of the crowd. This concept revolves around the general public instead of exclusive experts to determine the validity of news as fake or real.
  - Computational oriented fact checking method is the final model for the network mode method, it advocates the idea of automatic scalable systems to determine the validity and authenticity of any claim.
- b. Linguistic Method is a method whereby fake news is determined from the true news with the help of communication channels and letters. Research has shown that liars and truth speakers have different choices of word selection. Liars use other oriental materials whereas truth is spoken with self-orientation. This natural tendency of humans is used to distinguish between fake news and true news; therefore, these properties found in the content of a message can serve as linguistic clues that can detect deception (Rubin 2017).
- c. Naïve Bayes classifiers are derived from Bayes' Theorems. These calculate the probability of any certain condition happening in any system as something that has happened because something related to it has already occurred (Saxena 2017). Thus, they calculate the imminent outcome of any result by observing the preceding events. These are the machine language clauses. The technique of Naïve Bayes' classifiers is the swift and accessible technique. The biggest downfall of the naïve Bayes' classifiers is that it determines all the features separately which would be perplexing for this technique and may suffer the ability to determine the news because of lack of coordinated analysis.
- d. Support Vector Machine (SVM) can be used interchangeably with support vector network, also known as SVN. Support Vector Machine works with a superior learnable algorithm. The programmer trains these algorithms to acquire special skills. SVM works after it has been trained and acquired a special skill. This method classifies the data and it also maximizes the margin between the available columns of two data columns (Brambrick 2018). It is a very accurate model of analysis, along with being more flexible, this method can determine the numbers and handle high dimensional storage spaces (Ray, Srivastava, Dar et al. 2017). These are very efficient in terms of data handling and memory storages and the negative aspect is the

difficulty in dealing with large data sets because the SVM model requires a lot of time and effort to train the algorithm.

- e. Semantic Analysis checks the probability of authenticity of the news by comparing the degree of compatibility between personal experience and profile of the content derived from collection of data (Conroy, Rubin, Chen 2015). Semantic analysis works along with Natural Language Processing NLP. This method determines the real and fake news through the process of authorization. This is very essential for language of multiple meanings and close synonyms.
- f. Long Short Term Memory Model (LSTM is a model based on visualized network of links and their intermingled relationships determine the authenticity of links (Aldwairi, Alsaadi 2017). It initiates a thorough search in all the possible outcomes of the search and matches all the information provided to the user, the whole process undergoes a search in which the model determines and identify sites which may contain misleading content such as slang phrases and hyperboles. Such websites will then be termed as sources of fake news, users are warned against such contents. The rationale behind this model is the idea that the general perspective and fake click baits have longer words than general click baits (Lewis 2011) (this assumption however requires further studies). It determines whether a headline is a potential click bait or normal. Aside from the regular scrutinization of the words and click baits, LSTM also determines punctuation marks and their usage in websites, associates the bouncing factor of the sites before determining their authenticity. In the case of click baits, they contain information that do not resemble the desired information of the user hence the ratio of bouncing from the sites from the click baits is greater (Chakraborty, Paranjape, Kakarla et al. 2016). The algorithm may present a list of potential fake news to users so they could act accordingly (Aldwairi, Abu-Dalo, Jarrah 2017).

Research in the area of fake news detection through machine learning approaches is advancing at a fast pace. The first fake news challenge stage-1 FNC-1 was organized in June 2017 and the proposal suggested through the challenge has had a 82% success rate.

### Weighted accuracy algorithmic approach

The weighted accuracy algorithmic approach is a method proposed by this paper as an alternative to the existing methods in fake news detection and reporting.

### Method

This paper uses a combination of seven different machine learning algorithms through Natural

Language Processing to analyze the text content of a list of news samples and then predict whether they are FAKE or REAL based on the weighted accuracies of different algorithms and the maximum prediction accuracy among the models used. Natural Language Processing, NLP is a crucial technique in text analysis which is widely used in fake news detection (Riedel B., Augenstein, Spithourakis et al. 2017).

PHP language is used for data management while Sklearn<sup>1</sup> is used for training the models in this paper.

## I) Algorithm Training and Best Fit Model Selection

- a. Let's import seven algorithms namely,
  - Logistic Regression (LR)
  - Linear Discriminant Analysis (LDA)
  - KNeighbors Classifier (KN)
  - Decision Tree Classifier (CART)
  - GaussianNB (NB)
  - Support Vector Machine (SVM or SVC)
  - Passive Aggressive Classifier (PAC)
- b. Set an algorithm control mechanism to select the models that are suitable for fitting and transforming the dataset (meaning, only algorithms that are able to fit and transform the dataset under study will be used for further analysis).
- c. Import and clean up the dataset (such as dropping empty rows and mismatch columns).
- d. Set two URL inputs namely, Authentic news source and Unreliable news source.
- e. Copy and paste the URL of a news source that is generally accepted as authentic and do the same for Unreliable news source into the two URL inputs above respectively.
- f. Build a recursive crawler that goes into a website and extract the links and further extract sub-links and put them into a list.
- g. The crawler then goes into each link and scrapes the page, looks for news titles and main texts, then saves the extracted content into the existing dataset. Do this step repeatedly (for the same website and other websites) to increase the sample size of the dataset.
- h. The extracted data is saved in the following format:
  - Number of words; this is the number of words in the main text of each news article
  - Title; the heading or title of each news article
  - Text; this is main text content of the news article
  - Label; each news from Authentic sources is labeled as REAL
  - whereas those from Unreliable sources are labeled as FAKE
- i. Import all seven machine learning algorithms and assign labels to them using their abbreviations, e.g. Logistic Regression will be LR (The algorithm control mechanism will select which algorithms can fit and transform the dataset under study and use them for further analysis).

- j. Split the dataset into training and testing samples (usually, 80% and 20% respectively).
- k. Train each of the selected algorithms with the training data and test them separately.
  - l. Record the accuracy, precision, recall, f1-score, support and confusion matrix for each algorithm.
- m. Find the mean, median, minimum, maximum of the list of accuracies.
- n. Choose the algorithm with the maximum accuracy as the best fit model for the dataset.

## II) Media Outlet Detection

- a. Copy and paste or type media outlet's website address or domain into URL input (stated above) and hit submit or enter.
- b. The crawler will go into this website and scrape its links recursively and arrange them into a list.
- c. The crawler will then scrape all the links and sub-links on the list and then look for news content.
- d. The news content will be put into a dataframe similar to the one stated above and/or saved to a csv file.
- e. The best fit model will predict each extracted news content in the dataframe and record the prediction as either FAKE or REAL in the column 'Label'. The content in the column 'Label' will then be transformed from string to integers; thus FAKE=0, REAL=1.
- f. Sum all the content in the Label column and divide by the number of elements in the Label column if there is at least one element in the Label column. Thus,
 

Let authenticity score be S, number of elements in the Label column be n(L) and each label be L, if n(L) 0, then

$$S = \frac{\sum_{i=0}^{n(L)} L_i}{n(L)} \quad (1)$$

- g. Authenticity score of 1 or 100% is the highest while 0 is the lowest. The higher the authenticity score the closer the cumulative content of the website is to being REAL and vice versa.
- h. Set performance constraints for the authenticity score to determine whether the media outlet's website is Authentic or Unreliable. (I used simple percentages as the constraints for simplicity sake). Let the news dataframe matrix be N, elements of Label column for fake news be Lf and Label column for real news be Lr
 

There are four possible outcomes;

If n(L) ≠ 0, if S ≥ 75%, N(Lf<sub>i</sub>) = 1, N(Lr<sub>i</sub>) = 1. Mark all news content on website as Authentic OR,

If n(L)≠0, if S ≤ 75% , N(Lf<sub>i</sub>) = 0, N(Lr<sub>i</sub>) = 0. Mark all news content on website as Unreliable OR,

If n(L)≠0, if 25% ≤ S ≤ 75%, N(Lf<sub>i</sub>) = 0, N(Lr<sub>i</sub>) = 1. Mark each news content on website as Authentic or Unreliable according to the model's prediction OR

<sup>1</sup> Sklearn – Scikit-learn is a free machine learning library which features algorithms.

If  $n(L)=0$ , the Label column is an empty set. Mark as  $\emptyset$ .

(I used 25% and 75% to get an interquartile range effect of the percentage values of S)

i. From step h) above we can automatically use the algorithms to estimate the authenticity of a news outlet's website without having prior knowledge of the website whether being FAKE, REAL or partly FAKE and partly REAL.

j. If the algorithm predicts that the content on the website is partly FAKE and partly REAL, the percentage of fake and real news can be calculated as follows.

Let  $P(f)$  be percentage of fake news on website and  $n(f)$  be the number of fake news elements in the set L. Then

$$P(f) = \frac{\sum_{i=0}^{n(f)} N(Lf_i)}{n(L)} \quad (2)$$

Likewise,

Let  $P(r)$  be percentage real news on website and  $n(r)$  be the number of real news elements in the set L. Then

$$P(r) = \frac{\sum_{i=0}^{n(r)} N(Lr_i)}{n(L)} \quad (3)$$

k. Let the unacceptable accuracy threshold of best fit model be  $U(\text{acc})$ , acceptable accuracy threshold of the best fit model be  $A(\text{acc})$ , maximum of model accuracies of all algorithms be  $M(\text{acc})$ , mean of accuracies of all algorithms be  $\mu(\text{acc})$ , minimum acceptable mean of accuracies of all algorithms be  $\alpha(\text{acc})$ . The content on the media outlet will be added to the training dataset to further train the algorithms

if  $M(\text{acc}) \geq A(\text{acc})$ ;

Or if;

$U(\text{acc}) < M(\text{acc}) < A(\text{acc})$  and  $\frac{1}{4}A(\text{acc}) \leq S \leq \frac{3}{4}A(\text{acc})$

(S is taken from equation (1))

(I used  $\frac{1}{4}$  and  $\frac{3}{4}$  to get an interquartile effect of the percentage values under  $A(\text{acc})$ )

The constraints are set in order to maximize the quality of the training data thereby increasing the prediction accuracy of the algorithms in subsequent analysis.

### III) Single Link Detection

- a. Copy and paste news link into URL input and submit.
- b. The crawler will go into the page and scrape the news content (title and main text content) and put them into a dataframe and/or save to csv file.
- c. The best fit model will predict whether the news content is FAKE or REAL.
- d. If and , The news content together with its label predicted by the best fit model will be added to the training dataset to further train the algorithms.

### Results

In this experiment, I used [bbc.com](http://bbc.com) as a source for authentic news and [huzlers.com](http://huzlers.com) as a source of unreliable news (just for experimental purposes) and [cnn.com](http://cnn.com) as a test media outlet website. The initial dataset contained 6335 news contents labeled as FAKE or REAL as shown in figure 1.

Out of the seven algorithms mentioned above only four of them were able to fit and transform the news text content namely, Linear Regression, KNeighbors Classifiers, Decision Tree Classifier and Passive Aggressive Classifier. The other three could not fit and transform the news content in the dataset and were therefore eliminated from the analysis by the algorithm control mechanism. All four models learn from the dataset and their prediction accuracies according to the train and test data which are as shown in figure 2 (for the sake of simplicity this paper only considers accuracy scores for further analysis)

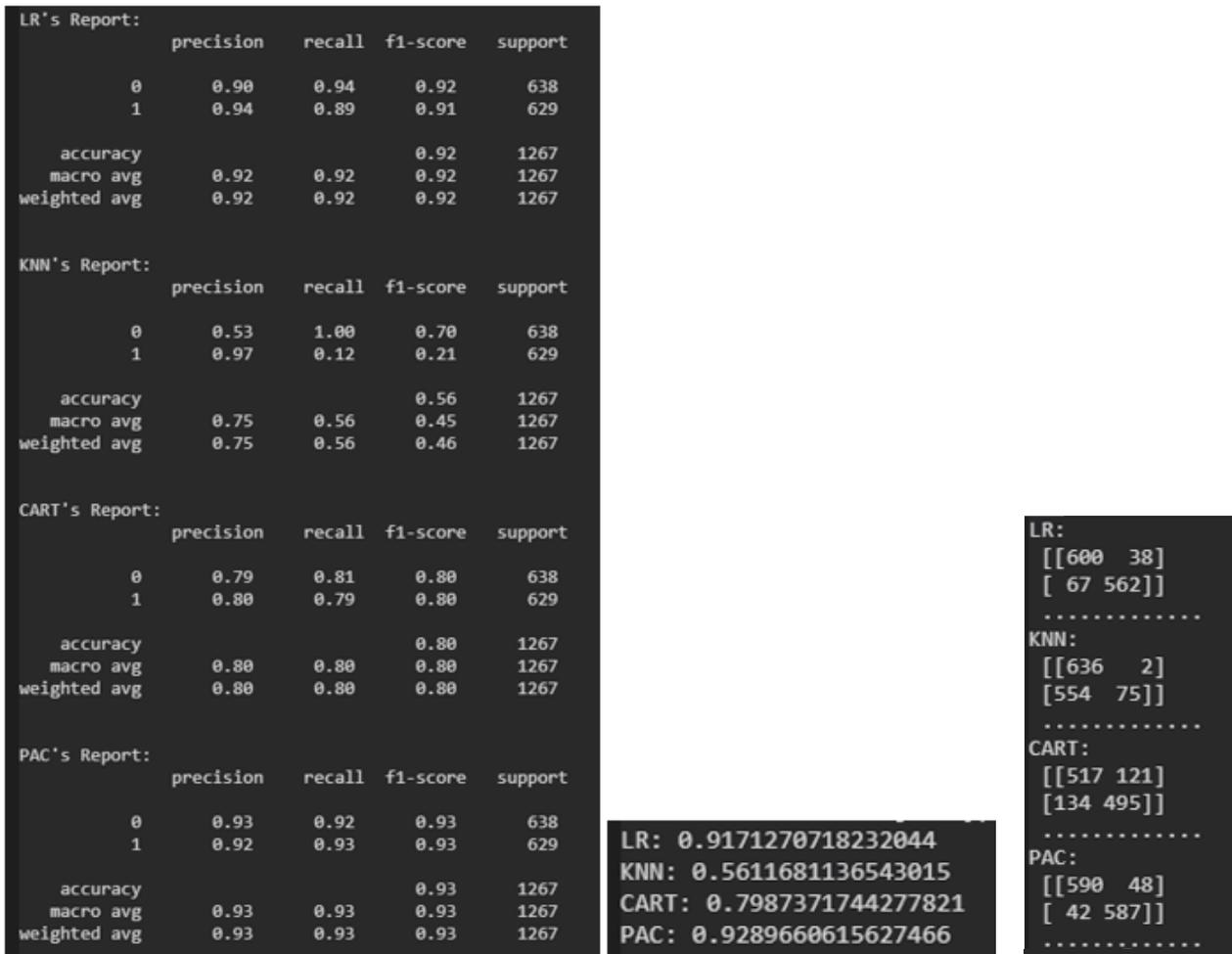
We can see from figure 2 that PAC is the best fit model to qualify for further analysis as it got an

```

Unnamed: 0      title \
6330      4490 State Department says it can't find emails fro...
6331      8062 The 'P' in PBS Should Stand for 'Plutocratic' ...
6332      8622 Anti-Trump Protesters Are Tools of the Oligarc...
6333      4021 In Ethiopia, Obama seeks progress on peace, se...
6334      4330 Jeb Bush Is Suddenly Attacking Trump. Here's W...

text label
6330 The State Department told the Republican Natio... REAL
6331 The 'P' in PBS Should Stand for 'Plutocratic' ... FAKE
6332 Anti-Trump Protesters Are Tools of the Oligar... FAKE
6333 ADDIS ABABA, Ethiopia –President Obama convene... REAL
6334 Jeb Bush Is Suddenly Attacking Trump. Here's W... REAL
    
```

**Figure 1.** Initial dataset containing 6335 news content labeled as FAKE or REAL  
Source: Screenshot from author's code studio.



*Precision, Recall, F1-score, Support*                      *Prediction Accuracies (≥1)*                      *Confusion Matrices*

**Figure 2.** All four models learn from the dataset and their prediction accuracies according to the train and test data  
 Source: Screenshot from author's code studio.

accuracy score of  $\approx 0.929$ , i.e.  $\approx 92.9\%$ . KNN got the lowest accuracy score of  $\approx 56.12\%$ . The mean of all model accuracies is  $0.801499 \approx 80.15\%$  and the median is  $\approx 85.79\%$ .

The crawler goes into [bbc.com](http://bbc.com), scrapes 562 links and sub-links and extracts 2357 news contents, goes into [huzlers.com](http://huzlers.com) and scrapes 193 links and sub-links and extracts only 24 news contents (the number of links, sub-links and news content extracted will be based on the quality of their contents as determined by the crawler). Both extracted news contents are added to the dataset, so there are  $2357+24 = 2381$  news contents for the algorithms to learn from.

The crawler then goes into [cnn.com](http://cnn.com), scrapes 528 links and sub-links and extracts 23 news contents. All four model predict whether the 23 contents are FAKE or REAL news. The results are as shown in figure 3.

We can see clearly from figure 3 that the accuracy scores have improved compared to the previous figures. PAC is still the best fit model, however, the other models also performed better and had better scores than the previous ones. PAC got an accuracy

score of  $\approx 0.937$ , i.e.  $\approx 93.7\%$ . KNN still got the lowest accuracy score of  $\approx 58.09\%$  (better than previous one of  $56.12\%$ ).

The mean of all model accuracies is  $0.8125 \approx 81.25\%$  and the median is  $\approx 86.59\%$ .

This shows the combined algorithm performance used as the indicator to determine which news is FAKE or REAL and which data is qualified to be added to further train the models. Further analysis has shown an increase in the efficiency of all the algorithms used (further study is required to determine how the constraints and can be efficiently deduced).

Then, I proceeded to do another out of sample test using a single news link to check whether it is FAKE or REAL news. I copied the link <https://news.yahoo.com/spains-catalonia-strictly-measures-coronavirus-080017814.html> from [news.yahoo.com](http://news.yahoo.com) and pasted it into the URL input and submit. The results are as shown in figure 4.

We can see from figure 4 that PAC is still the best fit model for the analysis. It predicted that the news is REAL and the constraints mechanism described

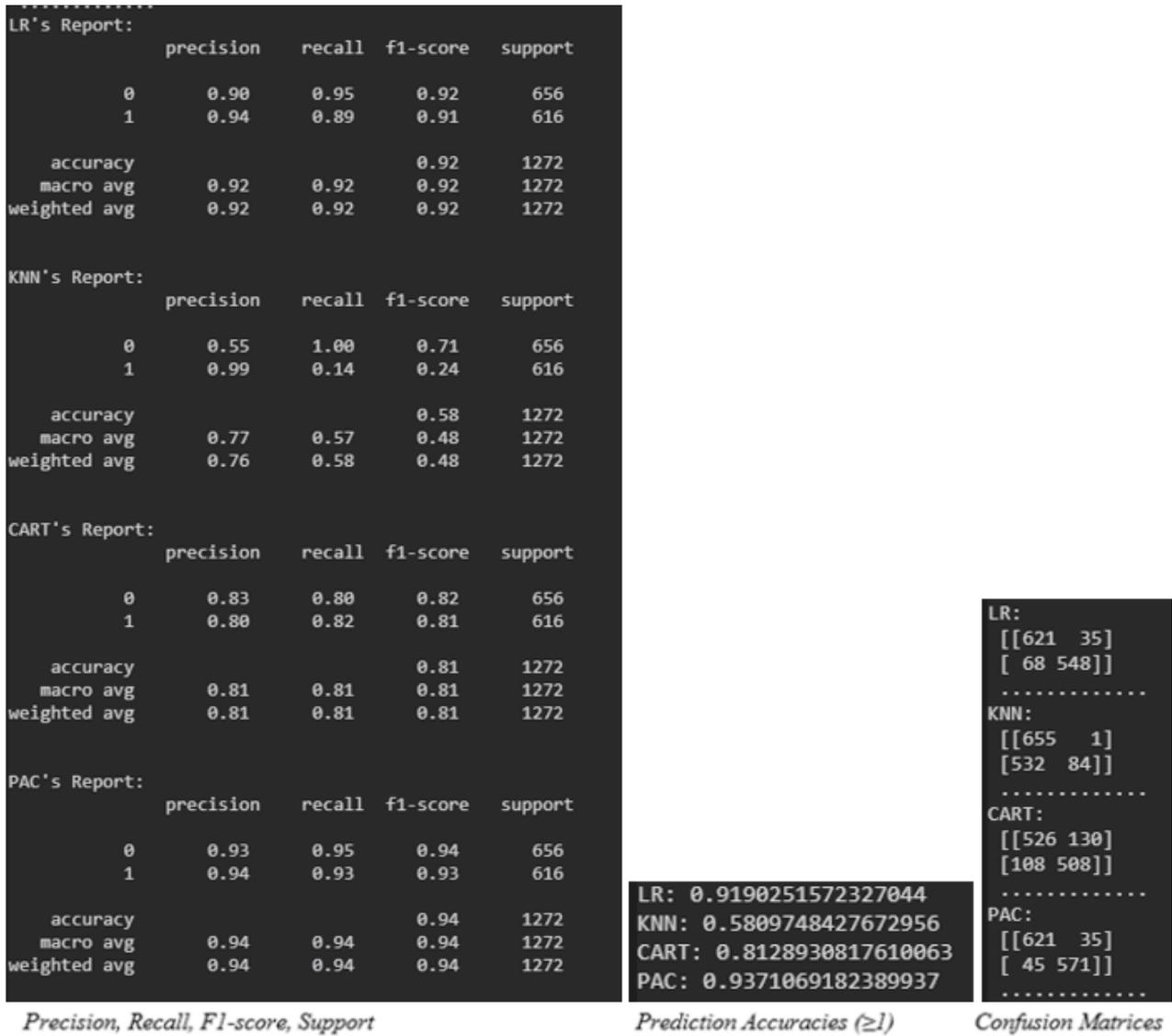


Figure 3. All four models predict whether the 23 news content are FAKE or REAL news  
 Source: Screenshot from author's code studio.

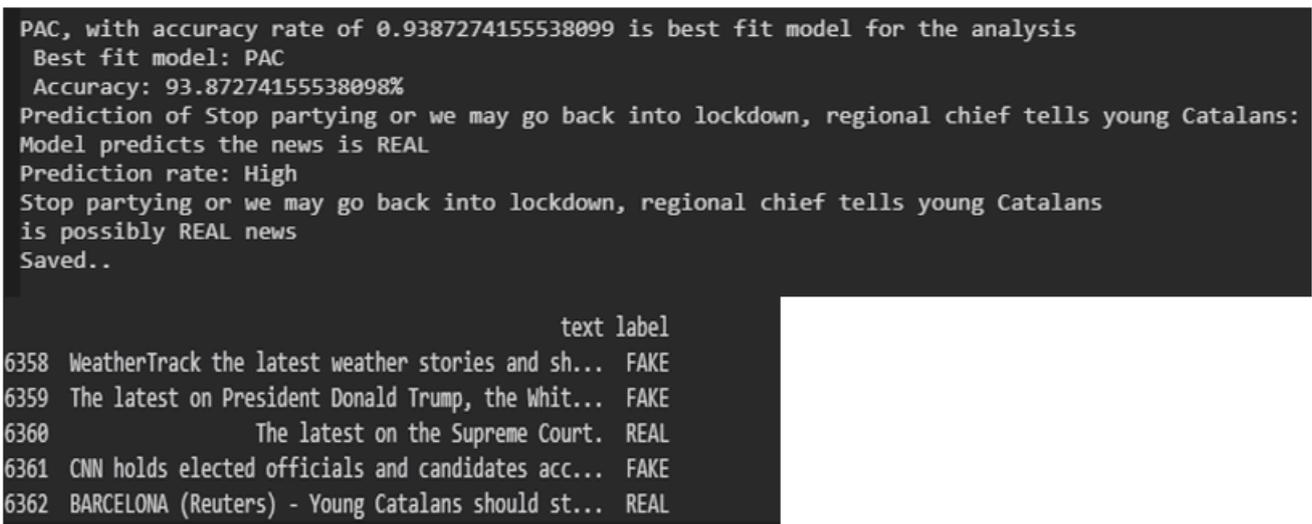


Figure 4. Best fit model for the analysis is PAC  
 Source: Screenshot from author's code studio.

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Prediction of Bill Gates, Vaccines & Transhumanism: Dark Secrets You Need To KnowWatch LiveFeaturedRel
ated ArticlesSearchSearchSide Hero AdToday on the ShowListen to the Alex Jones Show - Here's HowWatch
the ShowWatch Live NowTop StoriesLatest StoriesSignupGet InformedFrom the storeVisit Our StoreWatch t
he newsILLUSTRATIONIllustrationPollPOLLS:
Model predicts the news is FAKE
Prediction rate: High
Bill Gates, Vaccines & Transhumanism: Dark Secrets You Need To KnowWatch LiveFeaturedRelated ArticlesS
earchSearchSide Hero AdToday on the ShowListen to the Alex Jones Show - Here's HowWatch the ShowWatch
Live NowTop StoriesLatest StoriesSignupGet InformedFrom the storeVisit Our StoreWatch the newsILLUSTR
ATIONIllustrationPollPOLLS
is possibly FAKE news
Saved..

                                text label
6359 The latest on President Donald Trump, the Whit... FAKE
6360           The latest on the Supreme Court. REAL
6361 CNN holds elected officials and candidates acc... FAKE
6362 BARCELONA (Reuters) - Young Catalans should st... REAL
6363 David Knight is joined by Dr. Sherri Tenpenny ... FAKE

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**Figure 5.** Single link detection repeated for different website  
Source: Screenshot from author's code studio.

in the previous chapter also put the news as REAL so the news content is deemed REAL. The news content is qualified to be saved for further training of the algorithms based on constraints set by the mechanism of weighted accuracies of all four models and the maximum accuracy of the four accuracies, as described in the previous chapter.

The same test is done using the link <https://www.infowars.com/bill-gates-vaccines-transhumanism-dark-secrets-you-need-to-know/> and the results are as shown in figure 5.

PAC predicts the news is FAKE, the weighted effect of the four algorithms allows the content to be saved, the prediction accuracy is marked as high, and not to sound prejudicial, this news source is listed on Wikipedia as a fake news source (Wiki 2020).

## Discussion

The weighted accuracy algorithmic approach in fake news detection is different from the existing mechanisms in the sense that it automates the algorithm selection process and at the same time takes into account the performance of all used models including the worse performing algorithms. This helps to reduce overfitting by a singular algorithm that seems to be performing greatly. Also, this paper does not claim that the mechanism used here is the perfect solution for fake news detection; it is nevertheless an alternative to specialized algorithm detection mechanisms such as LSTM etc. More research is needed to show how to determine the constraints and more precisely.

## Conclusions

News is a critical factor for decision making. In this digital era, not only has misinformation become a marketing technique or public manipulative tool but has also been used by extremists which could bring about serious calamities such as public unrest if not handled with care. Therefore, it is imperative to counter any effect on the internet or in the area of information technology that may promote fake or false data and spread confusion in the society. This paper proposes a simple and effective tool based on weighted accuracy machine learning algorithms to determine potentially false or misleading information on the internet. The mechanism used in this paper has shown to improve the efficiency of detection through the combined performance of different algorithms thereby correcting overfitting that may produce overconfident results if singular or specialized algorithms are used.

A call for a more hygienic information environment is crucial to the socio-economic and geopolitical system of the global economy and internationalism as a whole.

## Abbreviations

AI – Artificial Intelligence  
U.S – United States  
EU – European Union  
PHP – Hypertext Preprocessor is a widely-used, open source scripting language  
Sklearn – Scikit-learn is a free machine learning library which features algorithms

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