Fake News detection

Author: Rüdiger Hass

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Introduction

Understanding the problem


PROPAGANDA

Fake News

"Fake news, [...] is a form of news consisting of deliberate disinformation or hoaxes spread via traditional news media (print and broadcast) or online social media." (Wikipedia).

Problems with Fake News

misinformation
&
manipulation

"complex, both technically and philosophically."

Mark Zuckerberg (2016)

Goal

A machine learning model which can be applied to distinguish Fake News contents from true news contents by Natural Language Processing (NLP).

02
DATA

Visualizing data

SHUTTERSTOCK, CNNMONEY

DATASET

- corpus comprises output of 9 publishers in a week close to the US elections 2016

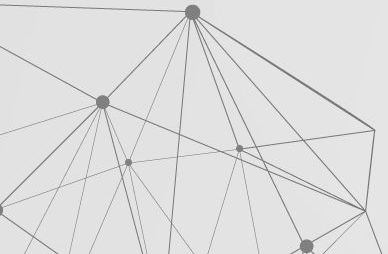
- Articles from 09/19 to 09/23 and 09/26 and 09/27/2016
- fact-checked by professional journalists at BuzzFeed

DATA SET

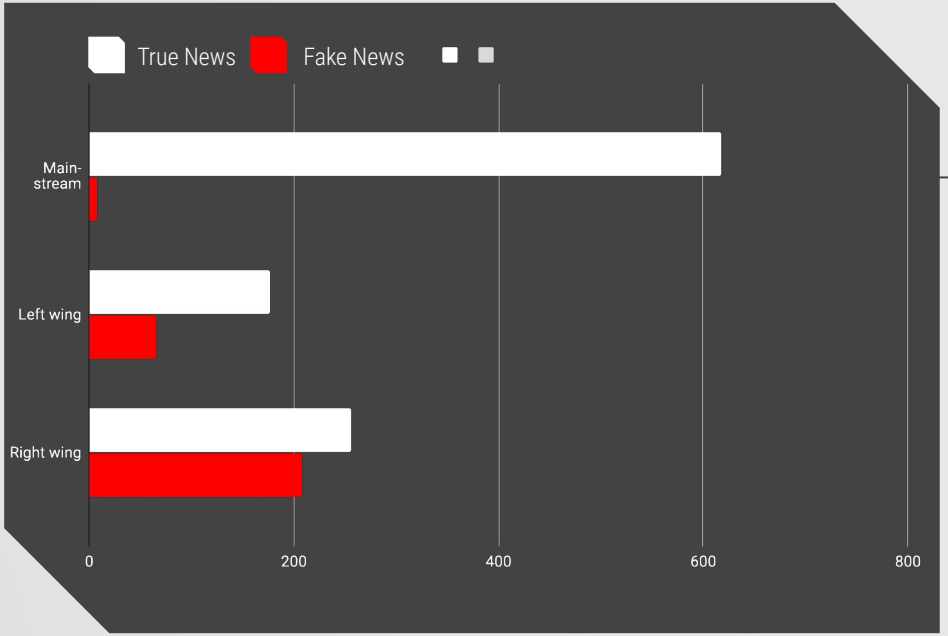
1496 Total Articles

1210 True Content

286 Fake News



Political Direction



Output of 9 publishers in a week close to the US elections. Among the selected publishers are 6 prolific hyperpartisan ones
All publishers earned Facebook's blue checkmark, indicating authenticity and an elevated status within the network

Mainstream

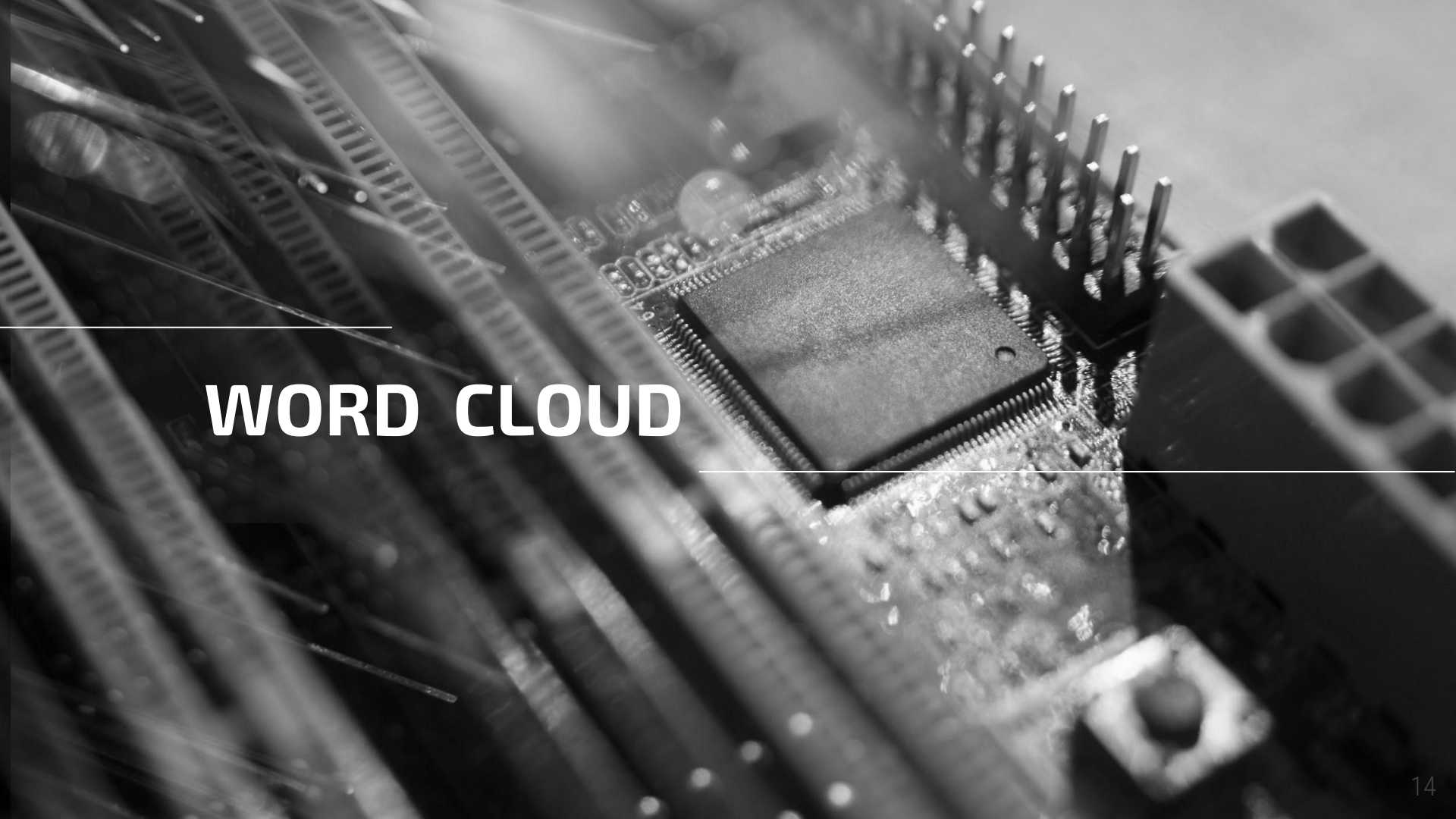
abc CNN politico

Left wing

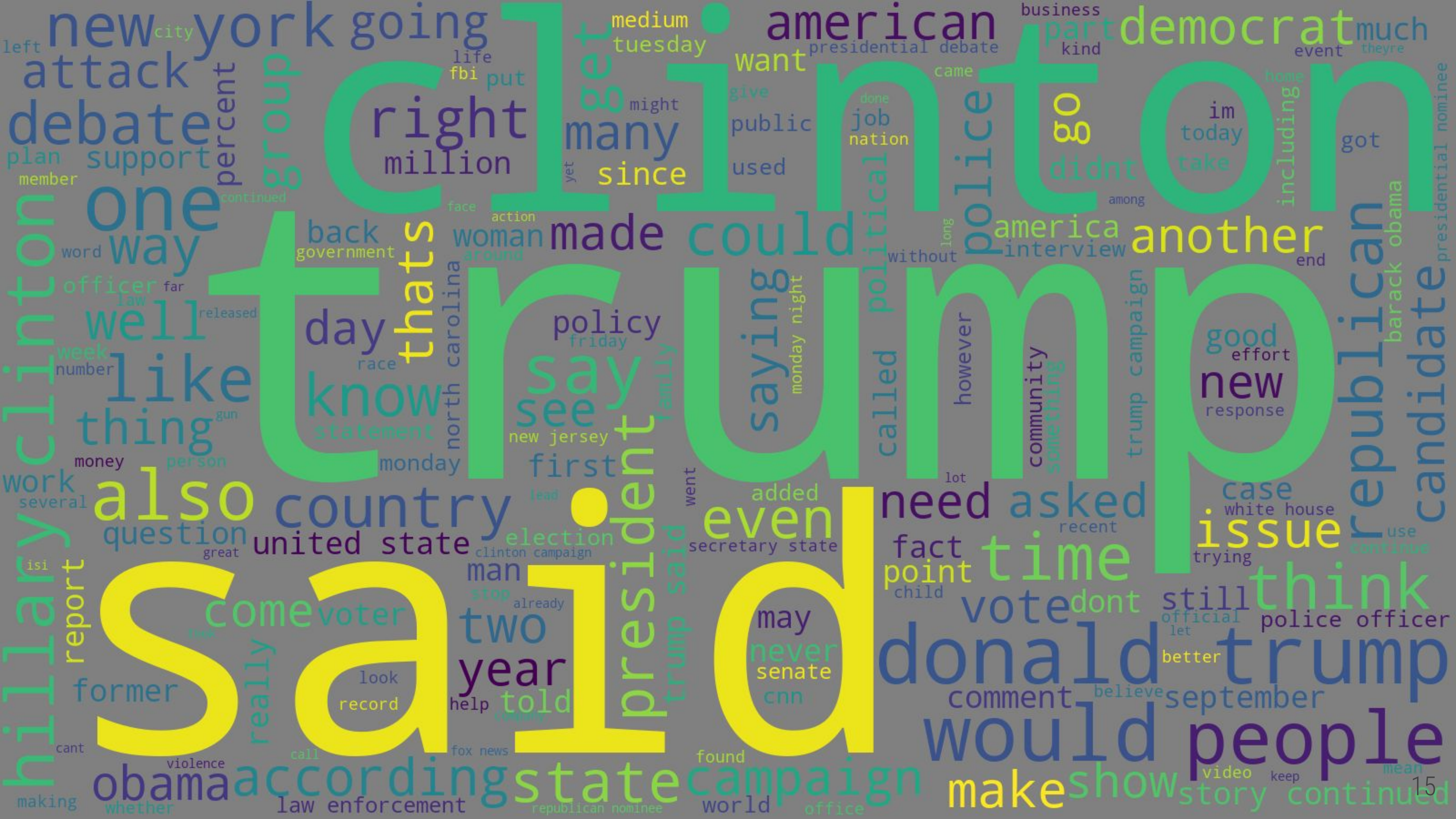
Occupy Democrats other98 addicting-info

Right wing

Freedom Daily Eagle Rising Right Wing News



WORD CLOUD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candidate
barack obama
presidential nominee
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hillary clinton
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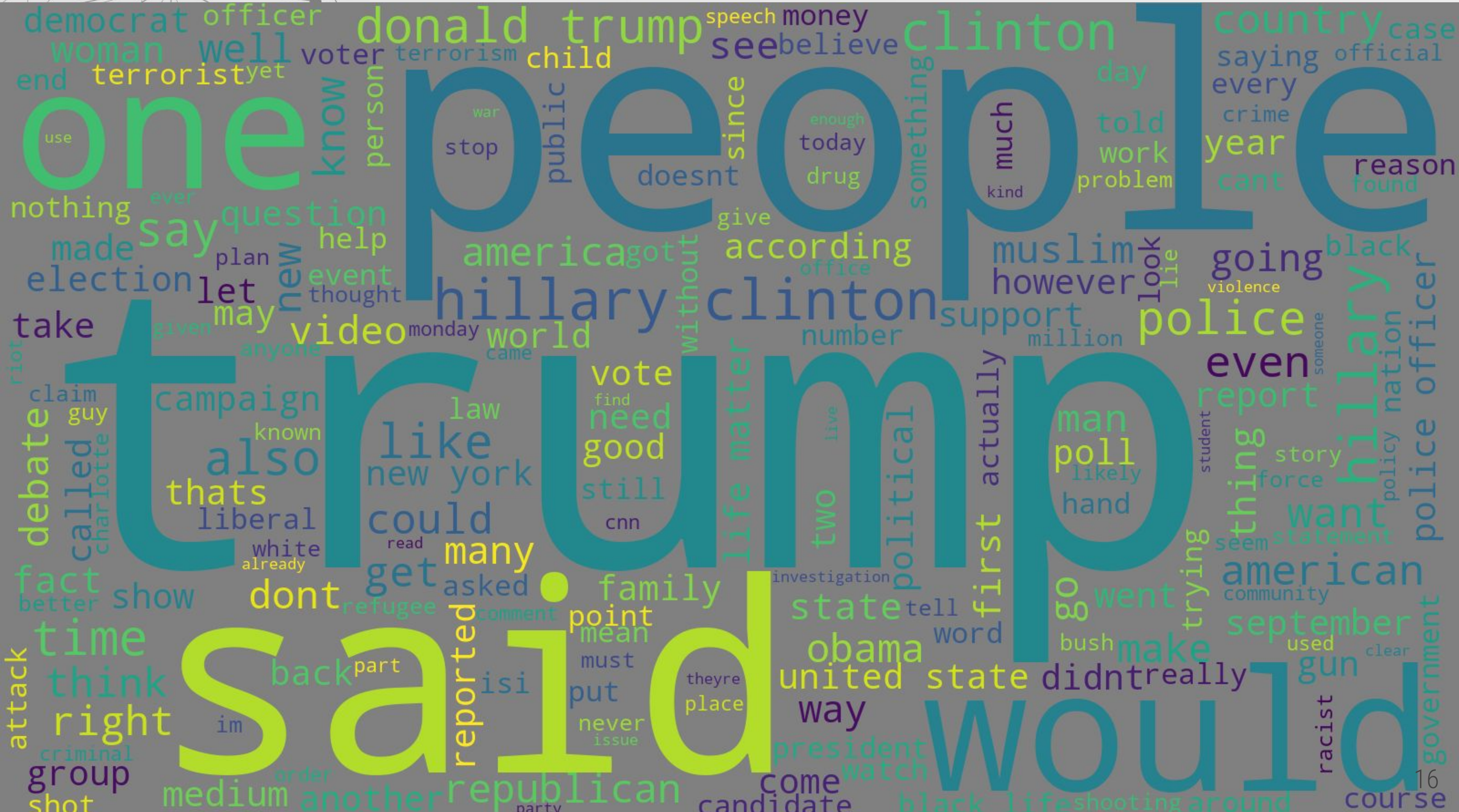
people
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used
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government
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put
reported
attack
right
place
way
racist
im
never
issue
criminal
president
group
order
watch
come
medium
another
republican
candidate
black life
shooting
around
course
shot
party

03
MODEL

Explaining underlying models

NATURAL LANGUAGE PROCESSING

TEXT CLEANING

Lemmatization, set lowercase,
remove: punctuations, stopwords, URL's, twitter names

TOKENIZATION

Breaking up sentences into sequences of words

TRAIN MODEL

apply data in model

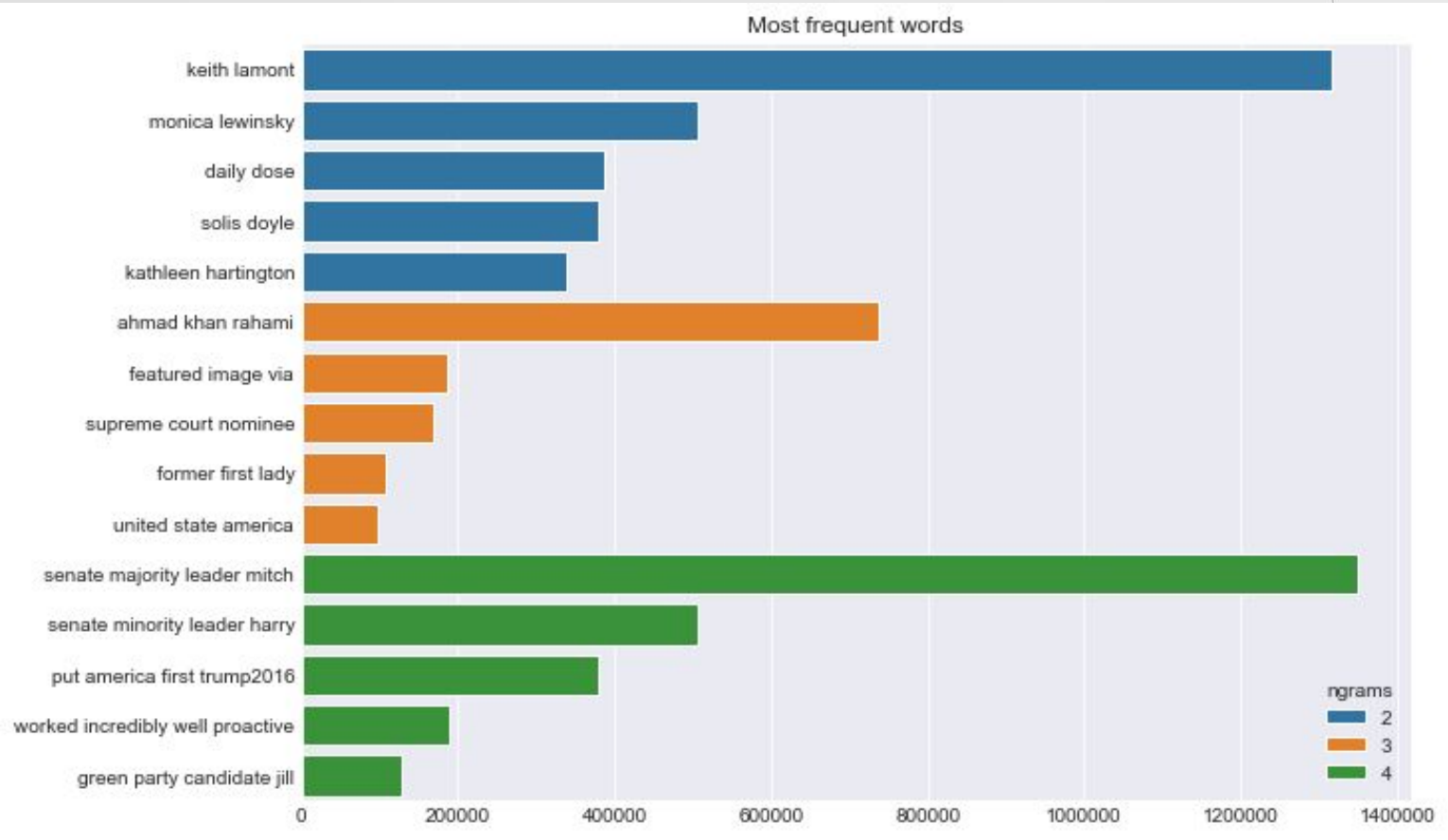
Models


MODELS
Machine Learning
Recurrent neural network
Bag-of-Words
term frequency - inverse document frequency
Word Embedding
Word2Vec

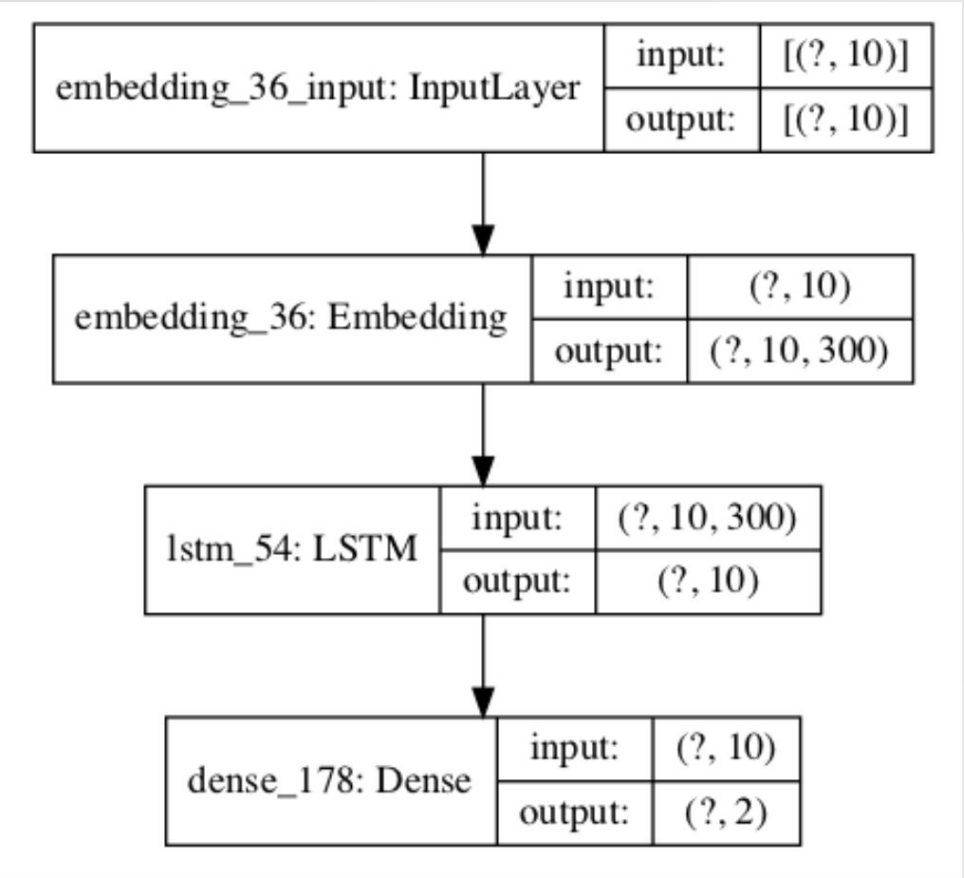
Bag-of-Words: Feature Importance

	feature	score	y
1828	combetta	0.965358	1
4088	hillary	0.963603	1
2809	drug	0.960520	1
7127	reddit	0.942785	1
7950	sharia	0.926557	1
2099	coughing	0.924741	1
8983	townsend	0.903395	1
3924	haiti	0.902220	1
1070	black	0.897204	1
2098	cough	0.888368	1

Word2Vec: ngrams



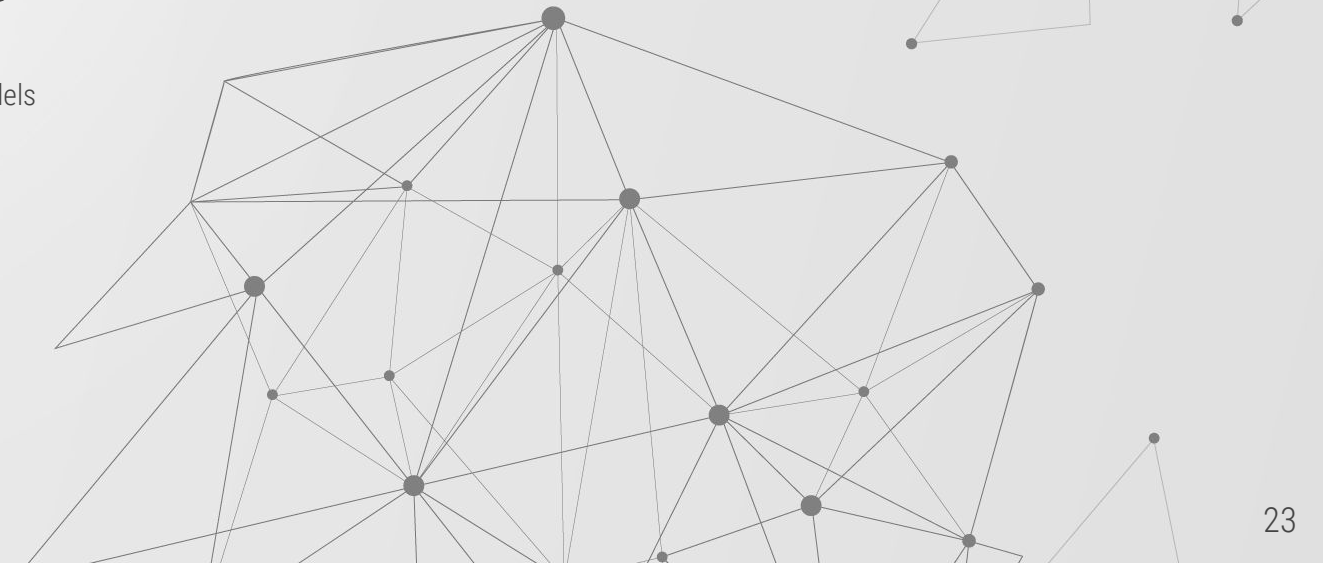
Word2Vec: Neural Network



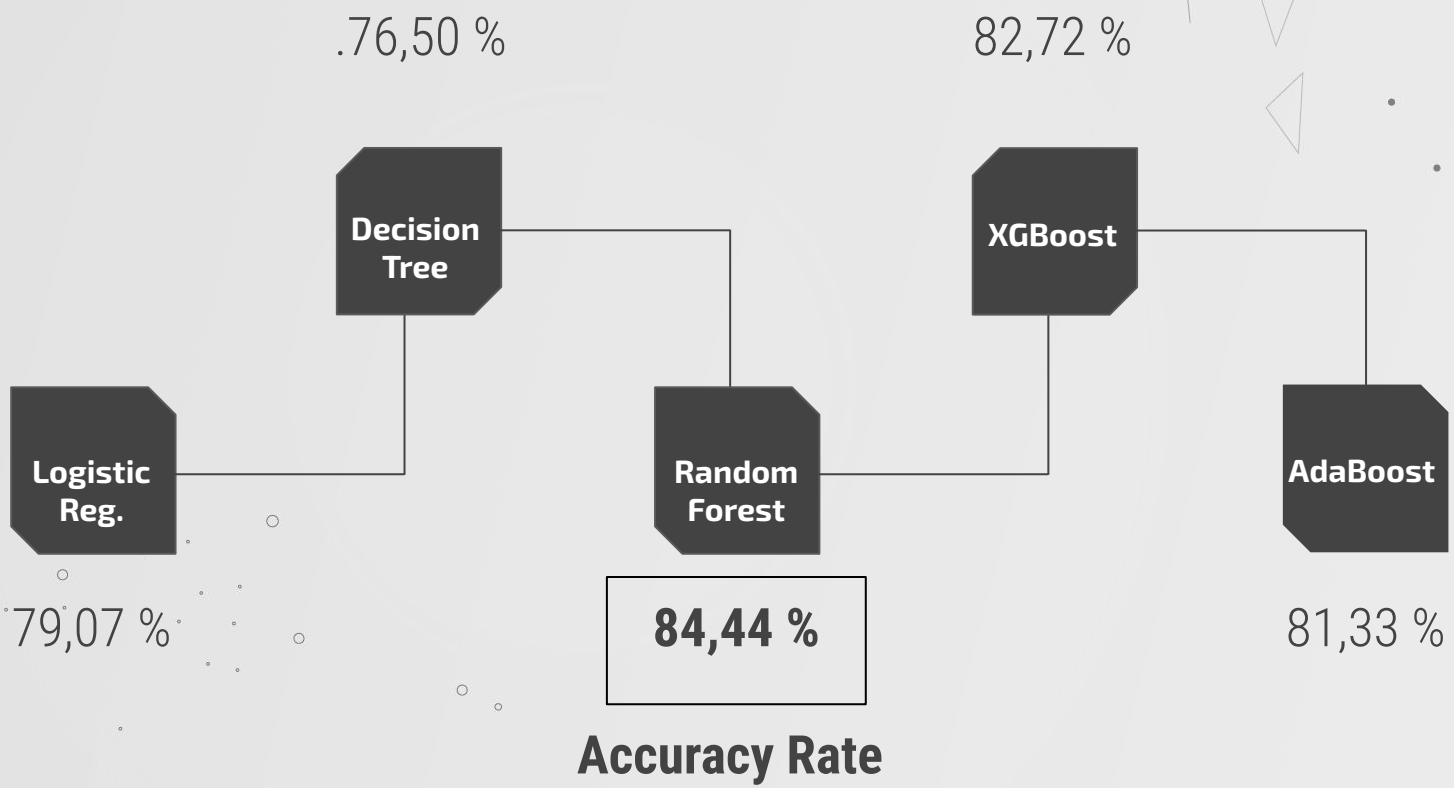
04

Results

Presenting results of the models



Bag-of-words



Accuracy Rate

Neural Network

Word2Vec:

- **Accuracy Rate around 80 %**
- **Need much time and energy**

05

Conclusion

Choosing best model

Recommendation

Bag-of-Words

- Accuracy Rate ~ 84 %
- Precision Rate ~ 76 %
- Most efficient model

Neural Network

- Small data set
- No need for Neural Networks

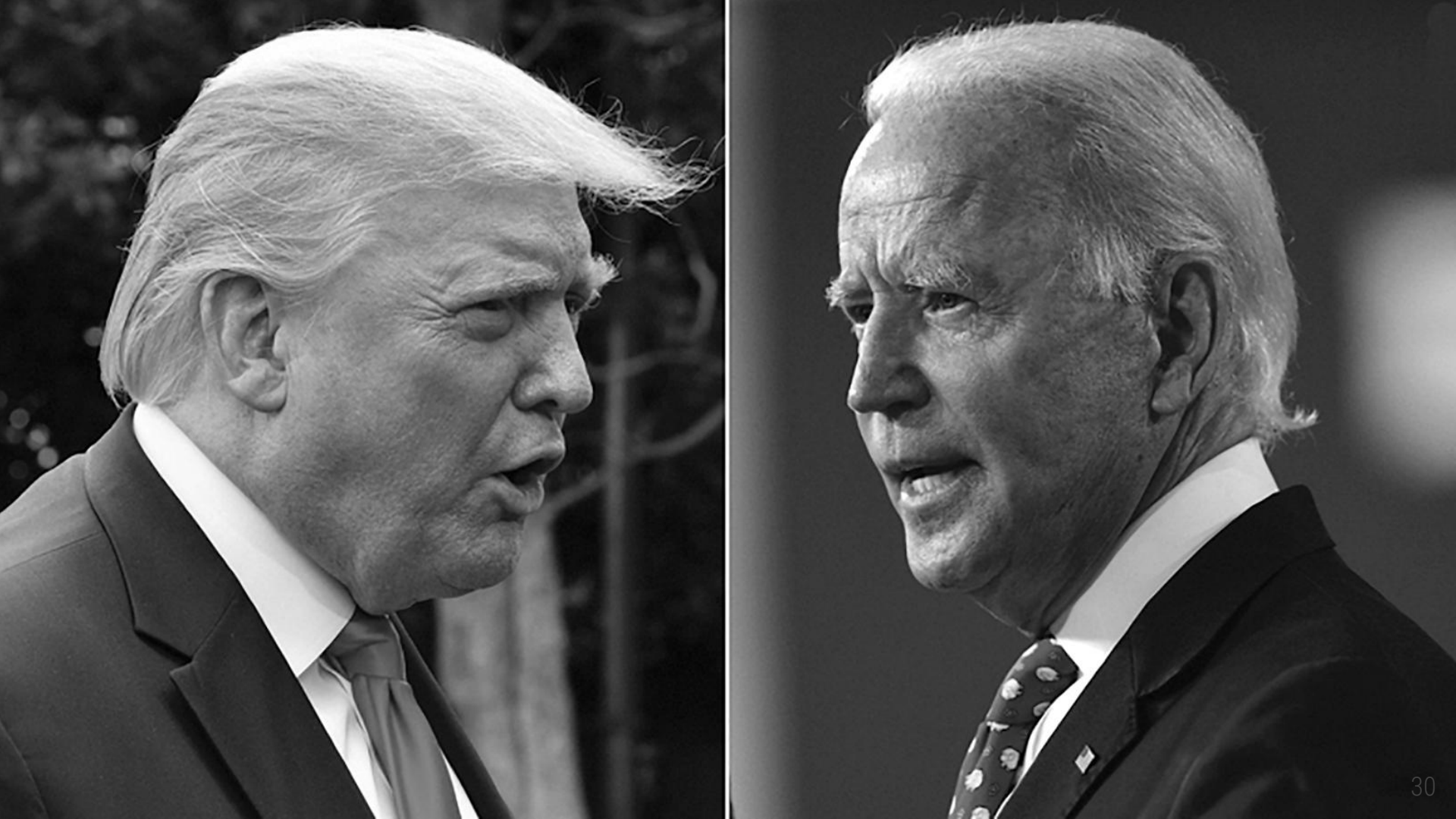
06

Outlook

Future Work

Future Work


Collect more data
Fake news detector for U.S. Presidential Election 2020
Improve Neural Network



THANKS

Does anyone have any questions?

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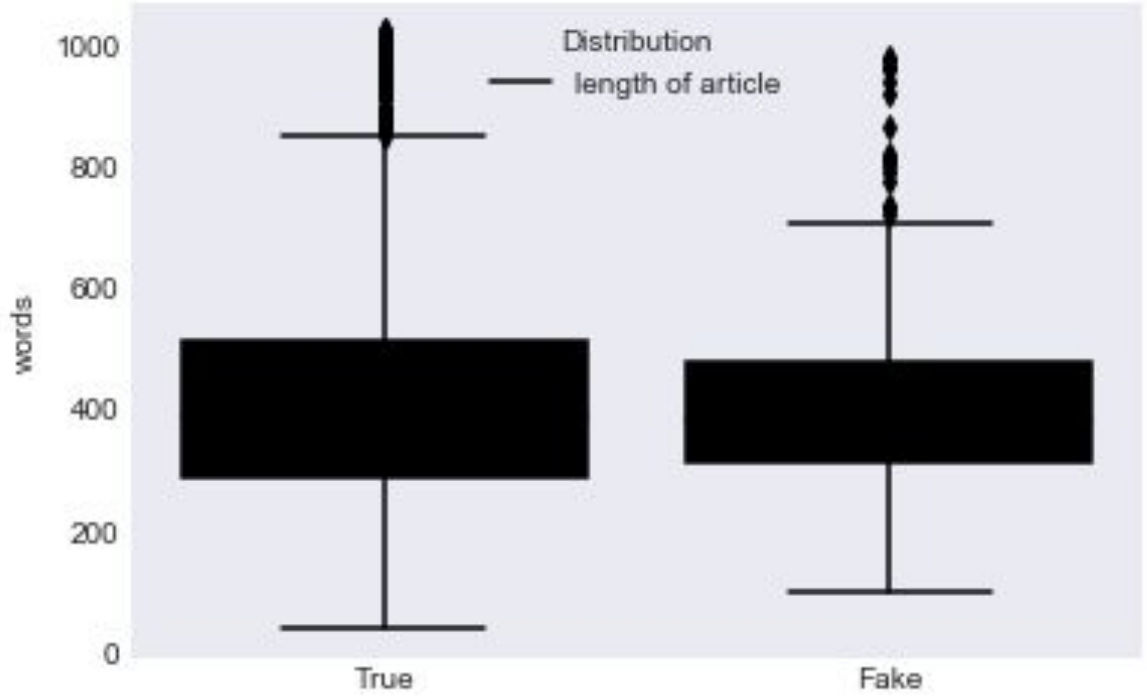
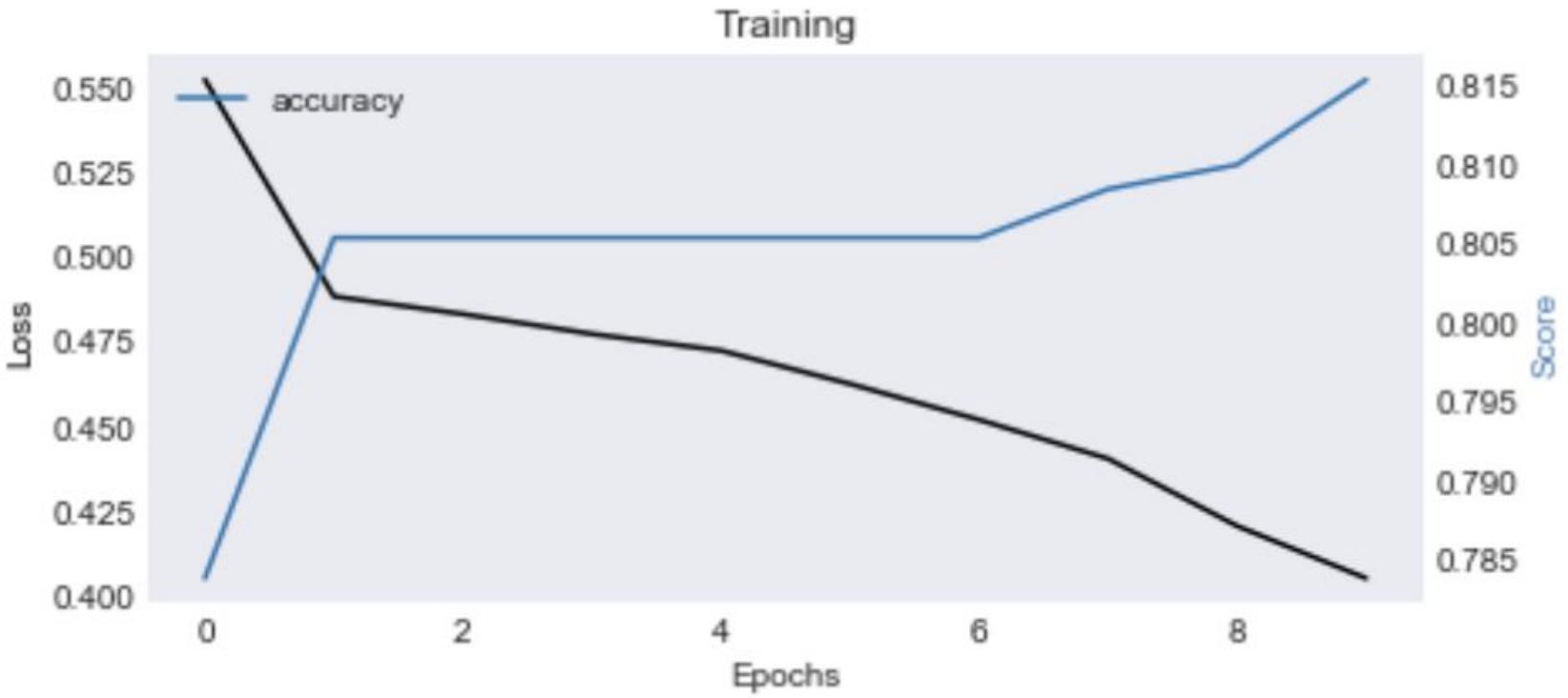
EDA: Box plot


Distribution
length of article
1000
800
600
400
200
0
words
True
Fake

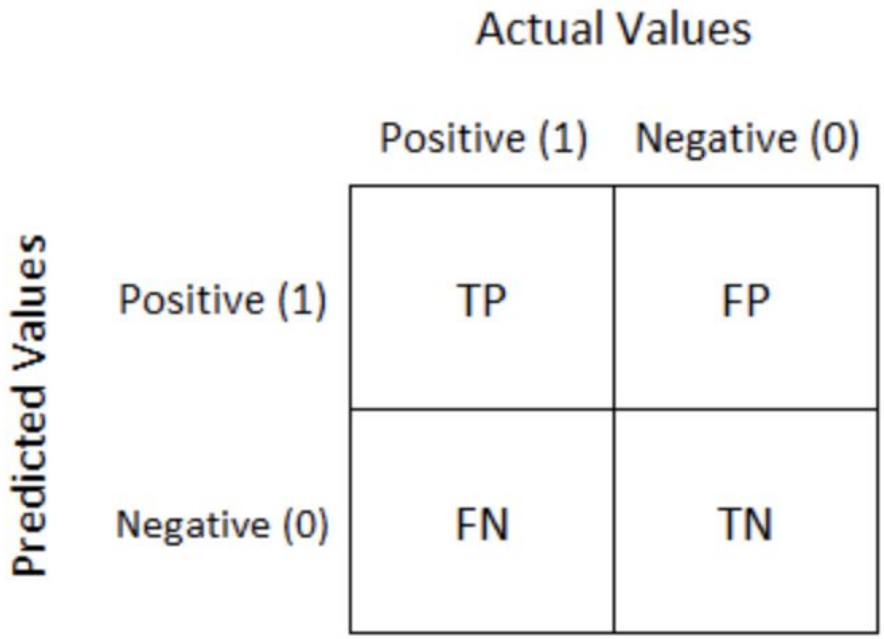
Bag-of-word: Results

	Accuracy	F1	Model	Precision	ROC-AUC	Recall
0	0.790773	0.624277	logreg	0.511041	0.794826	0.801980
1	0.765021	0.489510	tree	0.462555	0.676339	0.519802
2	0.844421	0.533762	forest	0.761468	0.687637	0.410891
3	0.827253	0.579634	XGB	0.613260	0.726807	0.549505
4	0.813305	0.571429	AdaBoost	0.568627	0.726855	0.574257

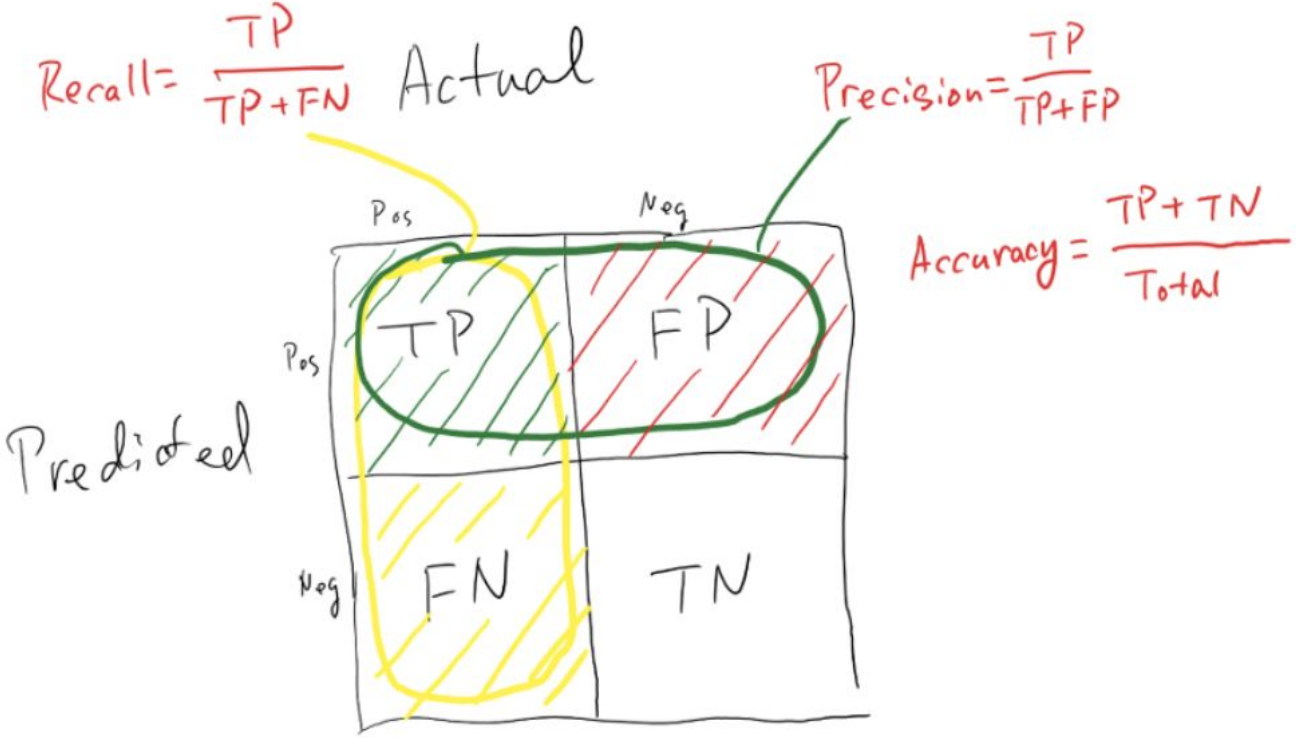
Word2Vec: Neural Network III



Confusion Matrix



Confusion Matrix II



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- Portrait of smiling man holding digital tablet looking at camera
- Smiling bearded man holding disposable coffee cup while opening door
- Portrait of pretty woman holding laptop looking at camera
- Motherboard with optical fiber