Fake News Detection

under Prof. Divya Bansal

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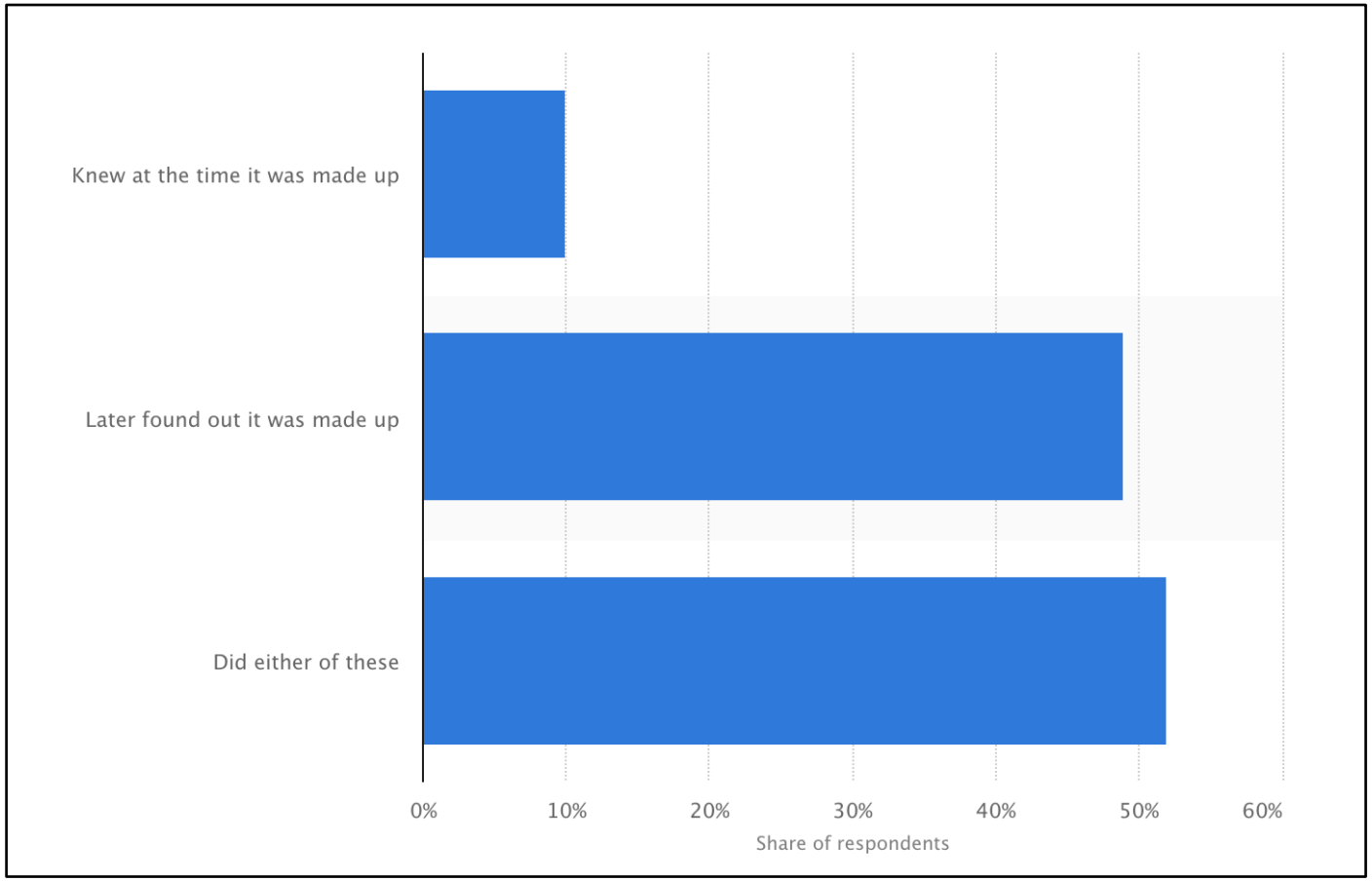
Motivation

- Extensive spread of fake news on various media platforms both social and news websites
- Hot area in text processing (NLP)
- Recent spread of fake news on topics like Kashmir Article 370, Ayodhya Verdict, etc of national importance.
- Scope of improvement, basic techniques are not able to cope up with changing nature of fake news.
- Personal opportunity to get hands on ML, Web Scrapping and python.

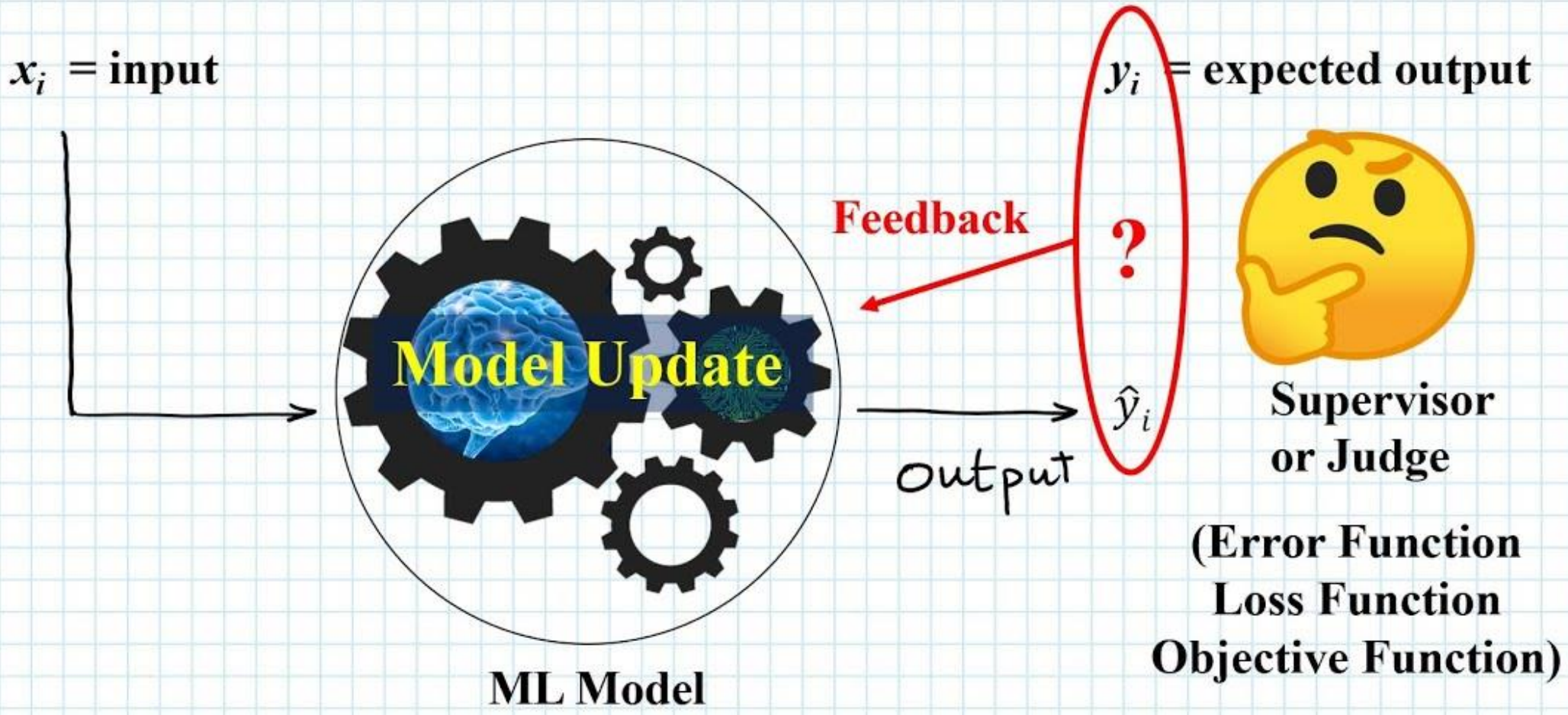


Data collection

- ❑ Kashmir Article 370
- ❑ Ayodhya Verdict
- ❑ Indian Elections
- ❑ Maharashtra Elections
- ❑ GST
- ❑ Demonetization
- ❑ CAA or NRC
- ❑ Corona Virus
- ❑ Pulwama Balakot Attack
- ❑ Pre Delhi Election
- ❑ Triple Talaq

Supervised Learning

Labelled Training Data (x_i, y_i)



Classification in Machine Learning: Fake News Detection (True/Fake)

Input (Data points) ----- Output (Labels)

Pure Feature Based

Pure Vector Based

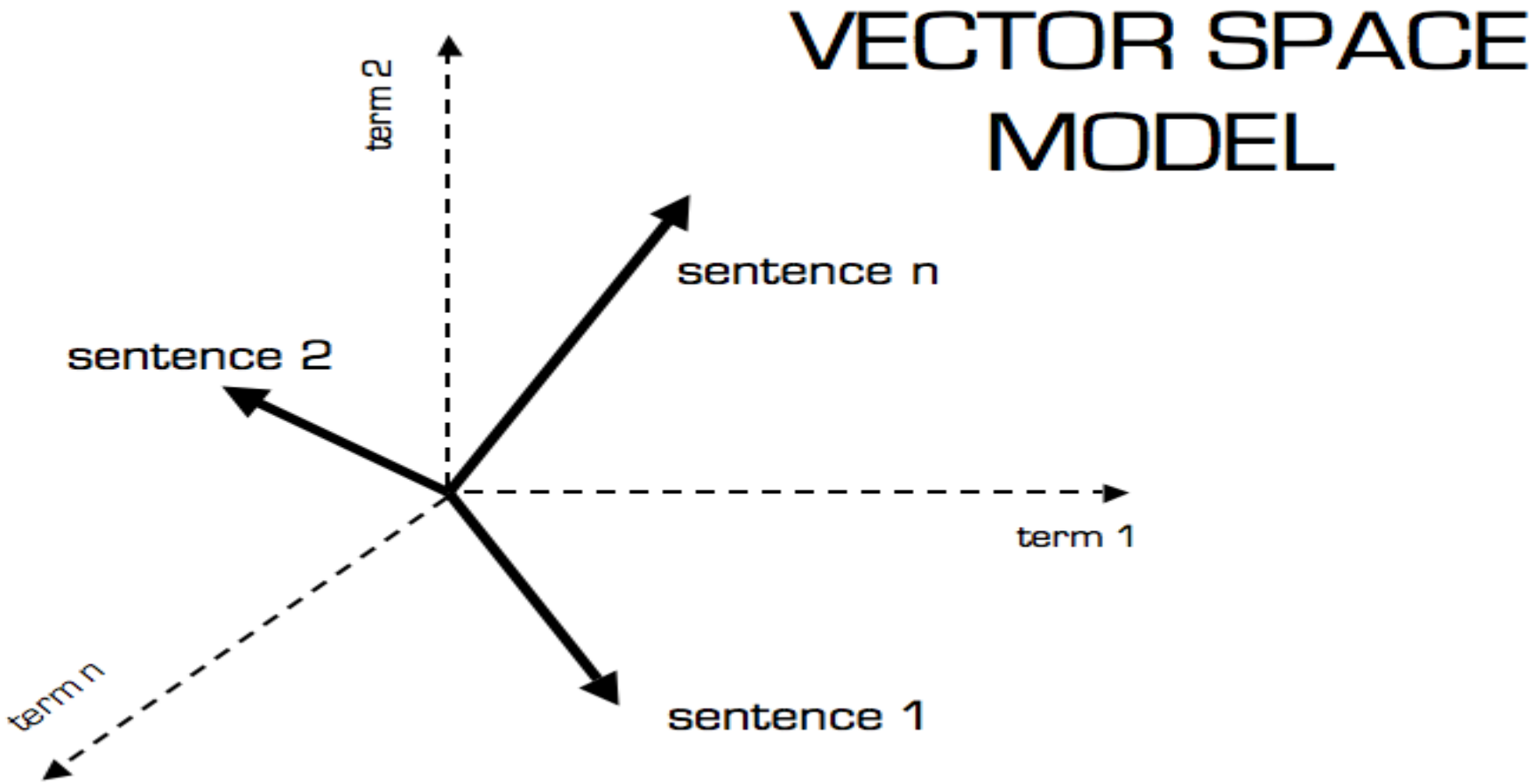
Amalgamation

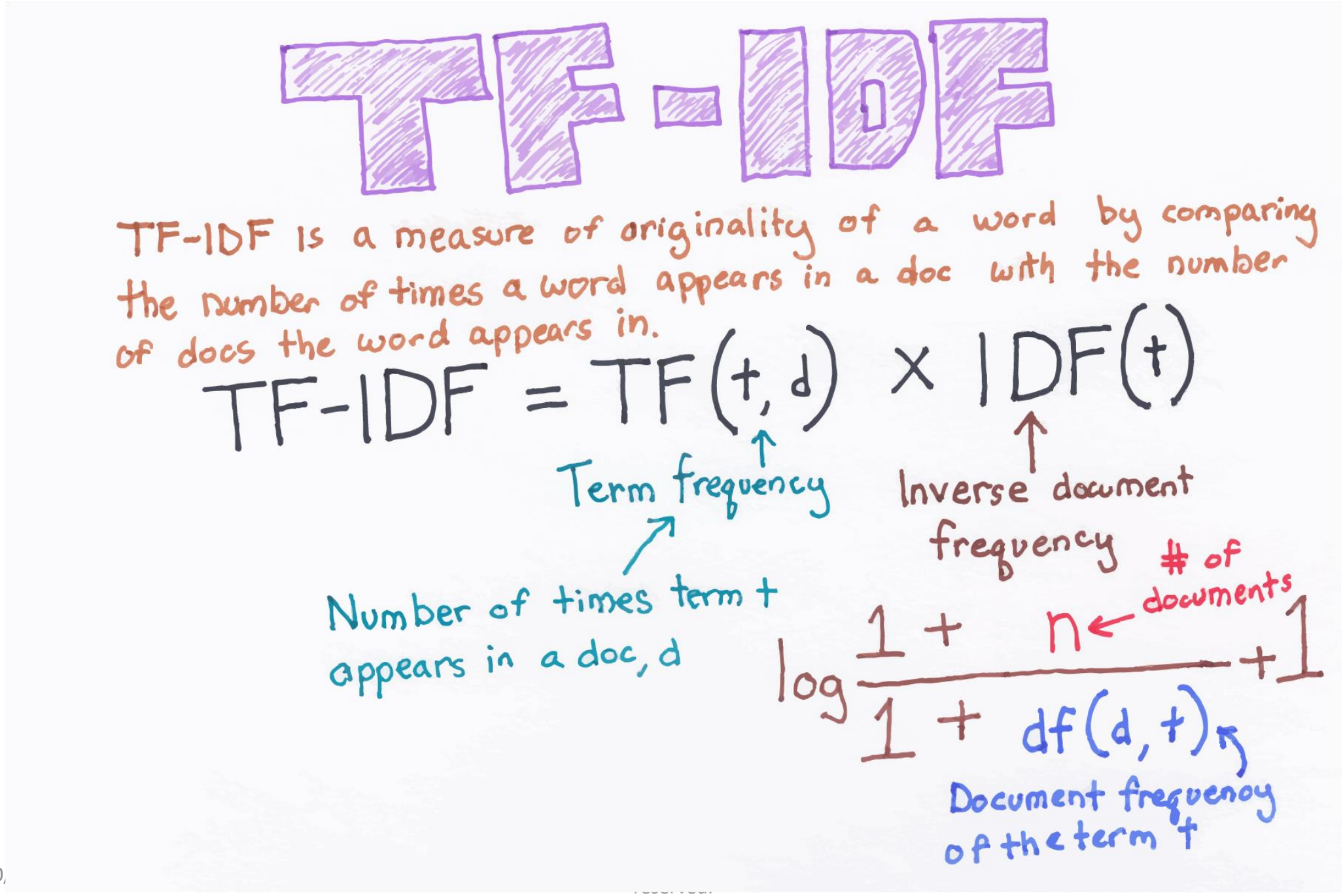
Machine Learning in NLP – Major Hurdle :
Algorithms deal with numbers, natural language is all text.

Text --------- [Text Vectorization] ---------- Numerical
Text --------- [Features] ---------- Numerical

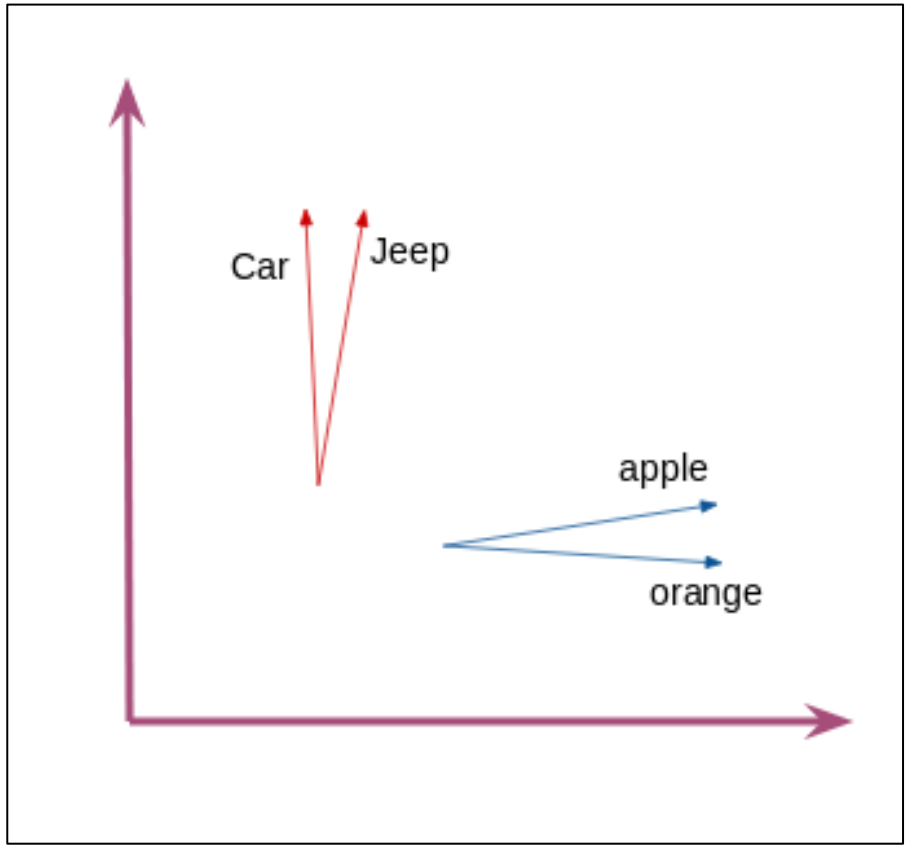
Different vectorization algorithms will give different end results

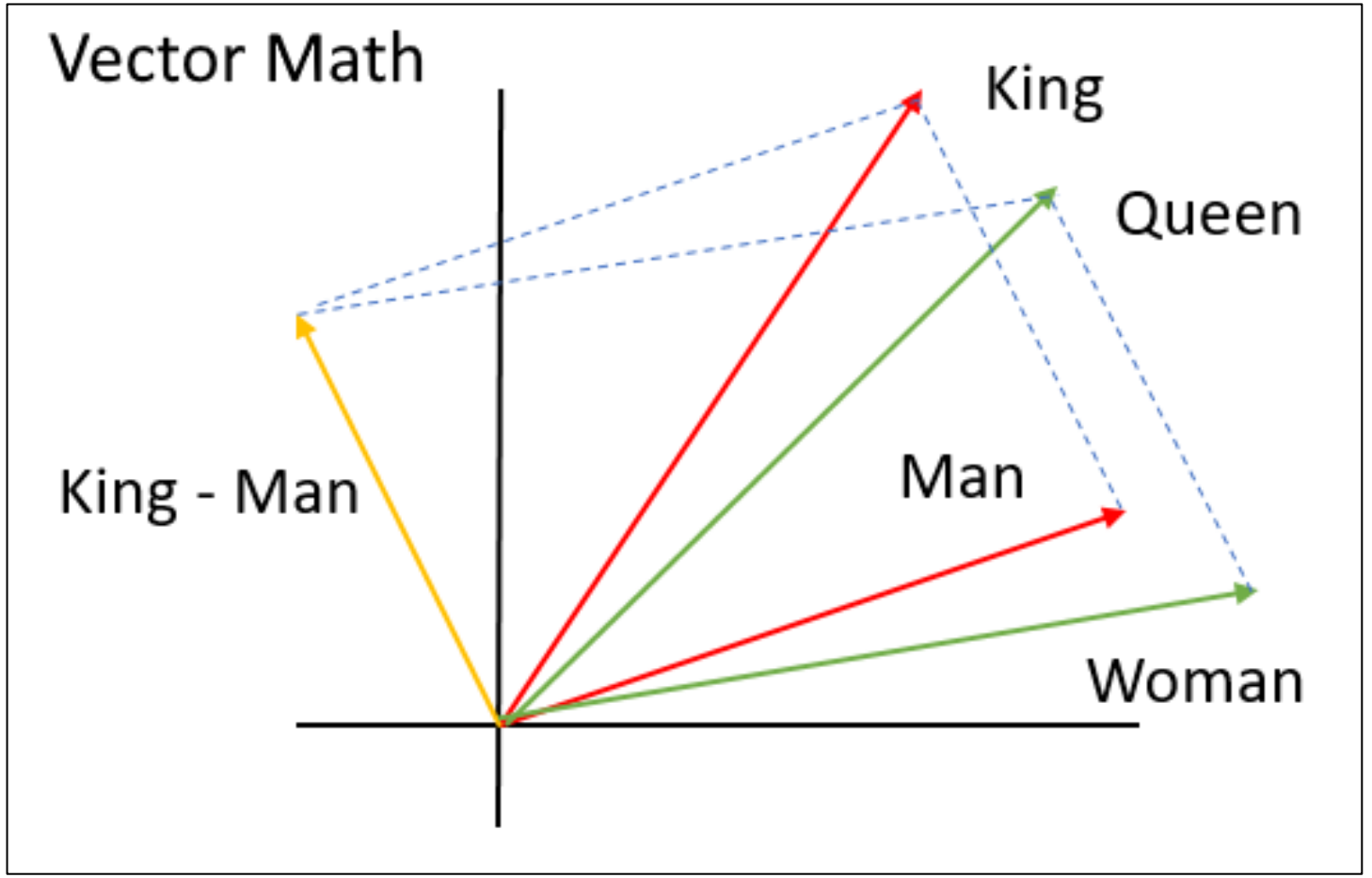
Text Representation In Vector Space




TF-IDF
TF-IDF is a measure of originality of a word by comparing the number of times a word appears in a doc with the number of docs the word appears in.
TF-IDF = TF(t, d) × IDF(t)
Term frequency
Number of times term t appears in a doc, d
Inverse document frequency
log (1 + n / 1 + df(d, t)) + 1
# of documents
Document frequency of the term t

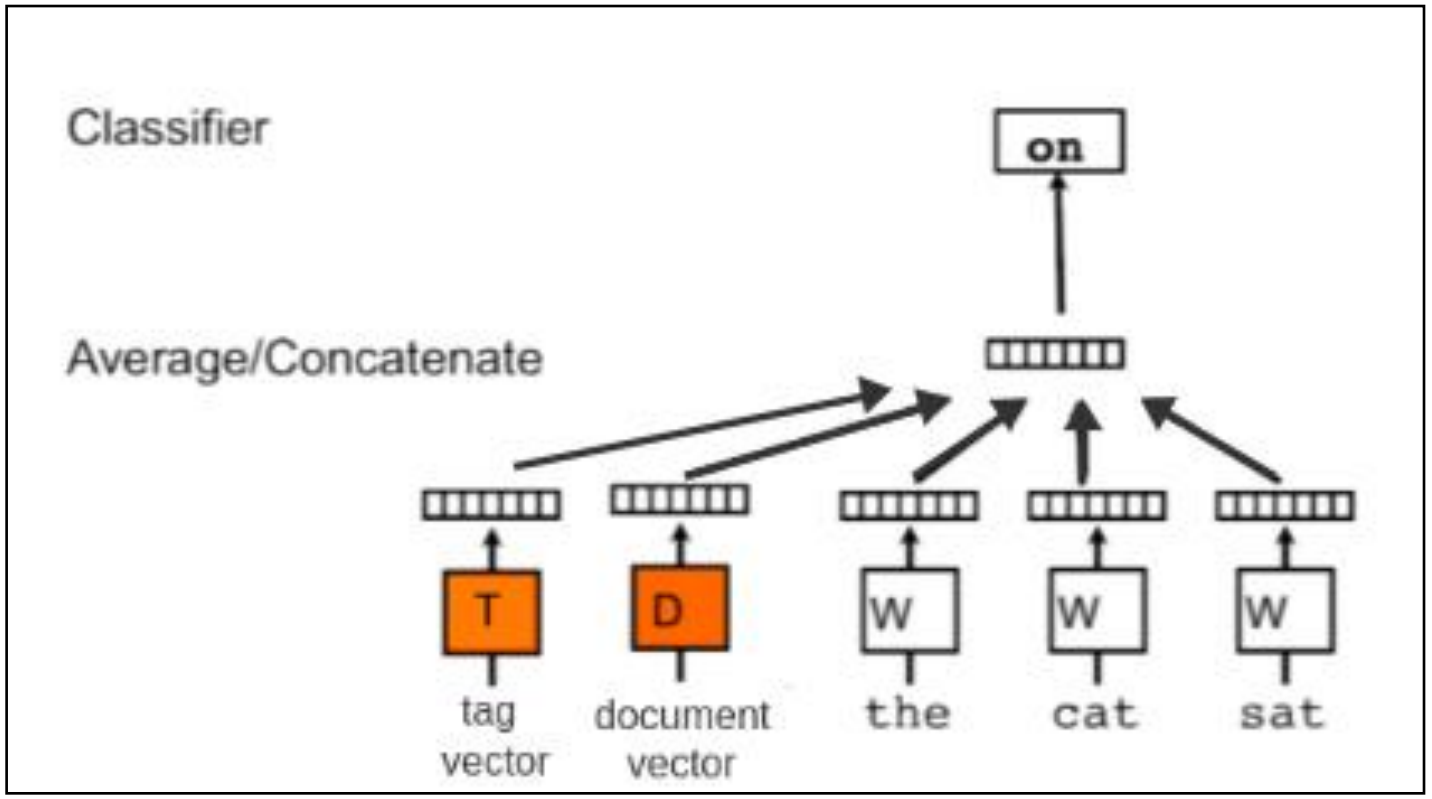
Word2Vec


Car
Jeep
apple
orange


Vector Math
King
Queen
King - Man
Man
Woman

Doc2Vec Model

- Based on Word2Vec model
- Preserves word order information.
- Extracts Word2Vec features and adds additional “document vector” with information about the entire document.



Linguistic Features:

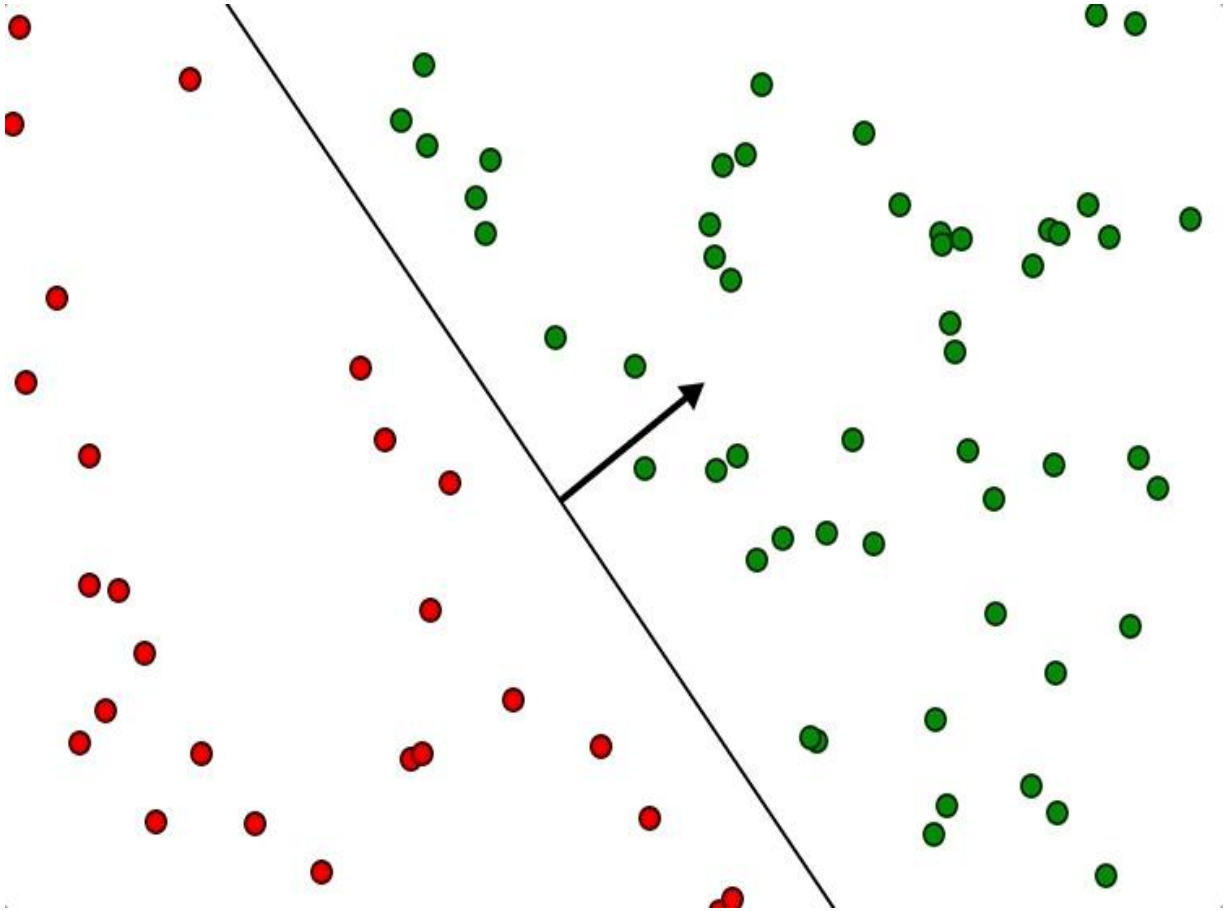
Linguistics is the scientific study of language.
Involves analysis based on:

- Language form
- Language meaning
- Language Context

Features we have used as of now

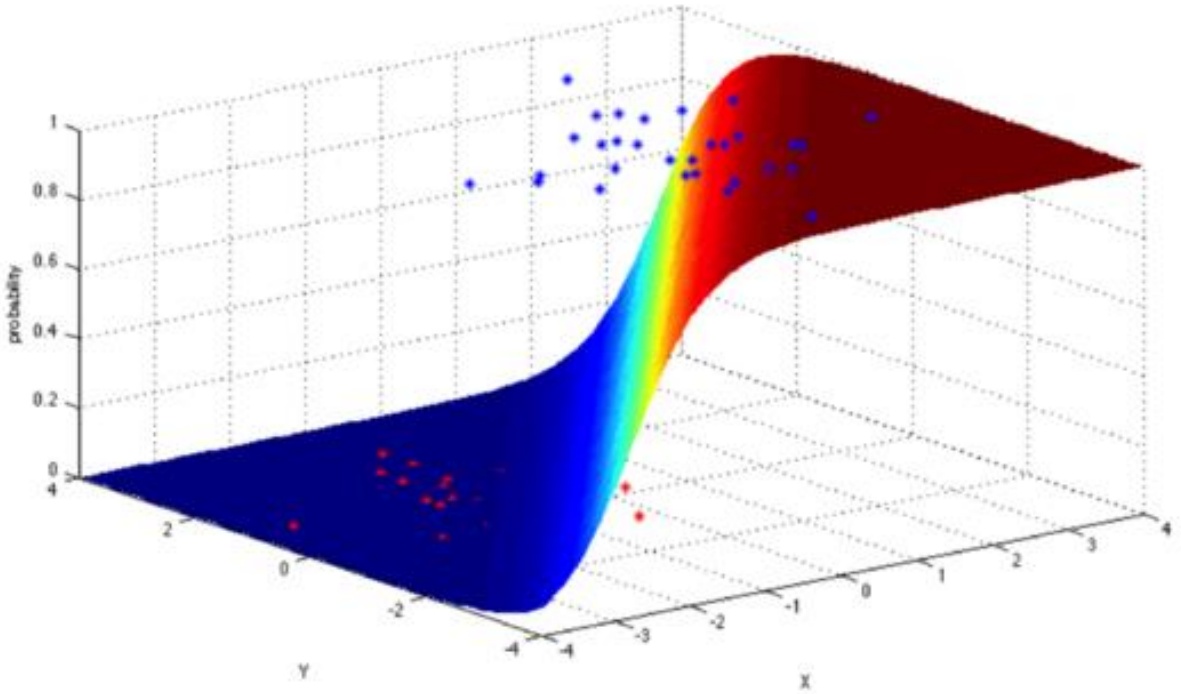
FEATURE	LIBRARY USED
Readability	Textstat ; ARI – grade level
Number of Punctuations	String ; custom function
Sentiment Score	Vader Sentiment Analysis

SVM



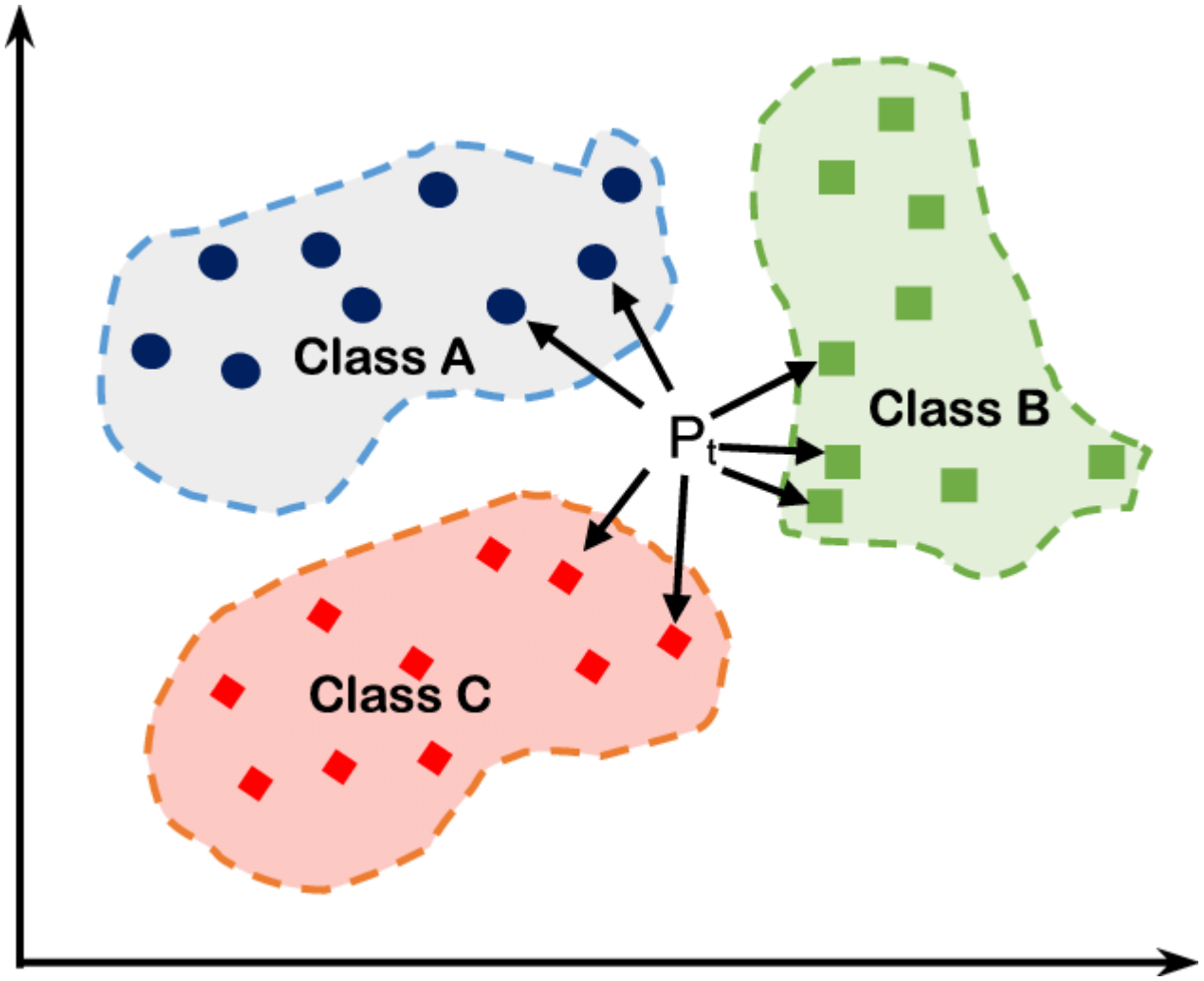
x	Accuracy
TF - IDF	96.25%
Doc2Vec	91.58%
Sentiment Score	61%
Punctuation Count	64%
Readability	65%
All 3 Linguistic Features	69%

LOGISTIC REGRESSION



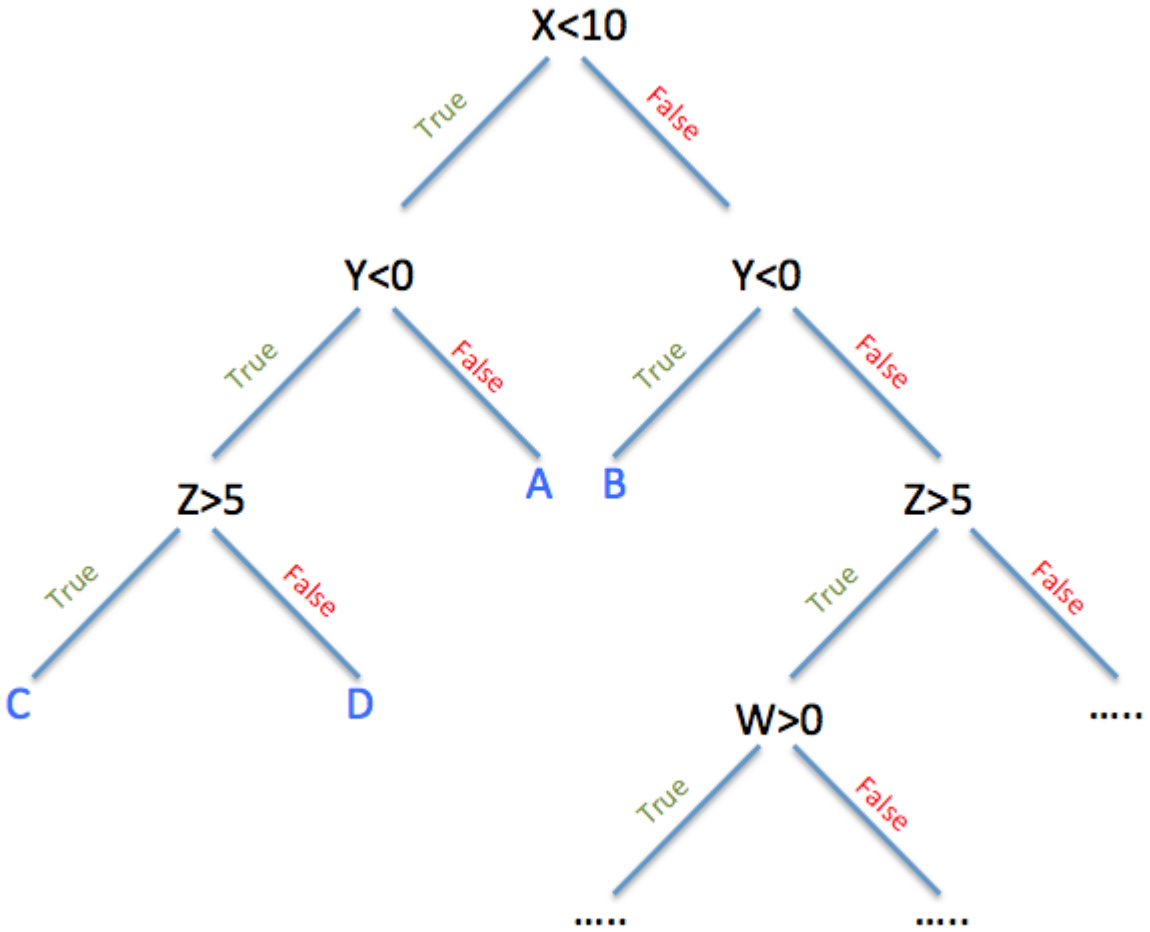
x	Accuracy
TF - IDF	95.13%
Doc2Vec	90.10%
Sentiment Score	57%
Punctuation Count	57%
Readability	66%
All 3 Linguistic Features	66%

KNN



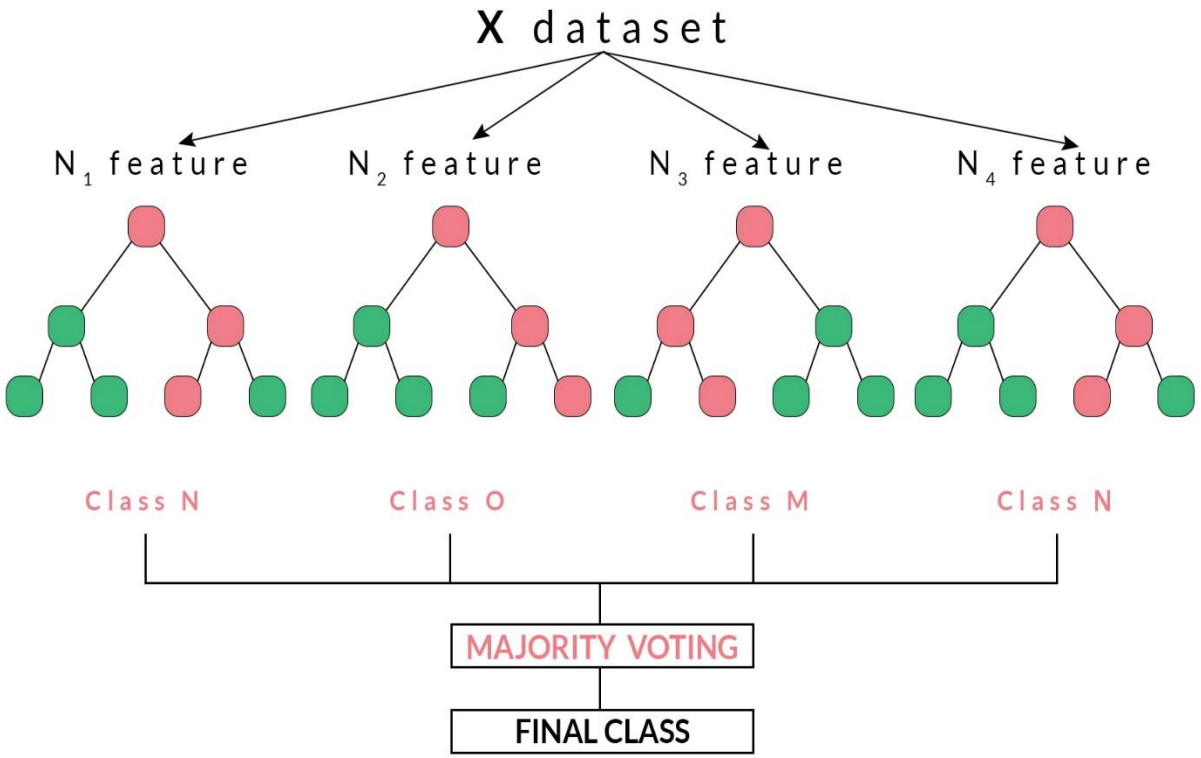
x	Accuracy
TF - IDF	86.03%
Doc2Vec	86.77%
Sentiment Score	57%
Punctuation Count	58%
Readability	60%
All 3 Linguistic Features	68%

DECISION TREE



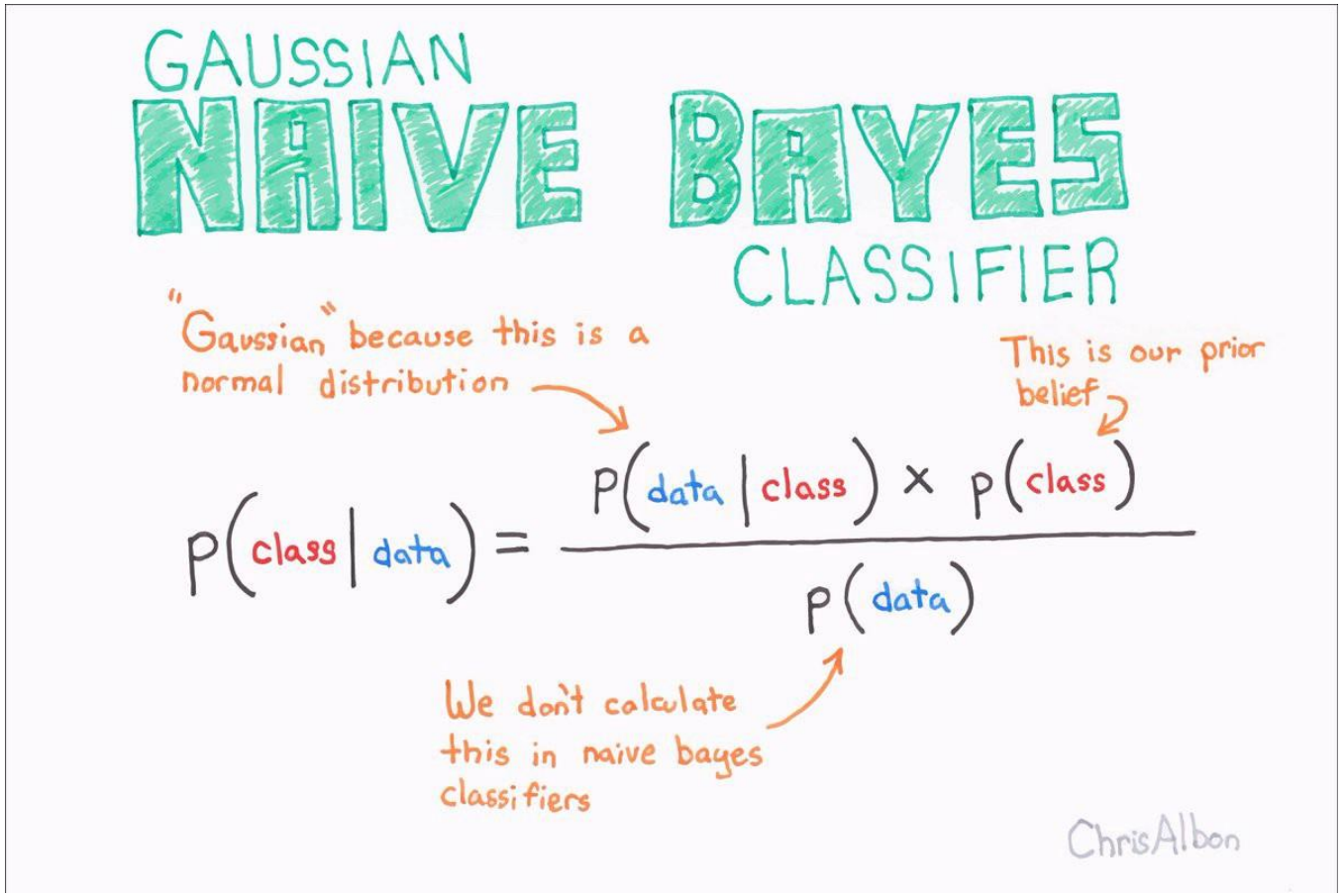
x	Accuracy
TF - IDF	90.43%
Doc2Vec	77.74%
Sentiment Score	59%
Punctuation Count	63%
Readability	65%
All 3 Linguistic Features	63%

RANDOM FOREST



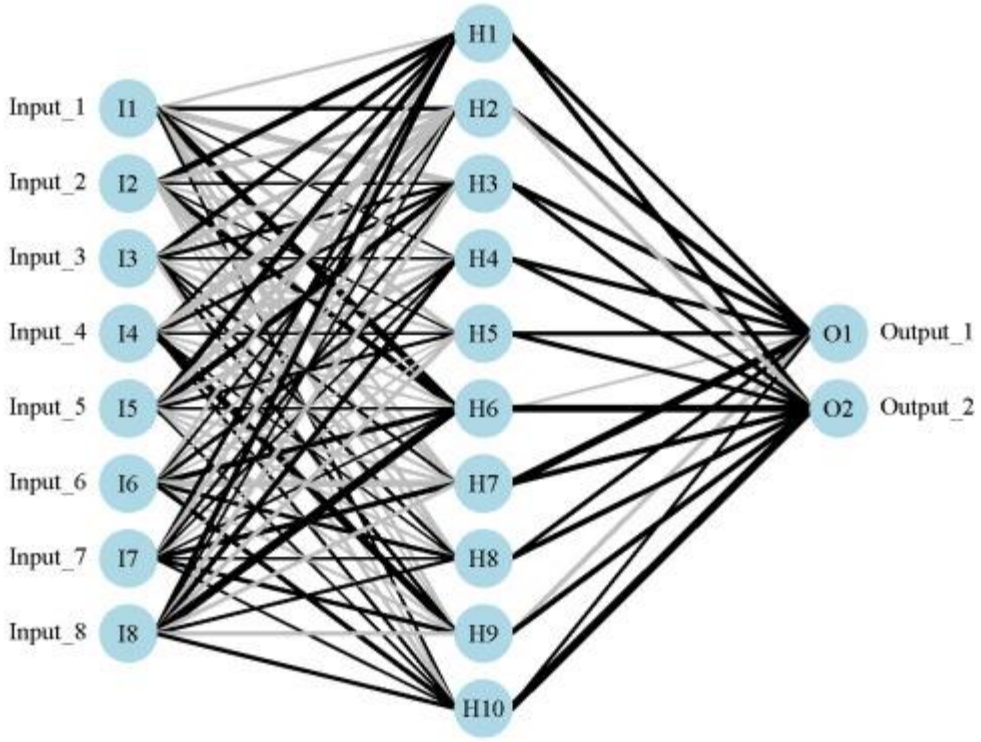
x	Accuracy
TF - IDF	90.00%
Doc2Vec	88.79%
Sentiment Score	59%
Punctuation Count	62%
Readability	65%
All 3 Linguistic Features	70%

NAIVE BAYES



x	Accuracy
TF - IDF	78.18%
Doc2Vec	74.32%
Sentiment Score	57%
Punctuation Count	57%
Readability	61%
All 3 Linguistic Features	61%

ARTIFICIAL NEURAL NETWORK



x	Accuracy
TF - IDF	95.6%
Doc2Vec	92.62%
All 3 Linguistic Features	71.53%

ROAD BLOCKS FACED

- Lack of fake news data on Indian News Websites
- Difficult to self annotate data from twitter due to a lot of scientific and specific jargon involved
- High cost of data annotation and little quality work in India
- AMT (Amazon Mechanical Turk) not available in India as of now

REFERENCES

- Kaggle - datasets
- Udemy A-Z ML course, and A-Z Deep Learning Course
- towardsdatascience.com
- Research Papers
  - mentioned in the Report
- python.org
- Stack overflow

THANK YOU
open for questions