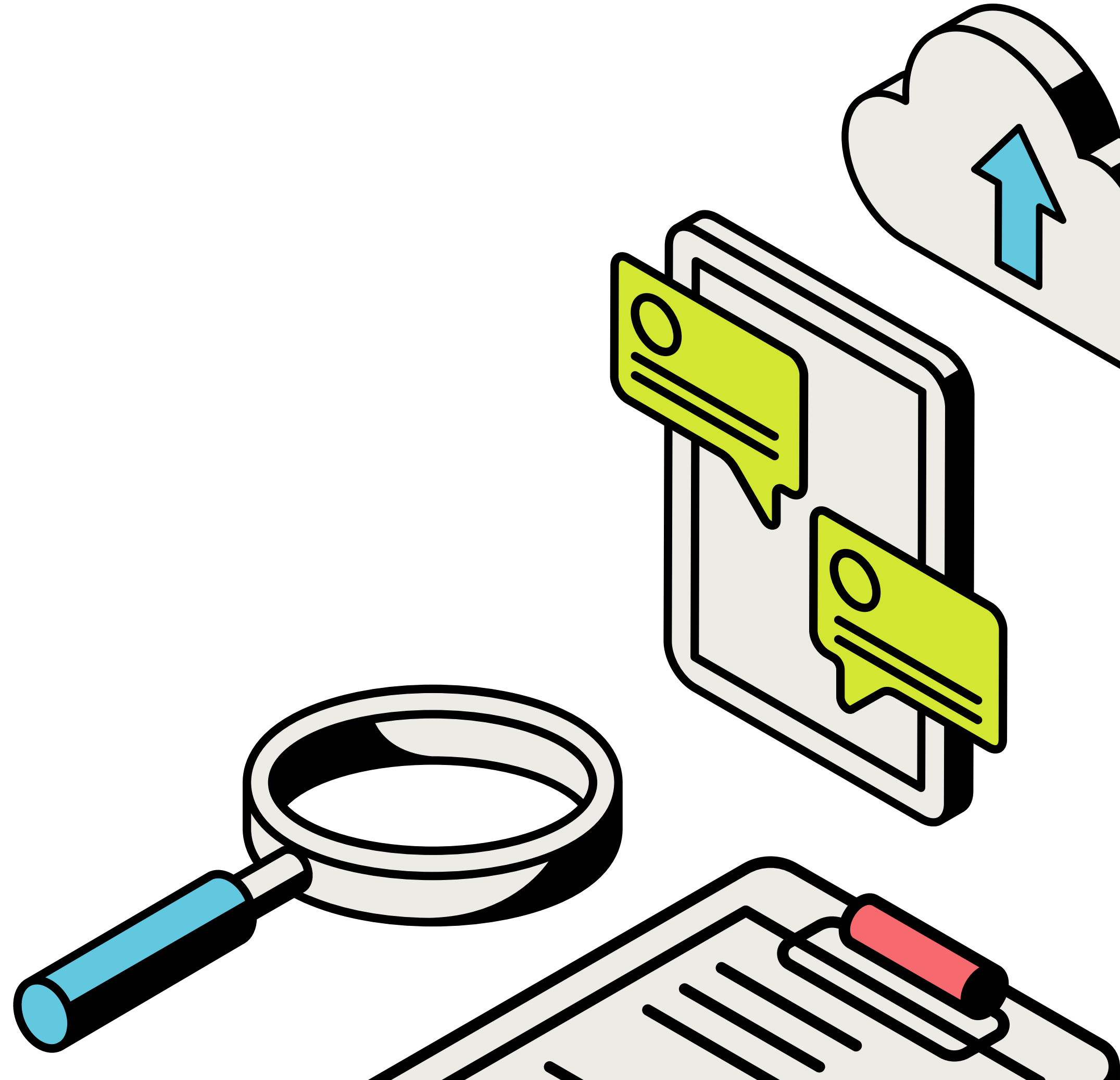


Fake News Detection

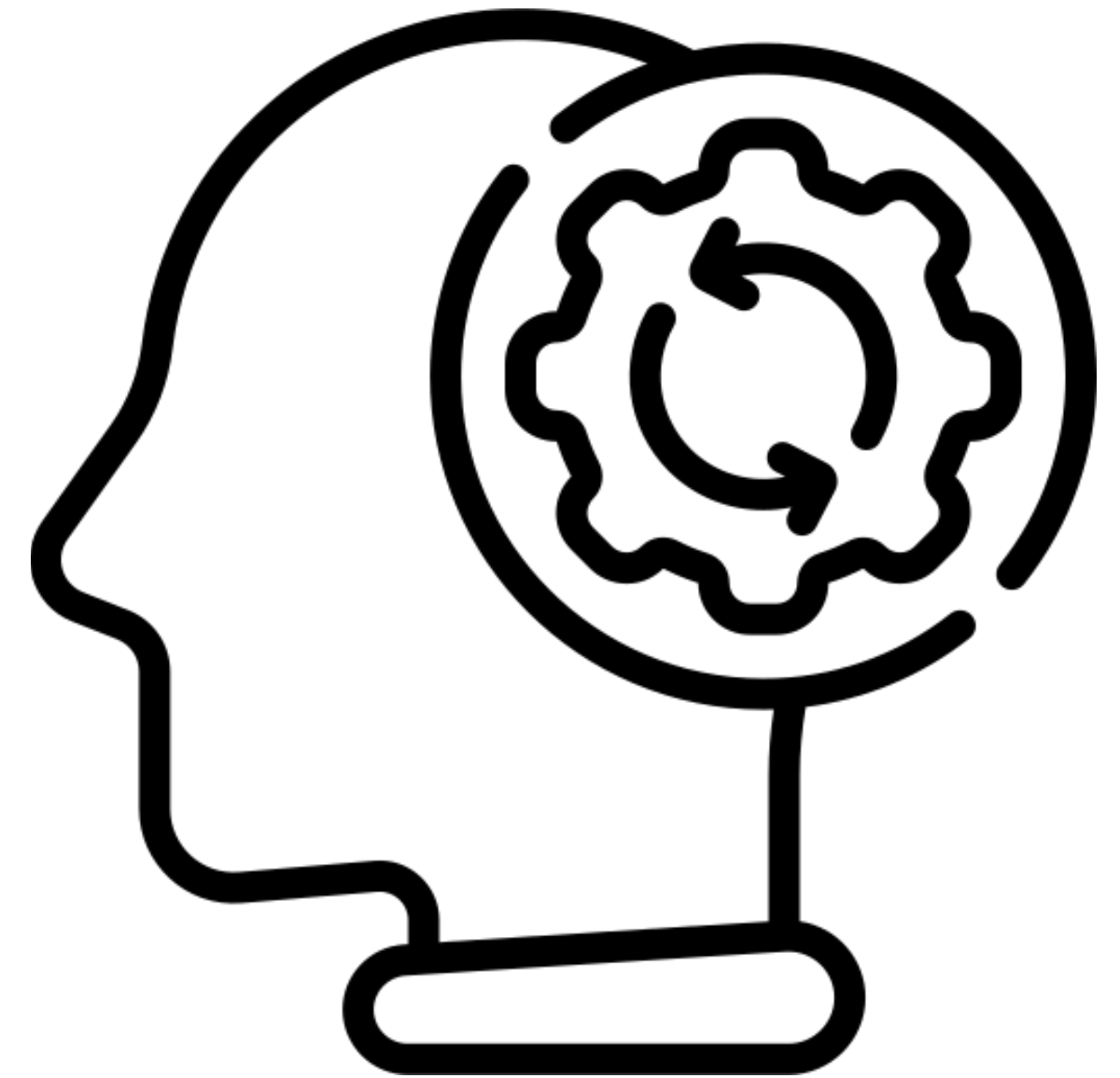
Date: Dec. 15, 2023

By: Keina Aoki



In this presentation:

- 1.Introduction + Proposed Solution
- 2.Impact of Solution
- 3.Data Overview
- 4.Data Preprocessing - Sentiment Scores
- 5.Exploratory Data Analysis
- 6.Baseline Models and Evaluation Metrics
- 7.Next Steps



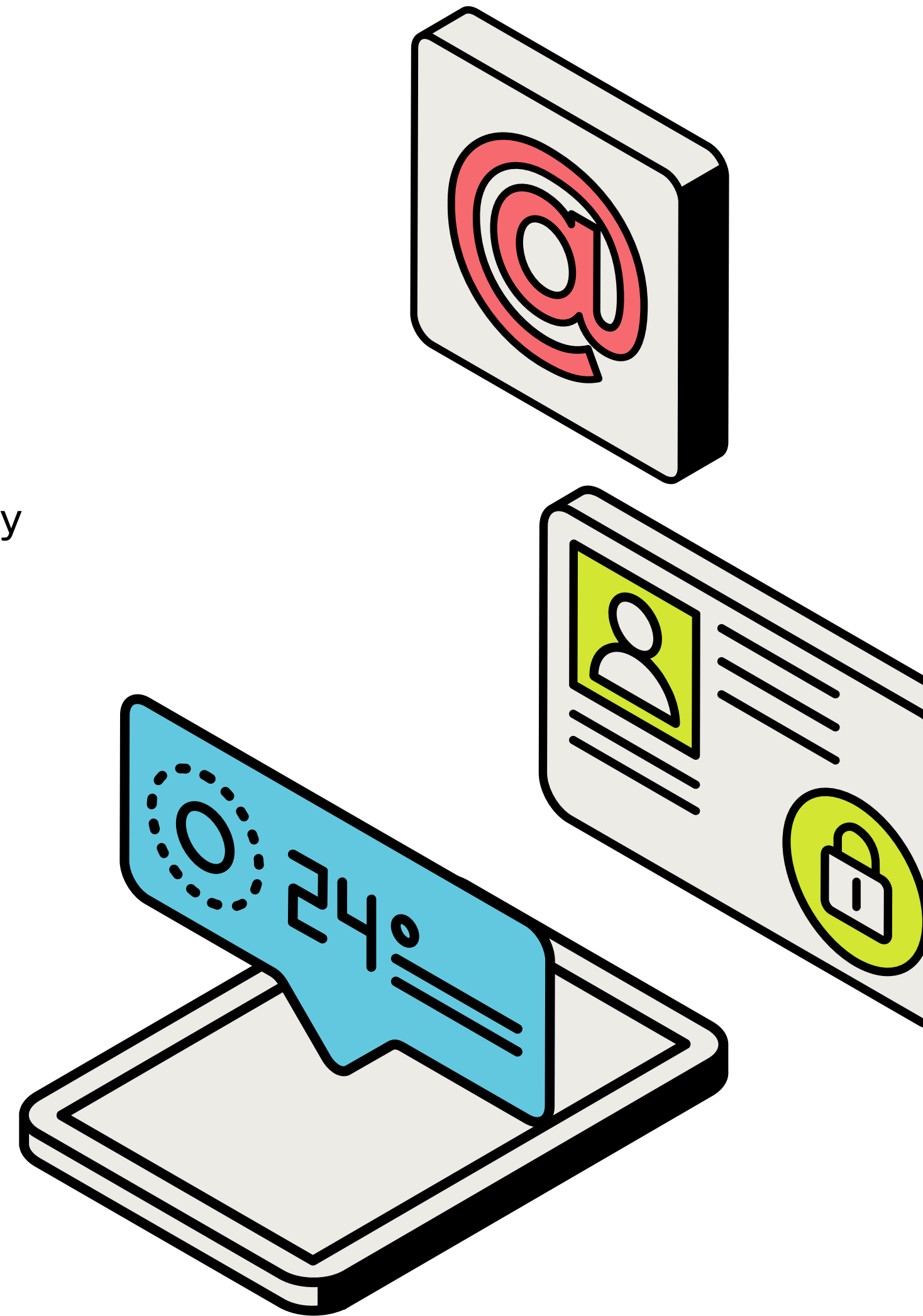
Introduction

There are vast amounts of information shared on a wide variety of digital platforms

- Easily accessed, created and shared
- Misinformation and disinformation is poses a threat to democracy
 - Reinforces polarizing viewpoints
 - Generates mistrust in persons and institutions
 - Destabilizes society

Proposed solution: Develop a tool to detect fake news to ensure we are well informed

- Use twitter data with labelled fake and real news



Impact of Data-Driven Approach



Speed

Faster the automation and detection,
less harm fake news causes



Consistency

Decisions made based on patterns
not on personal opinions



Cost-Effective

Compared to traditional fact-checking,
expensive and time consuming



Well-informed citizens

Data Overview

- Canadian Institute for Cybersecurity Truth Seeker Dataset 2023
 - 134,198 records and 60 fields
- Features and target variable (fake = 0, real = 1)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1		majority_tar	statement	BinaryNumT	tweet	followers_cc	friends_count	favourites_count	statuses_count	listed_count	following	embeddings	BotScore	BotScoreBin	cred	normalize_in	mentions	quotes
2	0	TRUE	End of evicti	1	@POTUS	4262	3619	34945	16423	44	0	[[0 0 0 0 0 0	0.03	0	0.54079432	0.10460231	1	
3	1	TRUE	End of evicti	1	@SOSickRic	1393	1621	31436	37184	64	0	[[0 0 0 0 0 0	0.03	0	0.46217651	0.09443633	3	
4	2	TRUE	End of evicti	1	THE SUPREM	9	84	219	1184	0	0	[[0 0 0 0 0 0	0.03	0	0.09677419	0.03984638	0	
5	3	TRUE	End of evicti	1	@POTUS	4262	3619	34945	16423	44	0	[[0 0 0 0 0 0	0.03	0	0.54079432	0.10460231	1	
6	4	TRUE	End of evicti	1	@OhComfyI	70	166	15282	2194	0	0	[[0 0 0 0 0 0	0.03	0	0.29661017	0.06113481	1	
7	5	TRUE	End of evicti	1	I've said this	29010	5081	120924	89474	405	0	[[0 0 0 0 0 0	0.03	0	0.85095773	0.12532361	0	
8	6	TRUE	End of evicti	1	As many fac	33	21	432	62	0	0	[[0 0 0 0 0 0	0.03	0	0.61111111	0.04593827	0	
9	7	TRUE	End of evicti	1	@Thomas1	919	620	131682	216319	71	0	[[0 0 0 0 0 0	0.03	0	0.597141	0.09202534	3	
10	8	TRUE	End of evicti	1	@Socialism:	18002	15754	969539	497128	48	0	[[0 0 0 0 0 0	0.03	0	0.53329778	0.12214566	2	
11	9	TRUE	End of evicti	1	@daysofarel	0	0	2	132	0	0	[[1 0 1 1 0 1	0.971	1	0	0	2	
12	10	TRUE	End of evicti	1	BREAKING N	200231	3529	44820	86430	1279	0	[[0 0 0 0 0 0	0.03	0	0.9826806	0.14427948	0	

tweet

0 @POTUS Biden Blunders - 6 Month Update Inflation, Delta mismanagement, COVID for kids, Abandoning Americans in Afghanistan, Arming the Taliban, S. Border crisis, Breaking job growth, Abuse of power (Many Exec Orders, \$3.5T through Reconciliation, Eviction Moratorium)...what did I miss?

1 @S0SickRick @Stairmaster_ @6d6f636869 Not as many people are literally starving and out in the streets as they were in the 19th century. Isn't capitalism grand? Meanwhile, we're facing an eviction moratorium threatening to make millions of Americans homeless. Fuck off with this corporatist propaganda.

THE SUPREME COURT is siding with super rich property owners and over poor struggling
2 AMERICANS by blocking the eviction moratorium during a pandemic which isn't even over
yet. ASSHOLES! get ready for more homeless people!

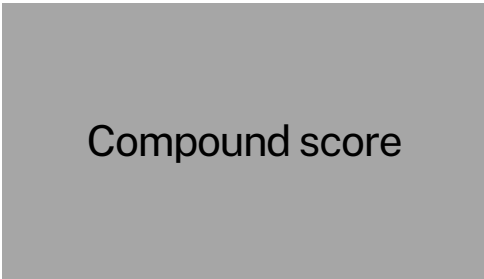
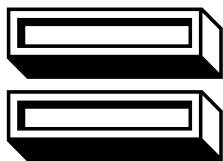
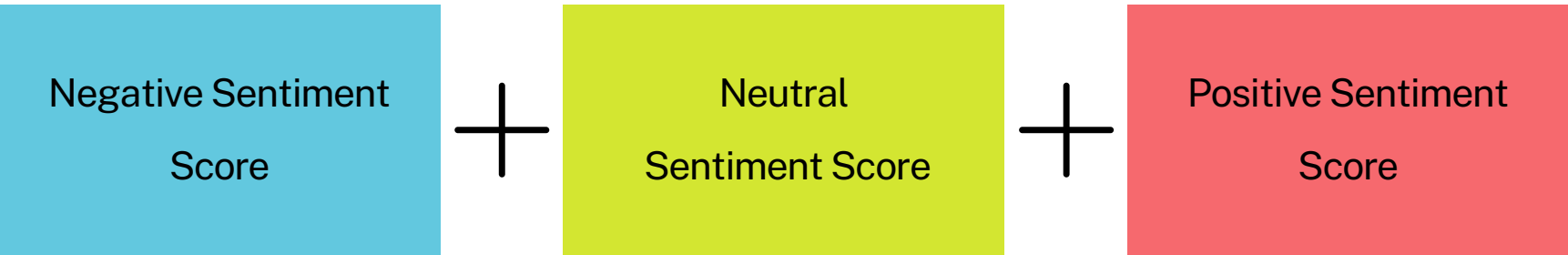


Data Preprocessing - Sentiment Score

VADER: Valence Aware Dictionary and sEntiment Reasoner

vaderSentiment package:

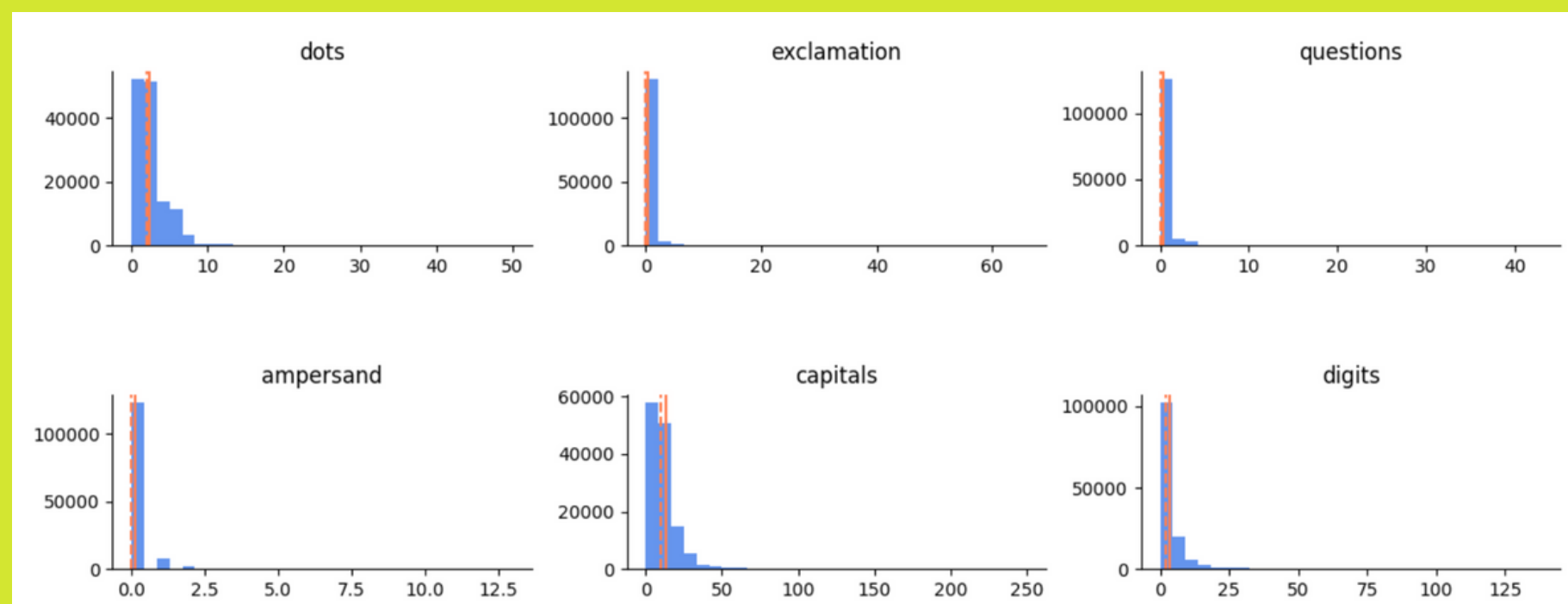
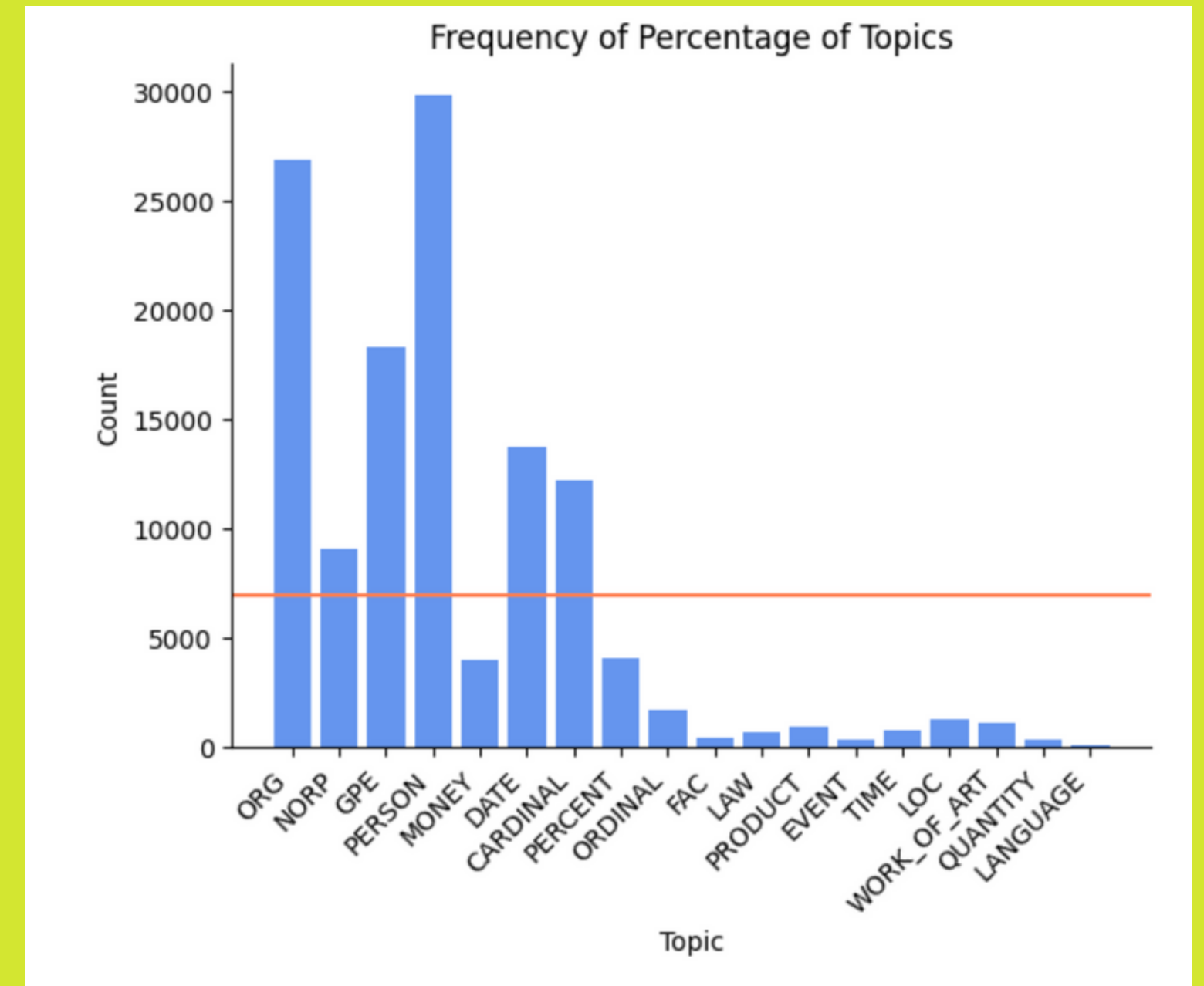
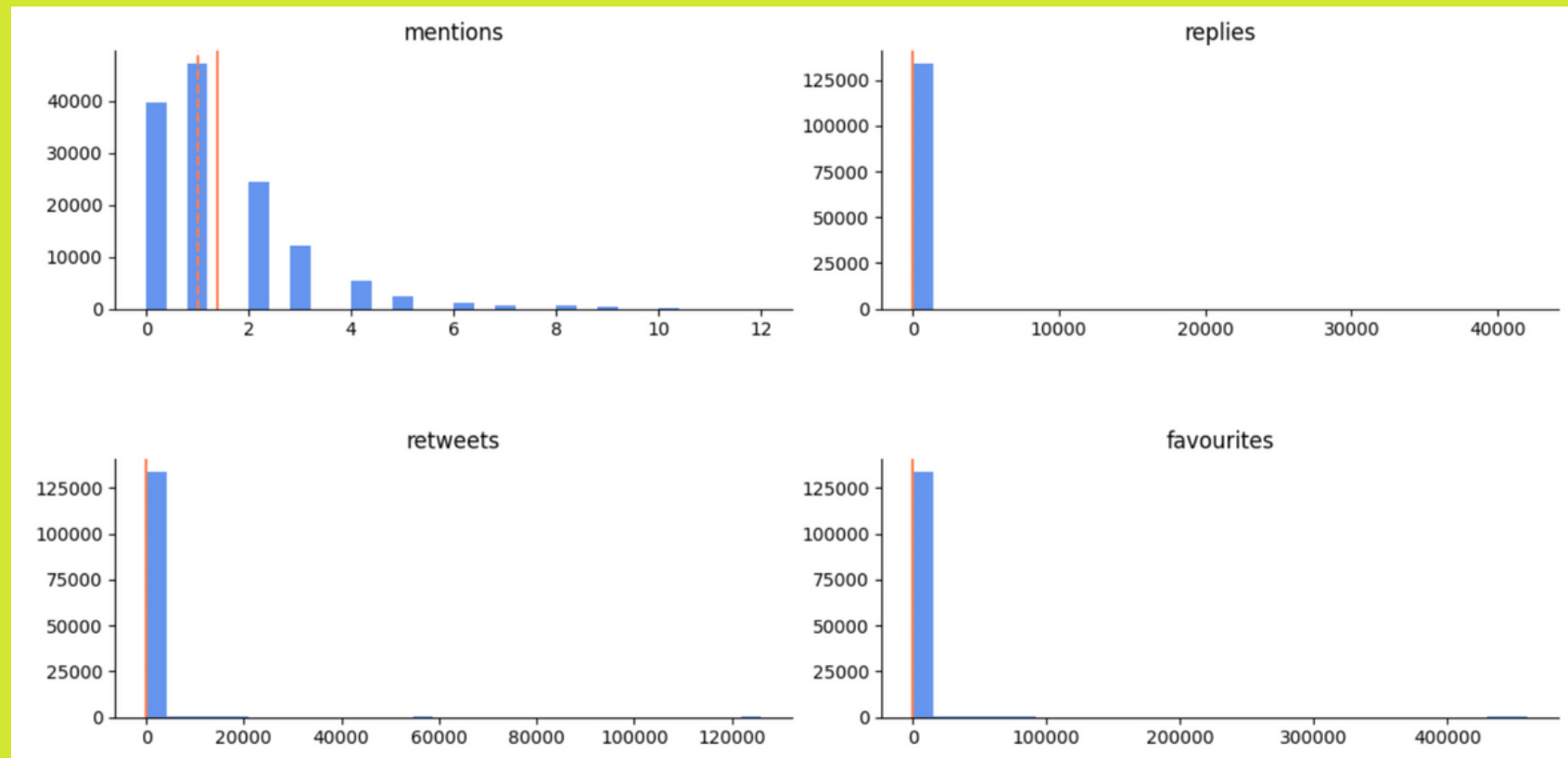
- a rule-based sentiment analysis tool
- attuned to sentiments expressed in social media
- detect polarity of sentiment



Sum of valence scores of each word (between -1 and 1)

	tweet	neg	neu	pos	compound
0	@POTUS Biden Blunders - 6 Month UpdateInflation, Delta mismanagement, COVID for kids, Abandoning Americans in Afghanistan, Arming the Taliban, S. Border crisis, Breaking job growth, Abuse of power (Many Exec Orders, \$3.5T through Reconciliation, Eviction Moratorium)...what did I miss?	0.303	0.646	0.051	-0.9169
1	@SOSickRick @Stairmaster_ @6d6f636869 Not as many people are literally starving and out in the streets as they were in the 19th century. Isn't capitalism grand?Meanwhile, were facing an eviction moratorium threatening to make millions of Americans homeless.Fuck off with this corporatist propaganda.	0.228	0.772	0.000	-0.8807
2	THE SUPREME COURT is siding with super rich property owners and over poor struggling AMERICANS by blocking the eviction moratorium during a pandemic which isn't even over yet. ASSHOLES! get ready for more homeless people!	0.292	0.457	0.252	-0.3147
3	@POTUS Biden BlundersBroken campaign promises, Inflation, Delta mismanagement, Dems without leadership, Abandoned Americans & Arming the Taliban, S. Border crisis, Breaking job growth, Abuse of power (61 Exec Orders, \$1.9T+ in Reconciliation, Eviction Moratorium, Vaccine Mandates)	0.231	0.612	0.157	-0.6828

Exploratory Data Analysis (Histograms)



Baseline Models

Accuracy Scores

Precision

Recall

F1

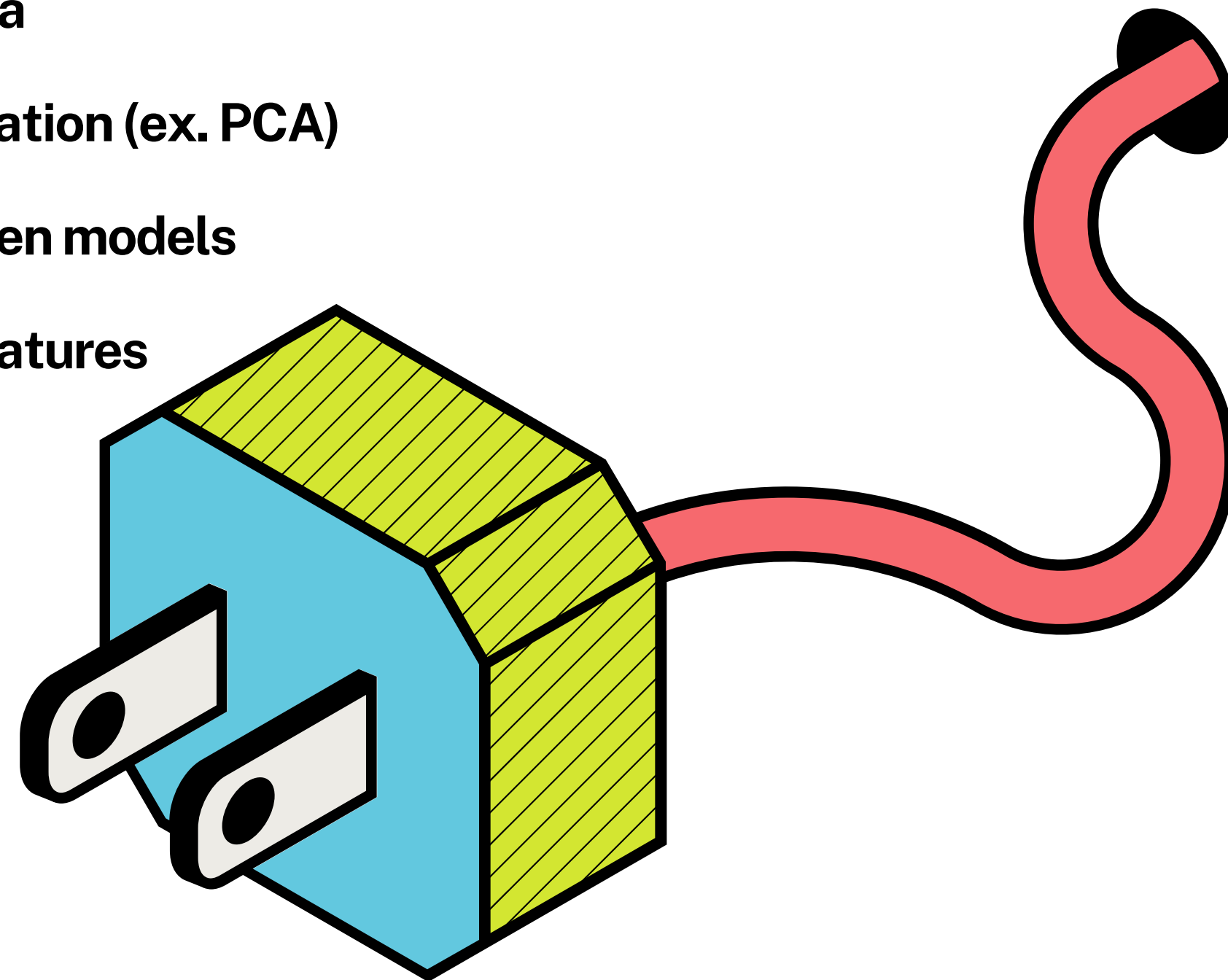
ROC Curve and AUC

CLASSIFICATION MODELS

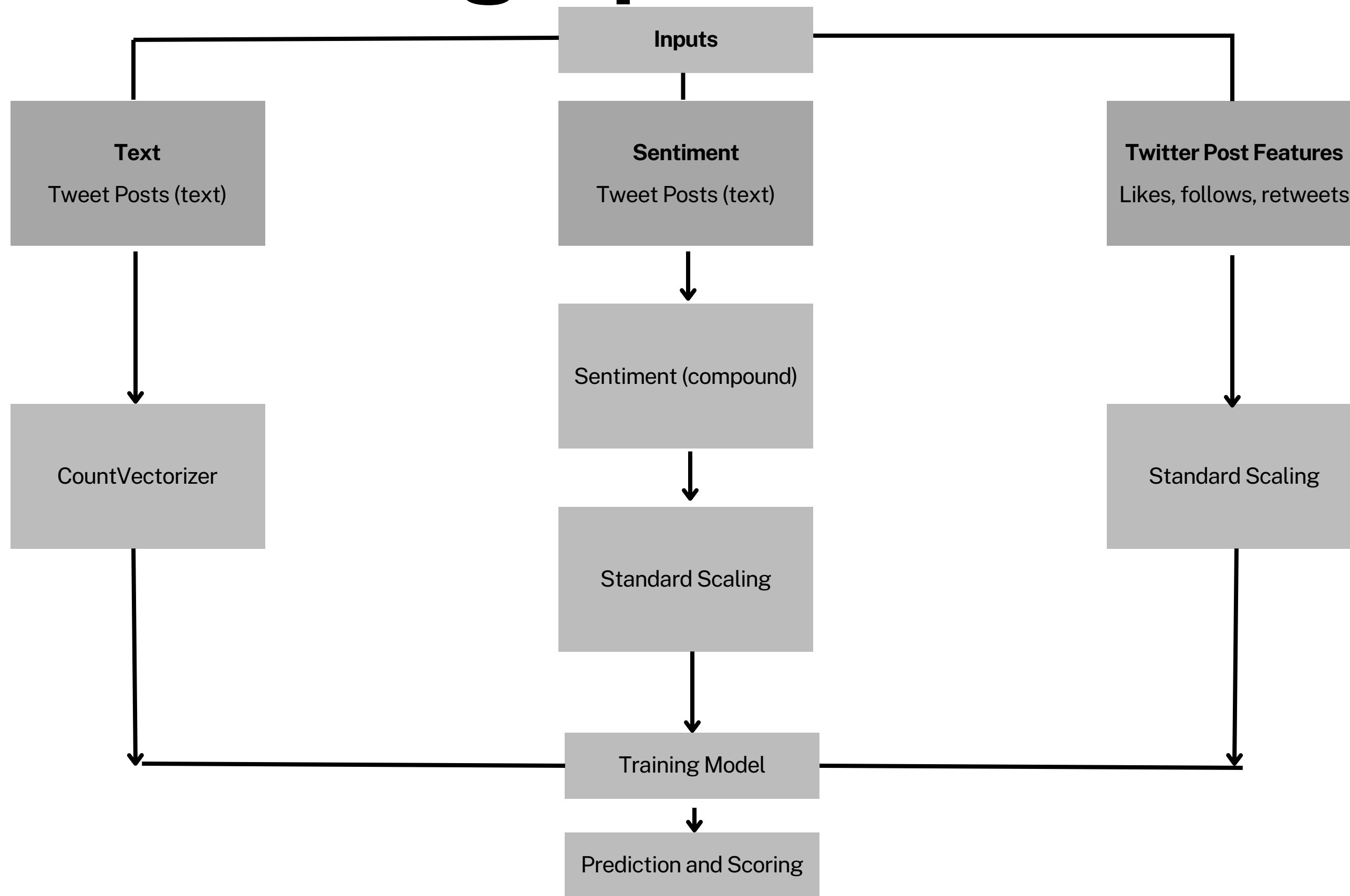
Logistic Regression	Train score: 0.55 Test score: 0.55
Decision Tree Classifier	Train score: 0.61 Test score: 0.60
KNN Classifier	Train score: 0.75 Test score: 0.64
Naive Bayes Classification	Train score: 0.59 Test score: 0.59

Next Steps

- Consider removing outliers for normally distributed data
- Build pipelines for ease during hyperparameter optimization (ex. PCA)
- Grid search for cross validation, compare results between models
- Consider CountVectorizer document-term matrix as features
- Final Steps: Input new twitter post and classify as real or fake



Machine Learning Pipeline



Thank you.

