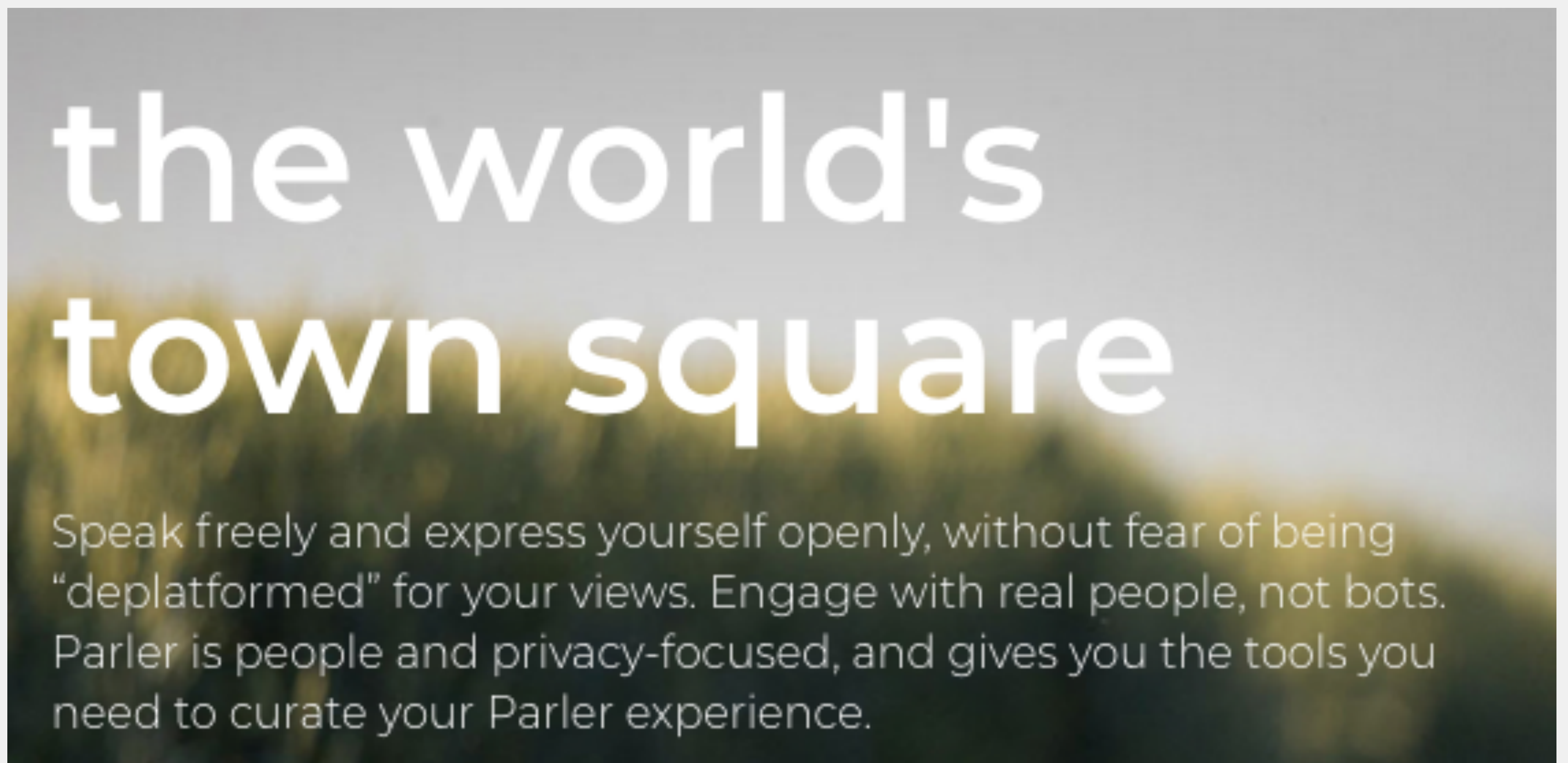# BOT OR NOT?

BOT CLASSIFICATION ON REDDIT

Introduction

WHY?

▸ Prevent the spread of misinformation.

▸ In May 2020, researchers at Carnegie Mellon reported that nearly half of all accounts tweeting about Coronavirus are likely bots.

▸ Users attrition may occur if bots are not monitored and removed if necessary.

Introduction

WHY?

the world's town square

Speak freely and express yourself openly, without fear of being "deplatformed" for your views. Engage with real people, not bots. Parler is people and privacy-focused, and gives you the tools you need to curate your Parler experience.

Copy on the home page of Parler, a new social media platform that promises 'Real people, not bots.'

Introduction

OBJECTIVE

▸ Develop a classifier that can predict if a comment was made by a bot or human user.

PROJECT STEPS

- ● DATA COLLECTION
- ● EXPLORATORY DATA ANALYSIS
- ● FEATURE ENGINEERING & PRE-PROCESSING
- ● MODEL EVALUATION AND ANALYSIS

.01
Data Collection

▸ **Pushshift API** to collect Reddit comments from both bots and non-bots.

▸ Non-bot users were manually verified.

▸ **Beautiful Soup** to scrape list of known bots on Reddit.

▸ **Features**: Author, Comment, Subreddit, Score, Time, Flair.

BOT COMMENT

|	ID	Author	Comment	Subreddit	Score	Time	Flair	Class
0	e7wig3e	ADHDbot	Just dropping by to show that OP is completely...	unpopularopinion	4	2018-10-16 16:47:28	None	Bot
1	cww687m	ADHDbot	As per the rules in the side bar, yes or no qu...	ADHD	1	2015-11-10 20:03:58	None	Bot

NON-BOT COMMENT

	ID	Author	Comment	Subreddit	Score	Time	Flair	Class
39384	dgga1g2	janellemonae	❤️	pics	3	2017-04-18 19:49:01	None	Non-Bot
39385	ddur7h1	janellemonae	Trying to get him to get an account so he can ...	hiphopheads	253	2017-02-16 22:22:57	THE QUEEN	Non-Bot

SCORE

.02

EDA

Score: Bots versus Non-Bots

.03
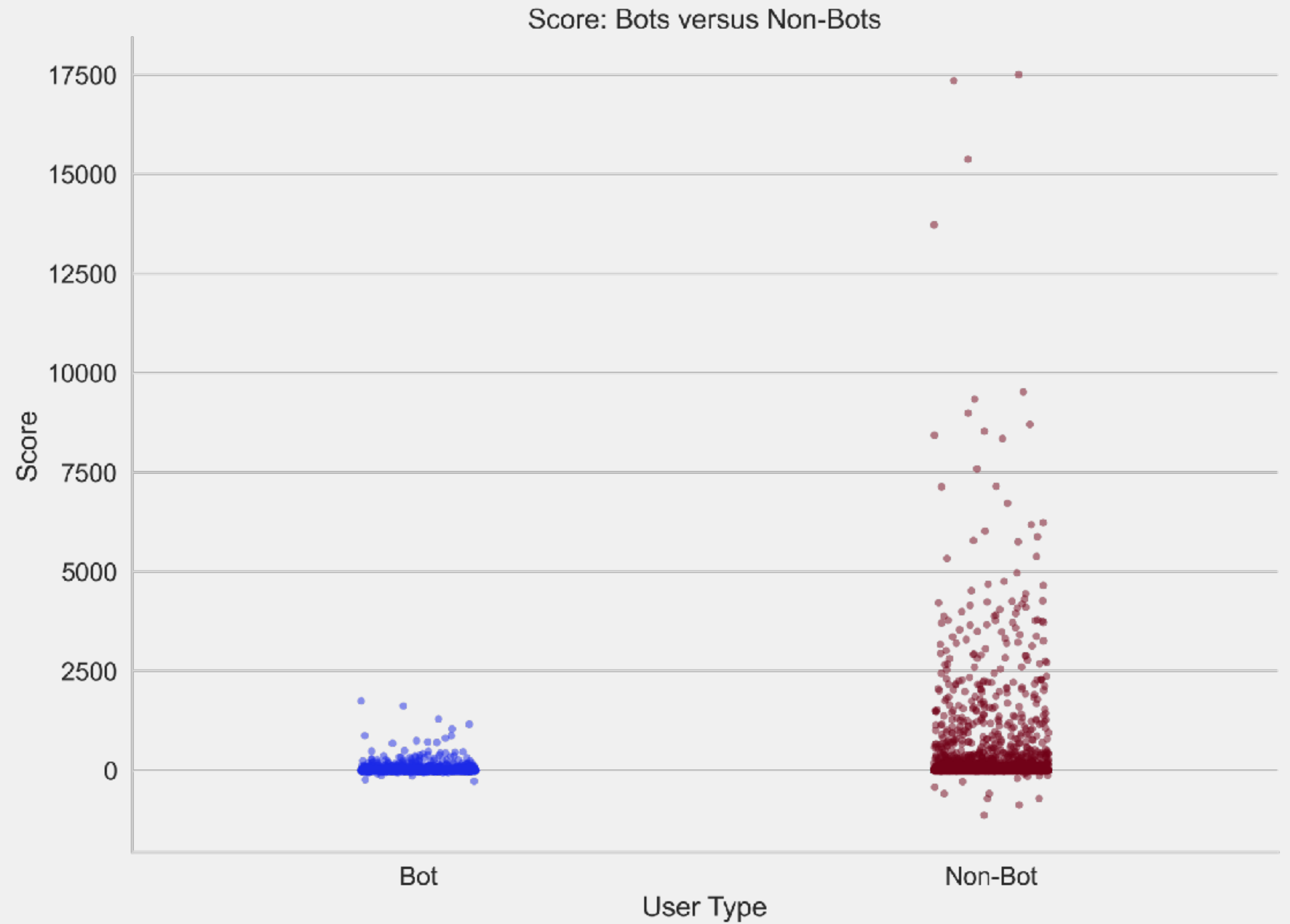
Feature Engineering & Pre-Processing

FEATURE ENGINEERING

▸ Emoji Count

▸ Comment Length

▸ Average Word Length

▸ Lexicon Count

▸ Sentence Count

▸ Syllable Count

▸ Readability

AFTER FEATURE ENGINEERING

Class	FlairCount	EmojiCount	CommentClean	CommentLength	CommentCharacters	AvgWordLength	LexCount	SentenceCount	ReadEase	SyllableCount
Non-Bot	0	0	i actually am not a huge fan of either of thei...	25	116	4.64	25	1	71.48	32
Non-Bot	0	0	thank you for voting! come back here and tell ...	13	61	4.69	13	2	100.58	14
Bot	1	0	i am slick wom-bot. anti-aristotelian mode act...	8	217	27.12	8	2	-224.29	40
Bot	0	0	how about some more info on toluene:\n\nthe ca...	28	209	7.46	28	1	43.06	45

.03

Feature Engineering & Pre-Processing

PRE-PROCESSING

▸ Create dummies for class (Bot/Non-Bot)

▸ Equal number of Bots/Non-Bots

▸ Train/Test Split (80/20)

▸ Created TFIDF vectors of bigrams

▸ Scale Train and Test Sets

▸ Final Training set size: 16563 rows, 1010 features.

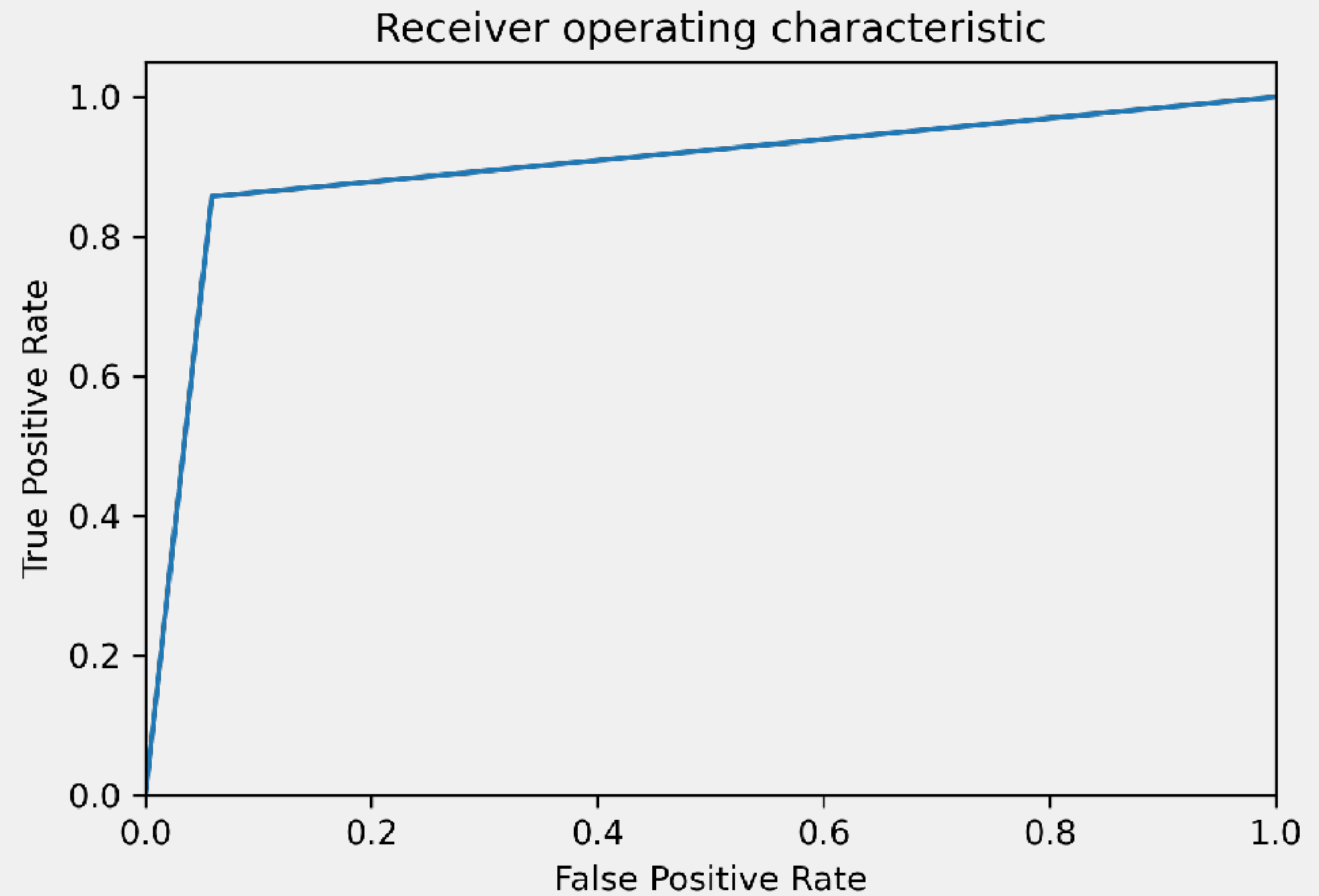# Model Evaluation & Analysis

LOGISTIC REGRESSION MODEL

▸ 85% accuracy rate

GRADIENT BOOSTING CLASSIFIER

▸ GridSearch CV to tune parameters

▸ n_estimators:100

▸ learning_rate = .25

▸ max_features=1000

▸ max_depth = 10

▸ min_samples_split=50

▸ 90% accuracy rate

CONFUSION MATRIX

Confusion Matrix

.04
Model
Evaluation
& Analysis

ACCURACY: .90

CLASSIFICATION REPORT

.04
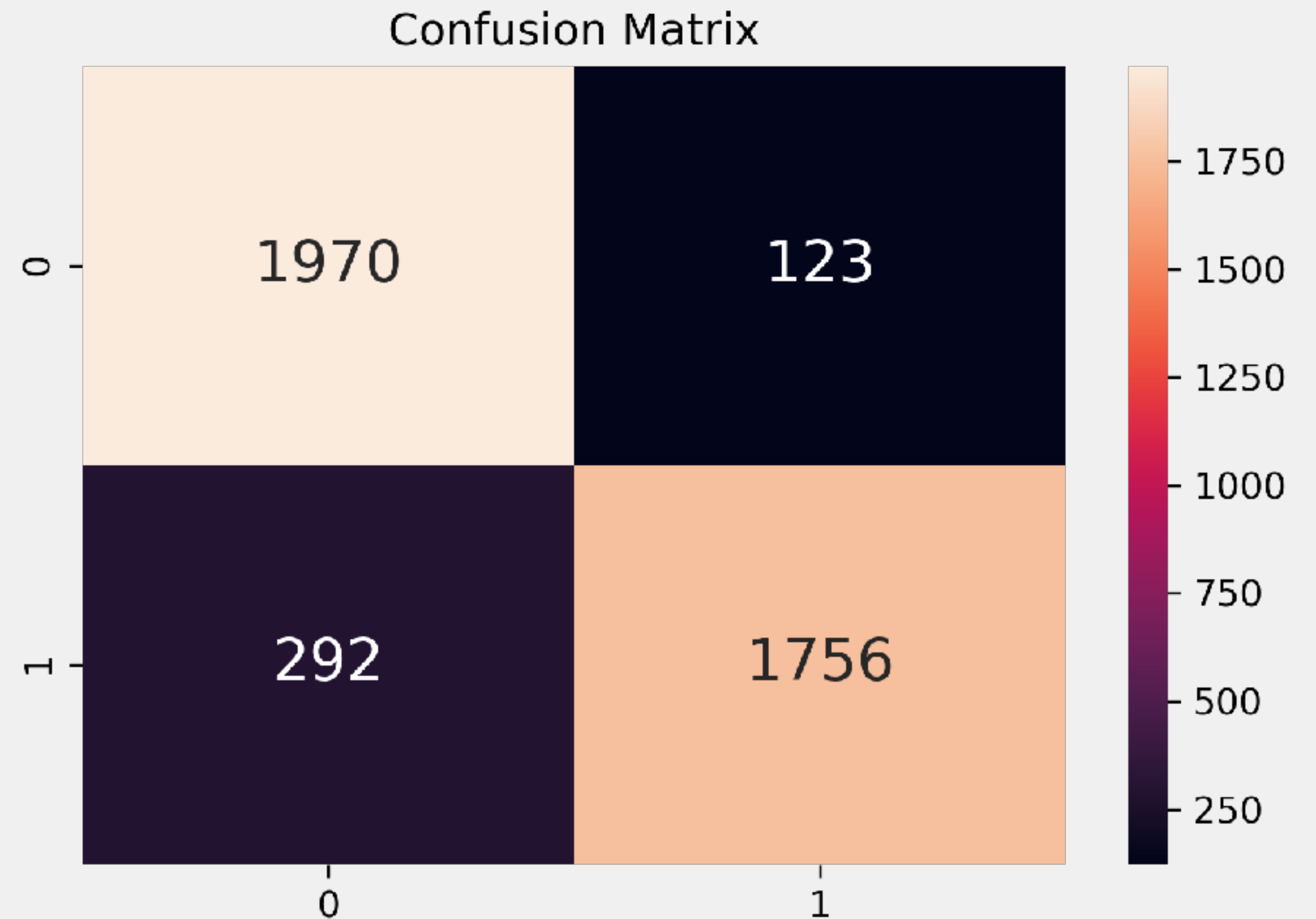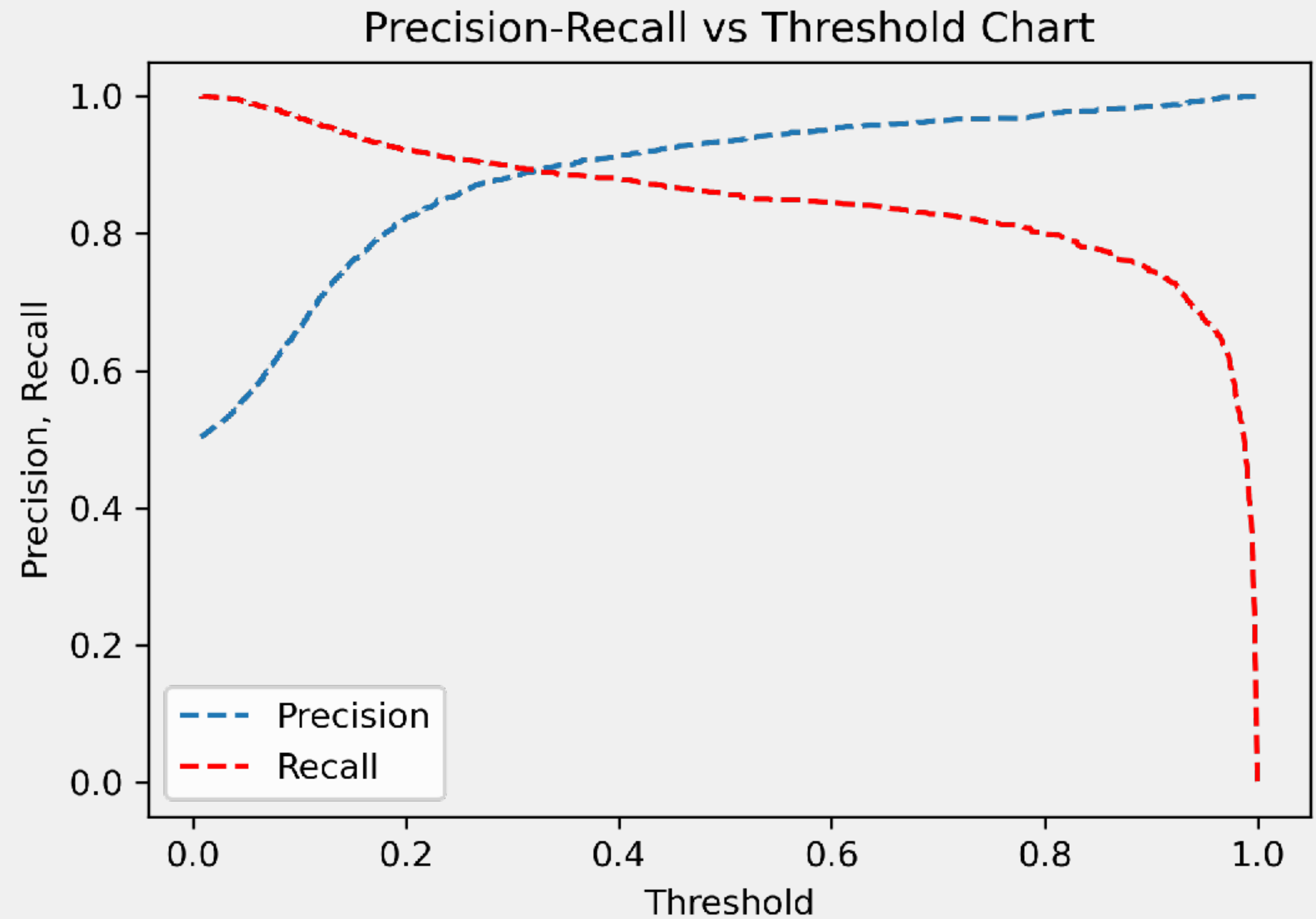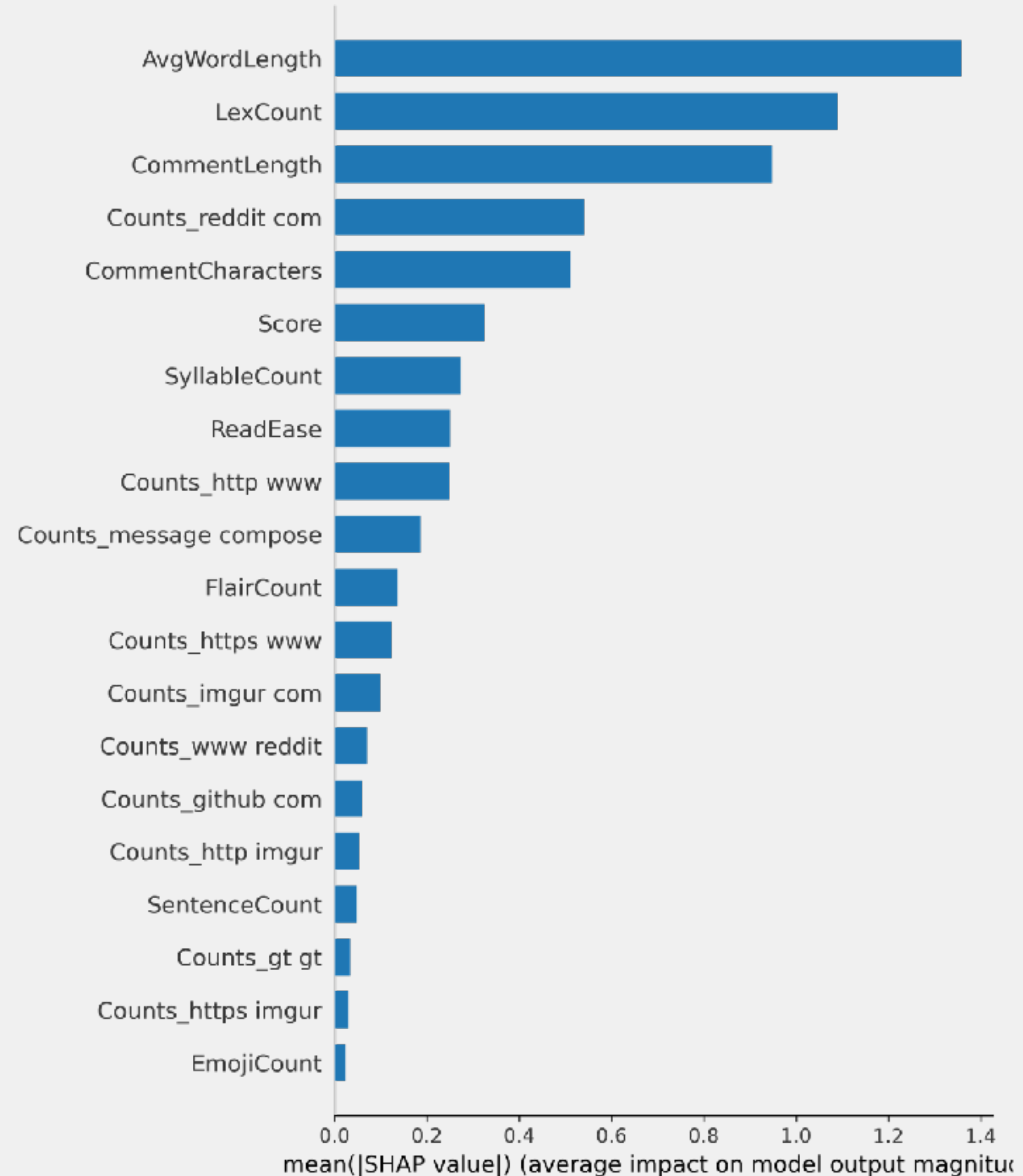
Model Evaluation & Analysis

	precision	recall	f1-score	support
0	0.87	0.94	0.90	2093
1	0.93	0.86	0.89	2048
accuracy			0.90	4141
macro avg	0.90	0.90	0.90	4141
weighted avg	0.90	0.90	0.90	4141

.04
Model Evaluation & Analysis

FEATURE IMPORTANCE

Conclusion

▸ The gradient boosting classifier was able to perform with 90% accuracy on the testing data set, providing evidence that bot comments are distinguishable from non-bots.

CAVEATS

▸ My non-bot user group is rather small.

▸ While I attempted to use a random selection process, I may have introduced bias based on my own opinion of what 'non-bot' user comments look like.

▸ Because several of my non-bot users were well-known public figures, I believe the scores for non-bots are skewed higher than they would be for the entire population of Reddit users.

Conclusion

NEXT STEPS

▸ I would love to build a second model which works on a user-basis, rather than on a comment basis.

▸ For this model, I would take a rolling average of all features for a user's most recent posts.

▸ I believe this model will have a higher accuracy rate, as the originality of Bot posts will be, on average, much lower than for human users.

CONTACT

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