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Reddit Classification

Why are we here?

Problem: Do Classification models help correctly group Reddit Posts into respective buckets? If so, what works?

Subreddits:

- TalesFromRetail
- TalesFromTechSupport

Why these subreddits?

- Similar enough that topics are not complete opposites of each other

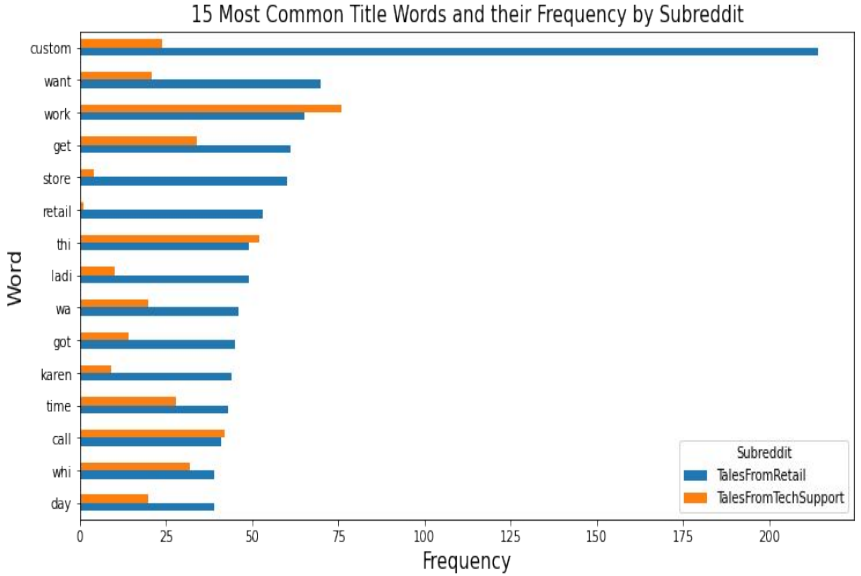
How is Data Collected?

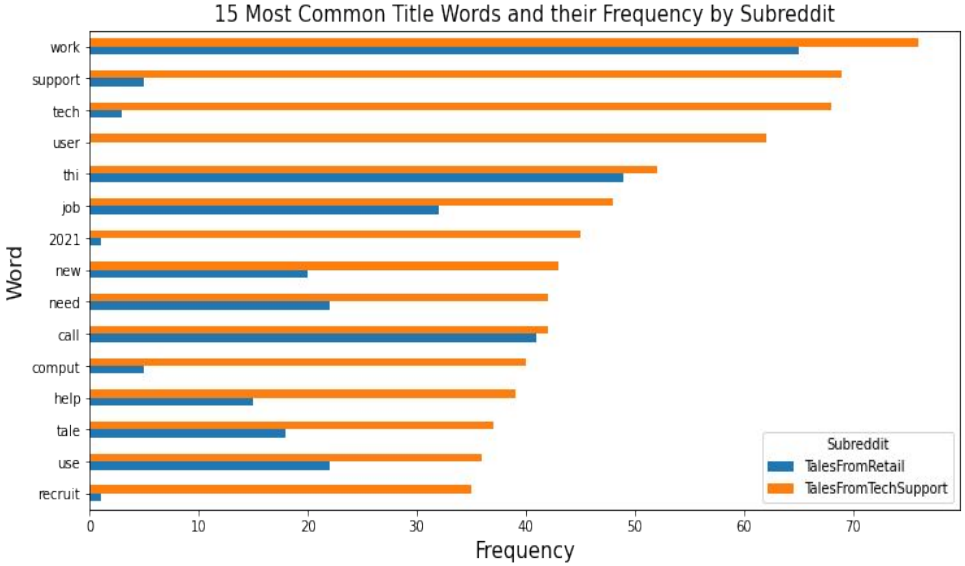
- Web Scraped using Pushshift Reddit API
- ~1500 posts from each subreddit
- Data Cleaning cuts ~2% of the data
- Baseline Accuracy: 50.18%

Exploratory Word Analysis

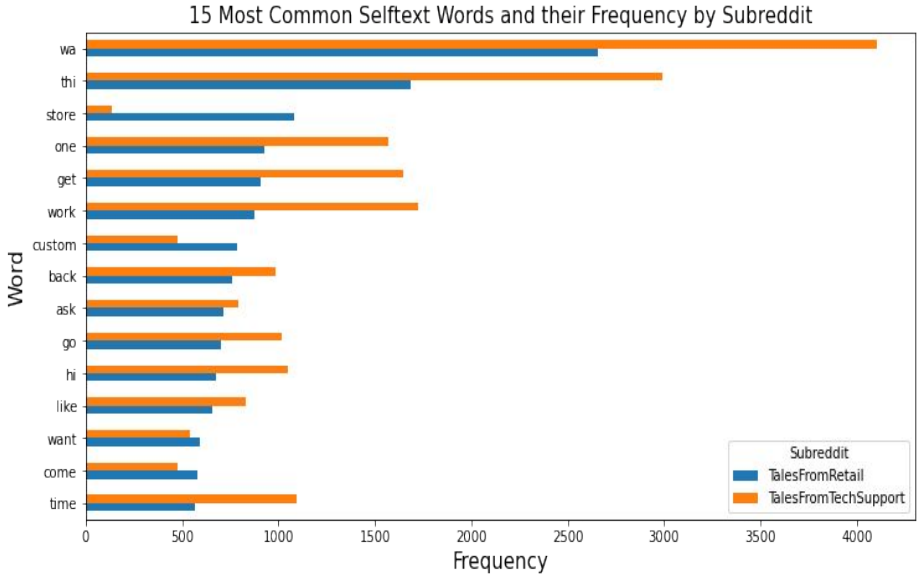
- Tokenize Title and Selftext columns
- Apply a Porter Stemmer to get to root word
- Compare top results sorted by Subreddit

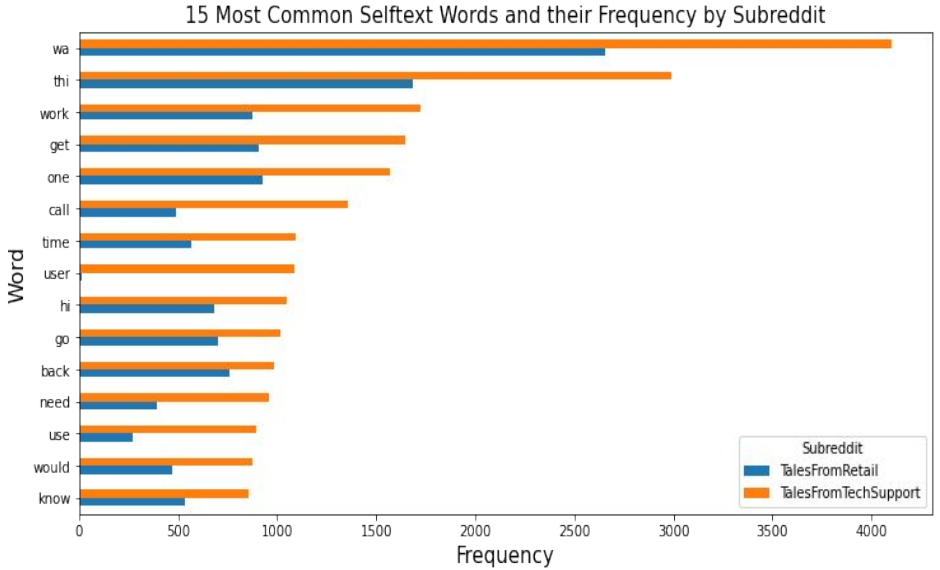
Title Word Analysis



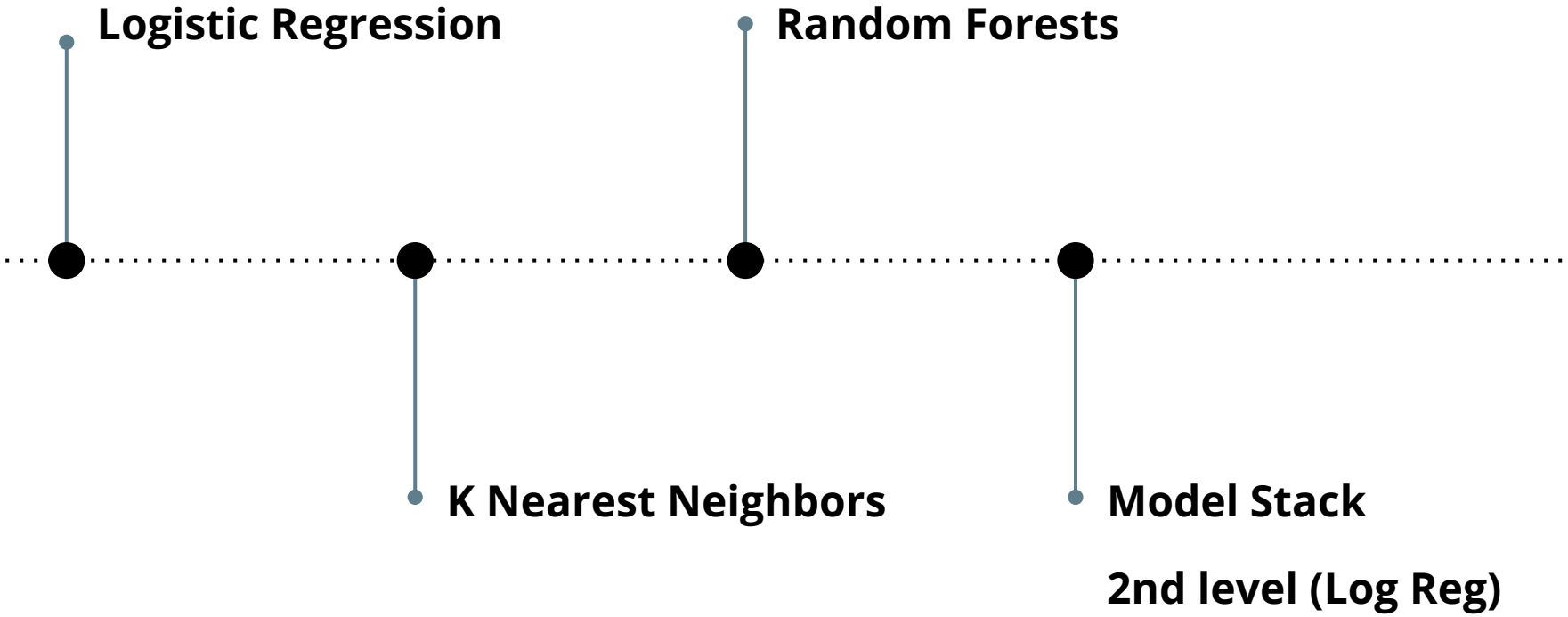


Selftext Word Analysis



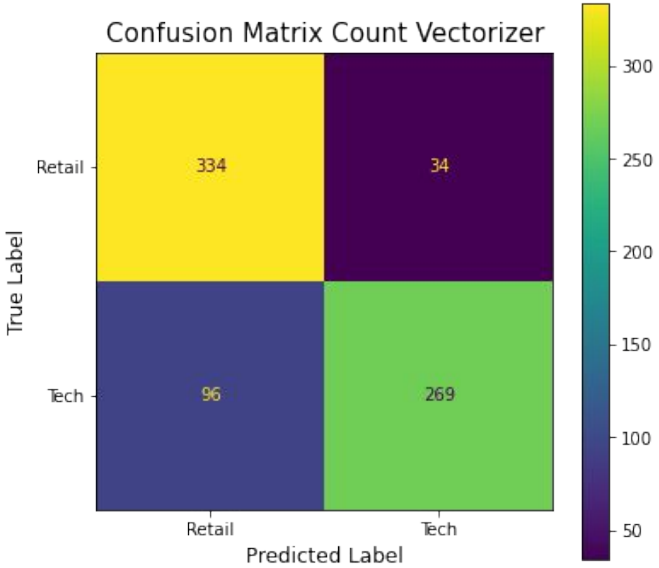


Modeling Process - All use Count/TfidfVectorizer
7 models total - All Created with Pipe/GridSearch

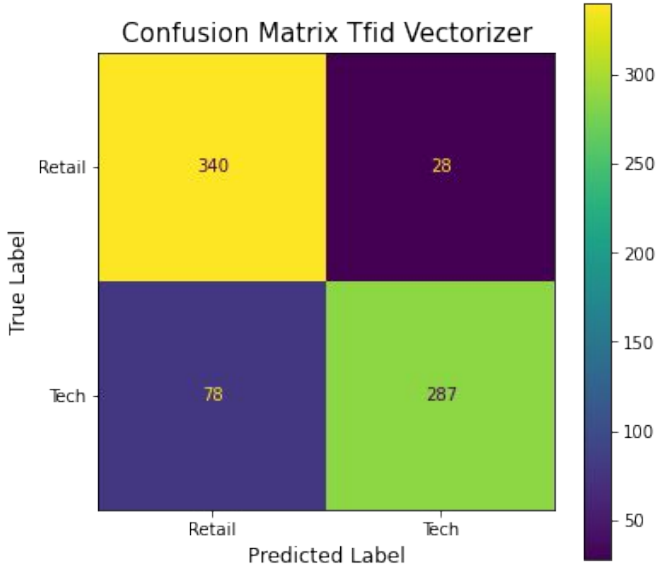


Logistic Regression

Cross Val : 0.8602
Accuracy : 82.26%
Specificity : 90.76%
Sensitivity : 73.70%
Precision : 88.78%

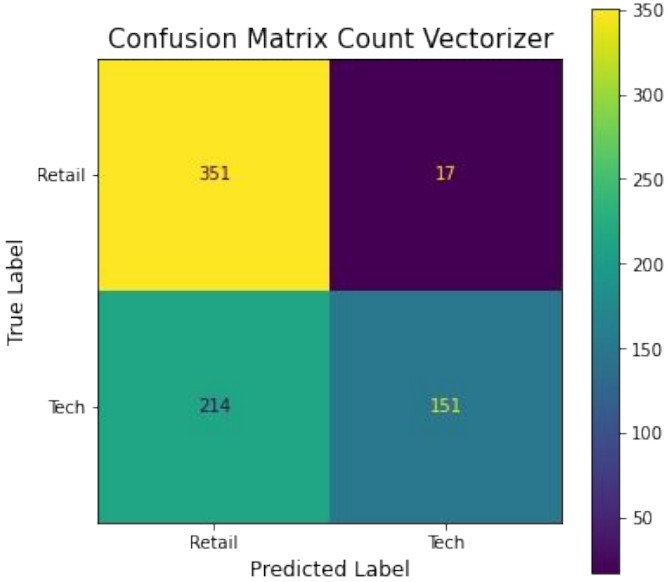


Cross Val : 0.8821
Accuracy : 85.54%
Specificity : 92.39%
Sensitivity : 78.63%
Precision : 91.11%

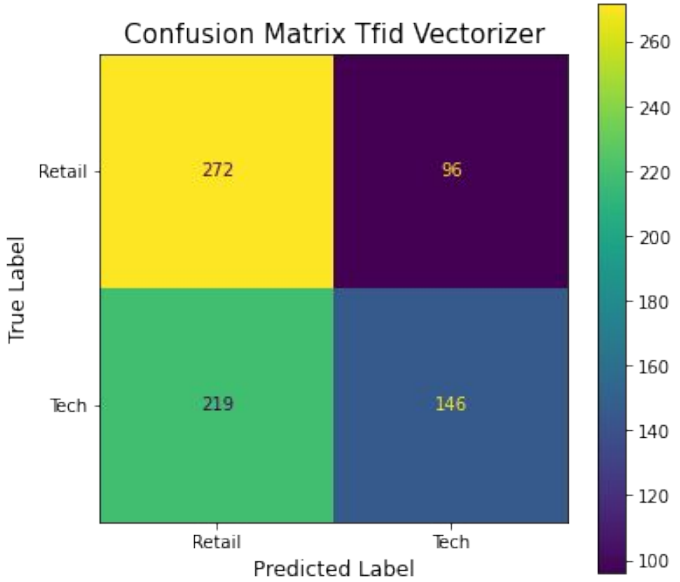


K Nearest Neighbors

Cross Val : .6708
Accuracy : 68.49%
Specificity : 95.38%
Sensitivity : 41.37%
Precision : 89.88%

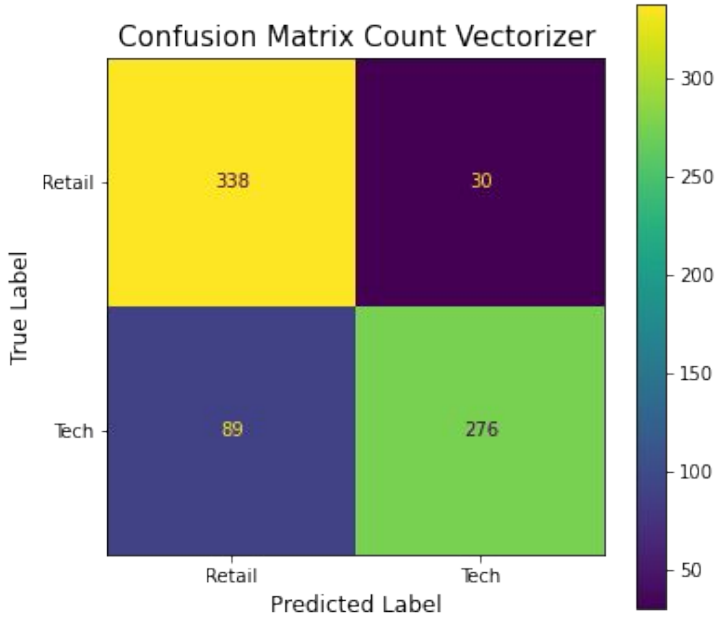


Cross Val : 0.5660
Accuracy : 57.03%
Specificity : 73.91%
Sensitivity : 40.00%
Precision : 60.33%

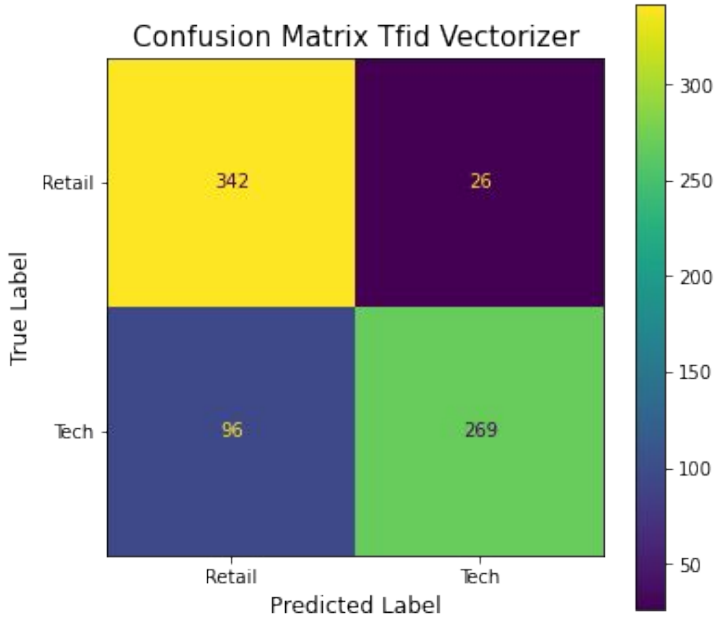


Random Forest

Cross Val : .8647
Accuracy : 83.77%
Specificity : 91.85%
Sensitivity : 75.62%
Precision : 90.20%



Cross Val : 0.8616
Accuracy : 83.36%
Specificity : 92.93%
Sensitivity : 73.70%
Precision : 91.19%



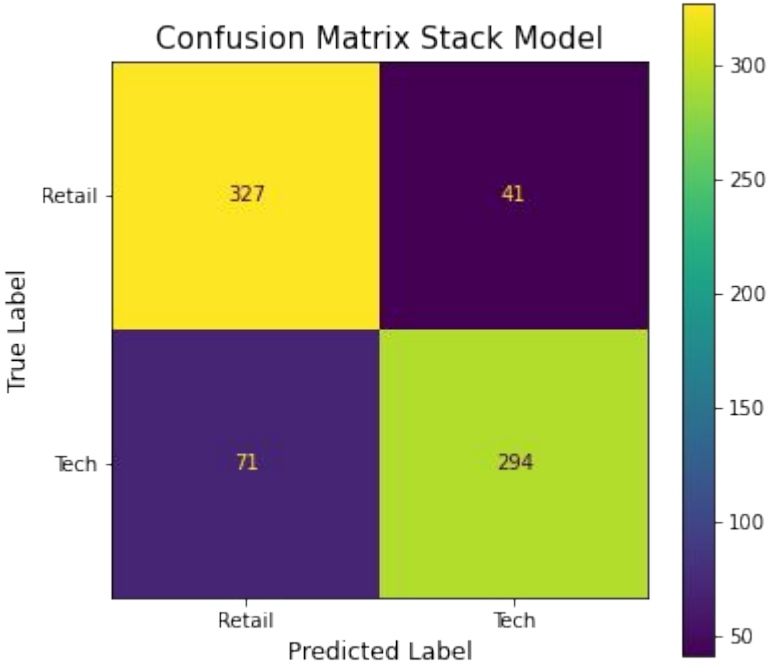
Model Stack!

- Combining all 6 models and their respective best parameters into level 1
- Use Logistic Regression for level 2 since that showed promise as the most accurate/highest cross val score

```
level_1_models = [
    ('logreg1_pipe', Pipeline([
        ('cvec', CountVectorizer(stop_words='english', ngram_range=(1,2), max_df=.3, min_df=4, binary=True)),
        ('logreg', LogisticRegression())
    ])),
    ('logreg2_pipe', Pipeline([
        ('tfidf', TfidfVectorizer(stop_words='english', ngram_range=(1,1), max_df=.3, min_df=3, binary=True)),
        ('logreg', LogisticRegression(solver='liblinear'))
    ])),
     ('knn1_pipe', Pipeline([
        ('cvec', CountVectorizer(stop_words=stopwords, max_df=.4, min_df=7, binary=True)),
        ('ss', StandardScaler(with_mean=False)),
        ('knn', KNeighborsClassifier(n_neighbors=7, weights='distance'))
    ])),
     ('knn2_pipe', Pipeline([
        ('tfidf', TfidfVectorizer(stop_words='english', max_df=.3, min_df=7, binary=False)),
        ('ss', StandardScaler(with_mean=False)),
        ('knn', KNeighborsClassifier(weights='distance'))
    ])),
    ('rf1_pipe', Pipeline([
        ('cvec', CountVectorizer(stop_words='english', max_df=.6, min_df=4, binary=False)),
        ('rf', RandomForestClassifier(n_estimators=200, min_samples_split=10, min_samples_leaf=1))
    ])),
     ('rf2_pipe', Pipeline([
        ('tfidf', TfidfVectorizer(stop_words='english', ngram_range=(1,2), max_df=.6, min_df=4, binary=False)),
        ('rf', RandomForestClassifier(min_samples_split=30))
    ]))
]

stack = StackingClassifier(estimators=level_1_models, final_estimator=LogisticRegression())
```

Cross Val : 0.8707
Accuracy : 84.72%
Specificity : 88.86%
Sensitivity : 80.55%
Precision : 87.76%



Statistic Summary

	Logistic Regression		KnearestNeighbors		Random Forest		Stack Model
	CountVec	TfidVec	CountVec	TfidVec	CountVec	TfidVec	
Cross-Val-Score	86.02%	88.21%	67.08%	56.60%	86.47%	86.16%	87.07%
Accuracy	82.26%	85.54%	68.49%	57.03%	83.77%	83.36%	84.72%
Specificity	90.76%	92.39%	95.38%	73.91%	91.85%	92.93%	88.86%
Sensitivity	73.70%	78.63%	41.37%	40.00%	75.62%	73.70%	80.55%
Precision	88.78%	91.11%	89.88%	60.33%	90.20%	91.19%	87.76%
Score STDEV	6.73%	5.46%	21.45%	12.09%	6.40%	7.61%	3.30%
Score MEAN	84.30%	87.18%	72.44%	57.57%	85.58%	85.47%	85.79%

Conclusion

- Highest Score Model: TfidfVectorizer Log Reg
- Best Score Distribution: Stack Model
- Future: Investigate further into Type I/II errors and find out why they were so prevalent in all models, then reevaluate all models