AN IN-DEPTH ANALYSIS OF GOOGLE PLAY STORE DATA

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THE PURPOSE

- The objective of this project is to give an informed and statistically significant opinion to mobile developers
  - What project should they work on next?
  - Which will give me the most downloads?
  - Which will give me the most money?

OR

THE DATA

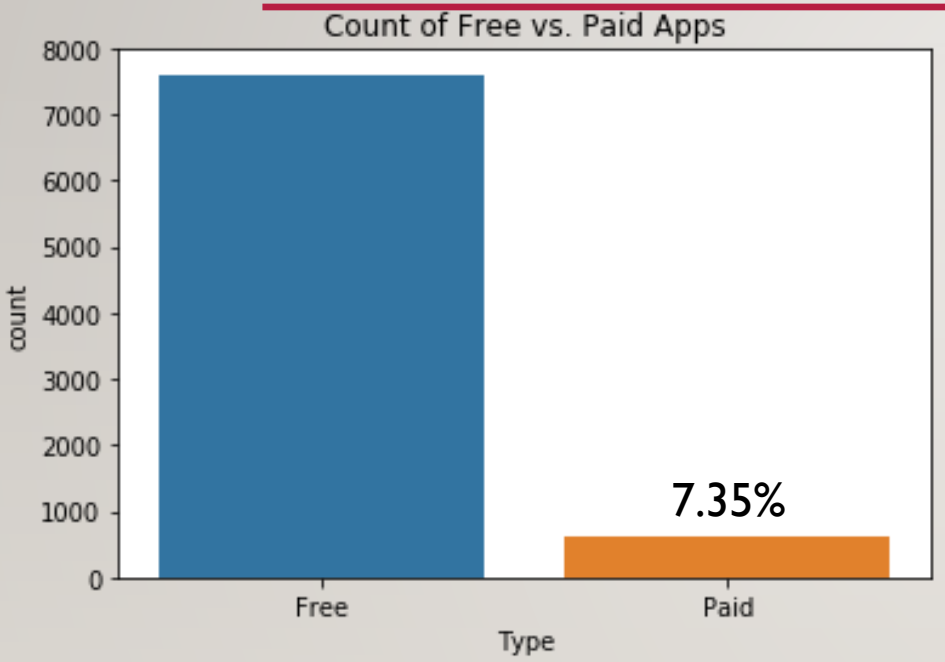
- Provided in two CSV files on Kaggle.com
  - 1st: 10,000 Apps with the name, rating, category/genre, file size, Android version, when it was last updated, and number of Installs and Reviews
  - 2nd: 60,000 separate reviews for about 900 different apps in the 1st dataset. Comes with preprocessed sentiment

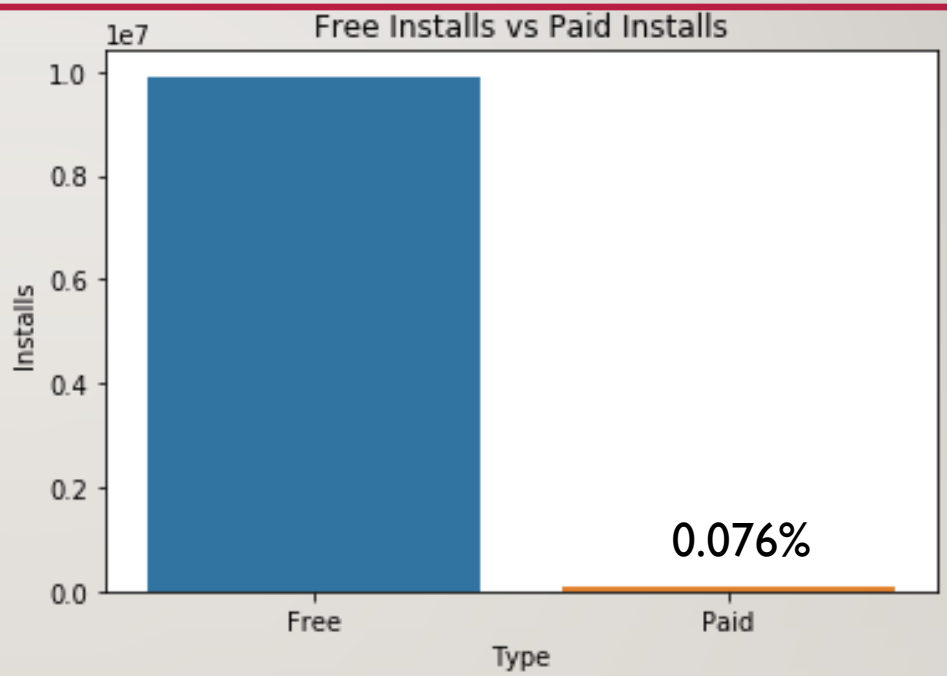
WRANGLING STEPS

- Number of installs and file size
  - Getting rid of "+", "M", and "k"
  - Divide by 1,000 for k

- Fill "Varies with Device" with Median
- All numbers are Integers and not Strings
- Many rows in 2nd dataset full of NaNs. Lost 23,000 observations

FREE APPS OUTWEIGH PAID APPS AT OVER 10 TO 1

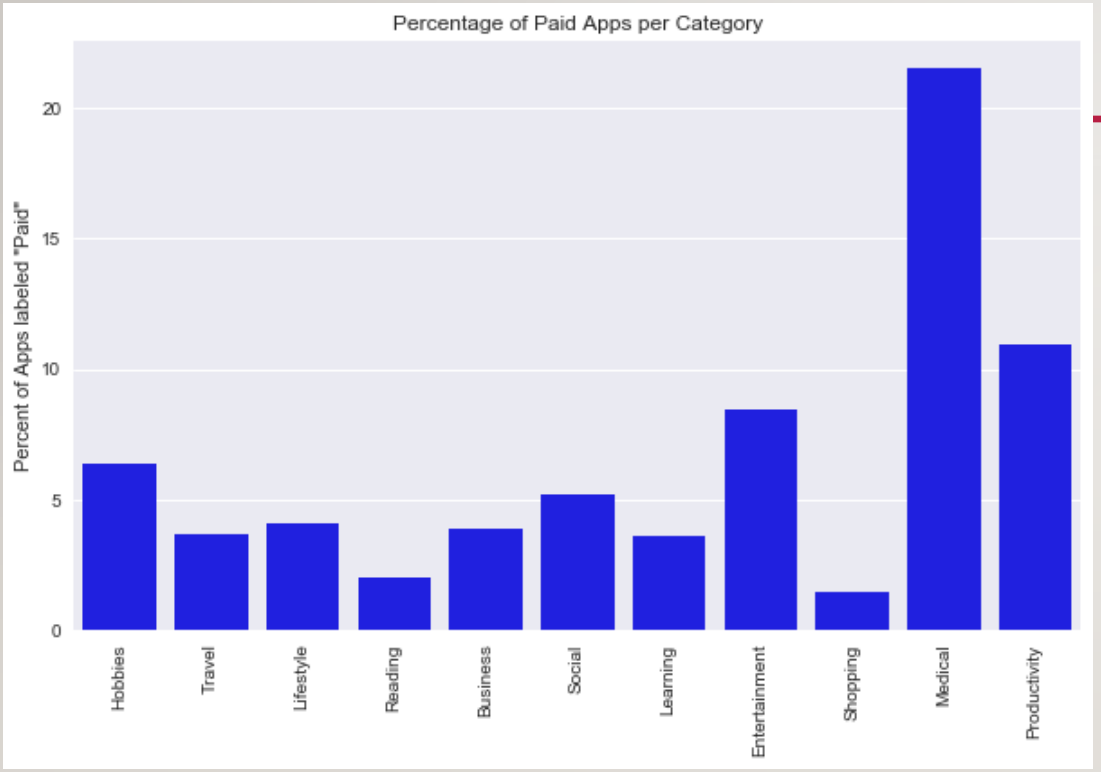


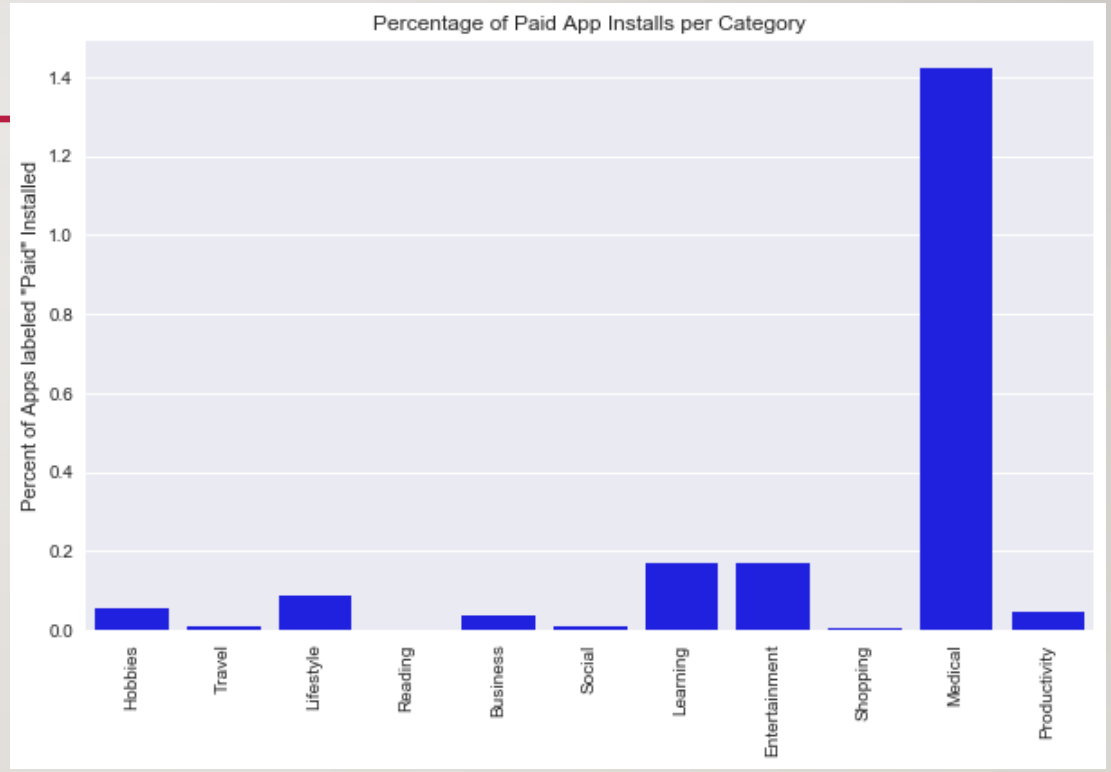


- Free apps are **installed** at a rate of 100 apps to 1 paid app

ANALYZING THE DATA

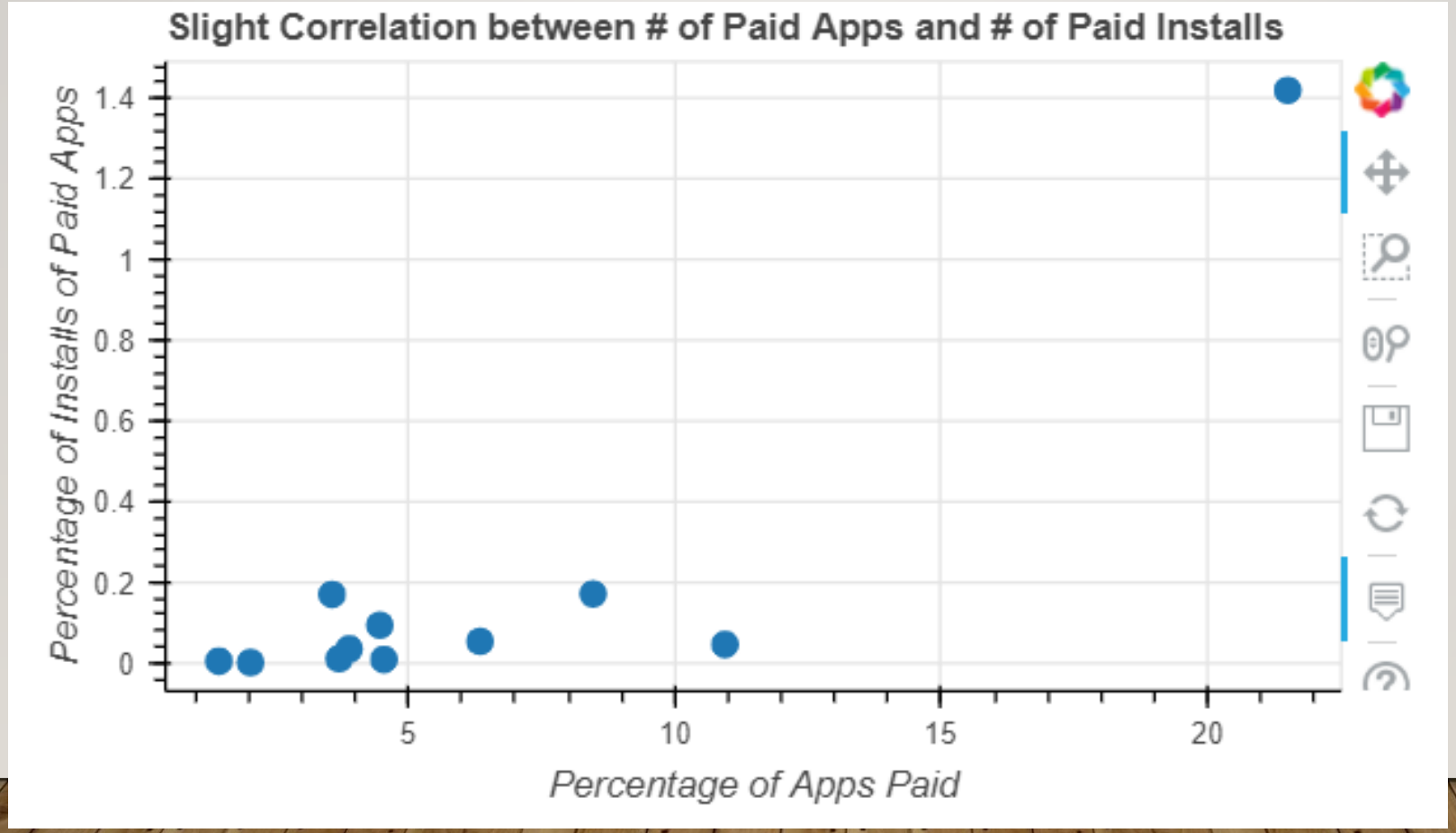
- Which apps, based on category, are most likely paid for?





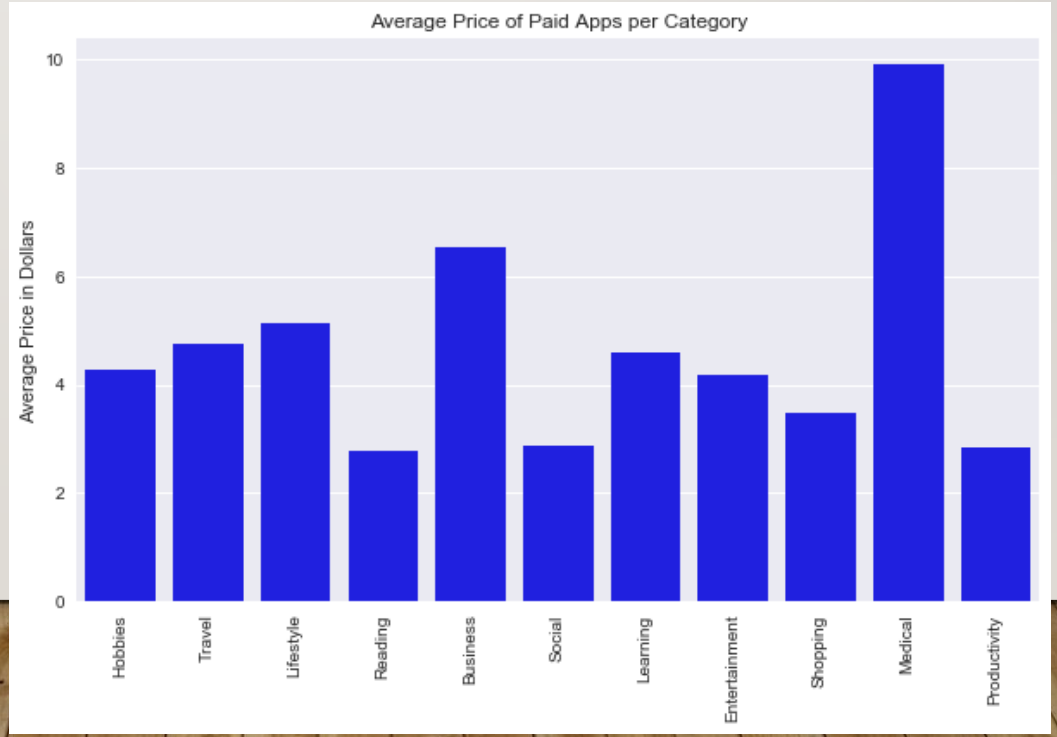
- Medical Apps both have the highest percentage of paid apps **and** have the highest percentage of installs of said apps.

R^2 OF 0.789 FOR THE 11 CATEGORIES



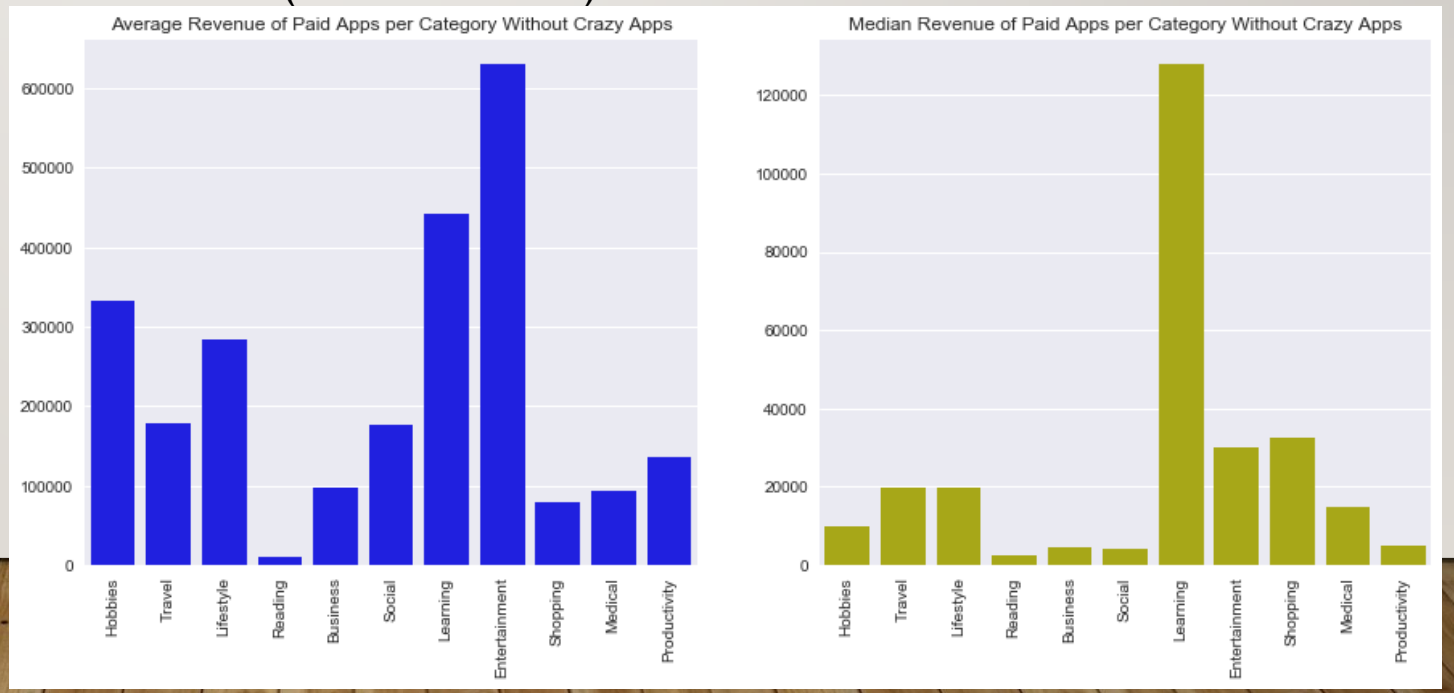
AVERAGE PRICE OF PAID APPS

- Business and Lifestyle categories had unusually high averages
  - Many "I am Rich" apps that cost $200-$400.
  - These most likely were not purchased at full price, so I dropped them for my analysis.
- After dropping these apps:
  - Medical apps have highest average price
  - Business apps are 2nd at $6.50 per app



REVENUE IS A DIFFERENT STORY

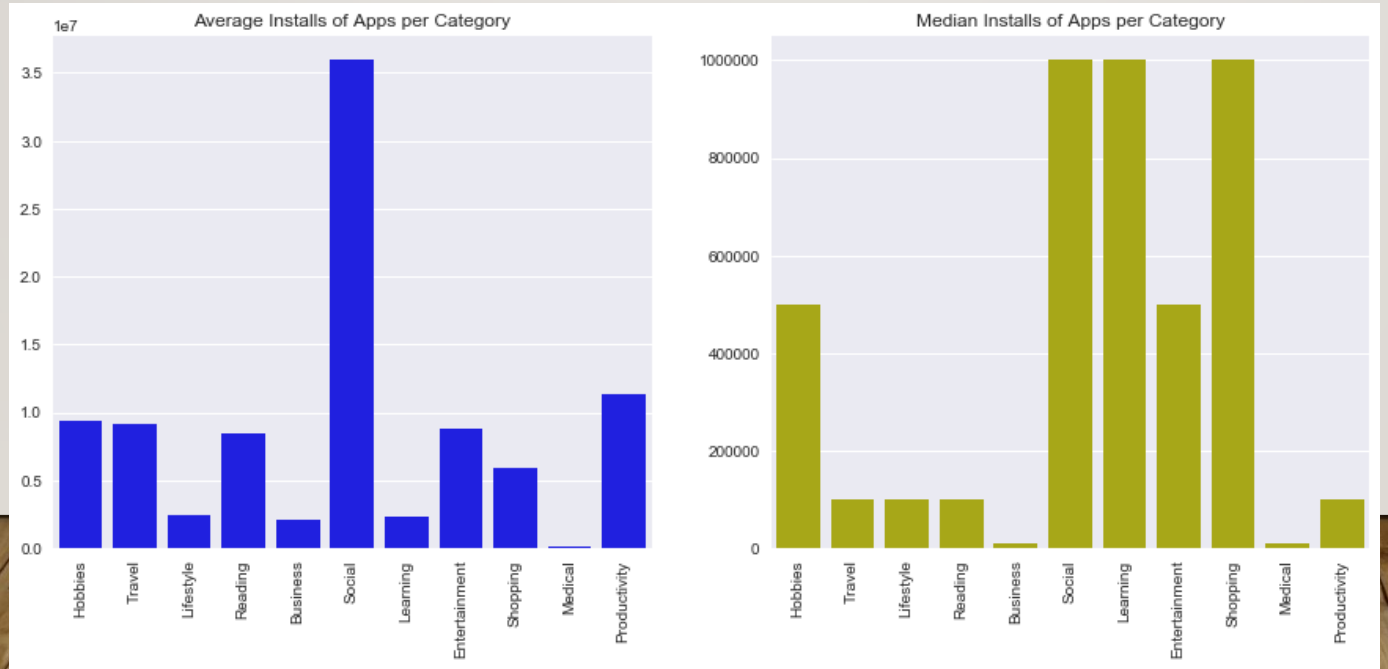
- Obtained revenue field by multiplying Installs by price
  - Two assumptions:
    - All apps purchased at full price
    - Number of installs closer to label than not (because of the +)
- Learning Apps rank highly in both average and median
  - Looking closer:
    there are only 6 paid apps
    but they all did fairly well



LEARNING APPS STILL RANKS HIGHLY FOR MEDIAN NUMBER OF INSTALLS OF **ALL** APPS

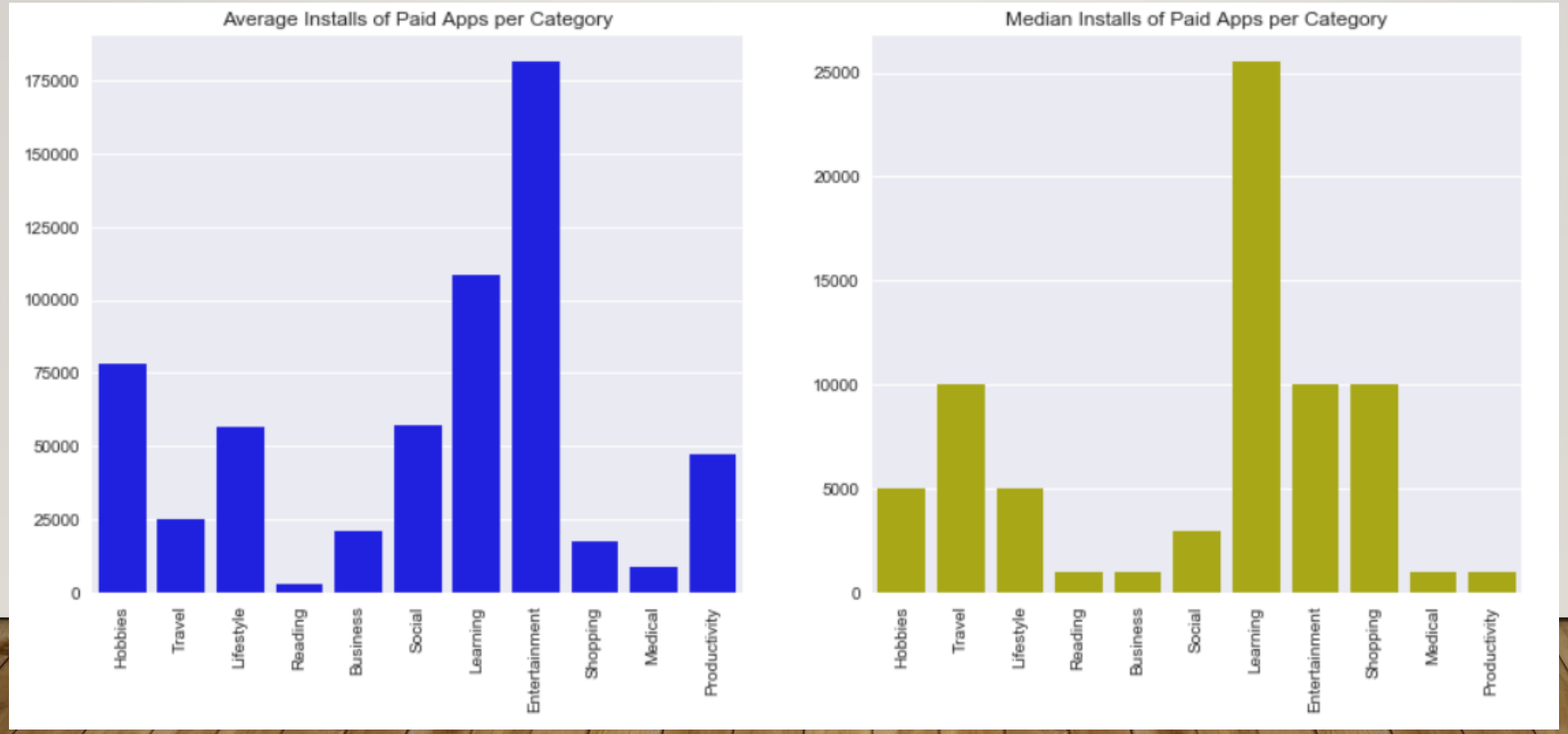
App	Ra
Messenger – Text and Video Chat for Free	
WhatsApp Messenger	
Skype - free IM & video calls	
Google Chrome: Fast & Secure	
Gmail	
Hangouts	
Google+	
Instagram	
Facebook	
UC Browser - Fast Download Private & Secure	

- Some sort of educational app may be good for developers to make if they want it to be downloaded a lot.
- Social apps seem like they could be a good choice, but looking at the top 10 apps in this category, we see that they are all by large companies like Google and Facebook



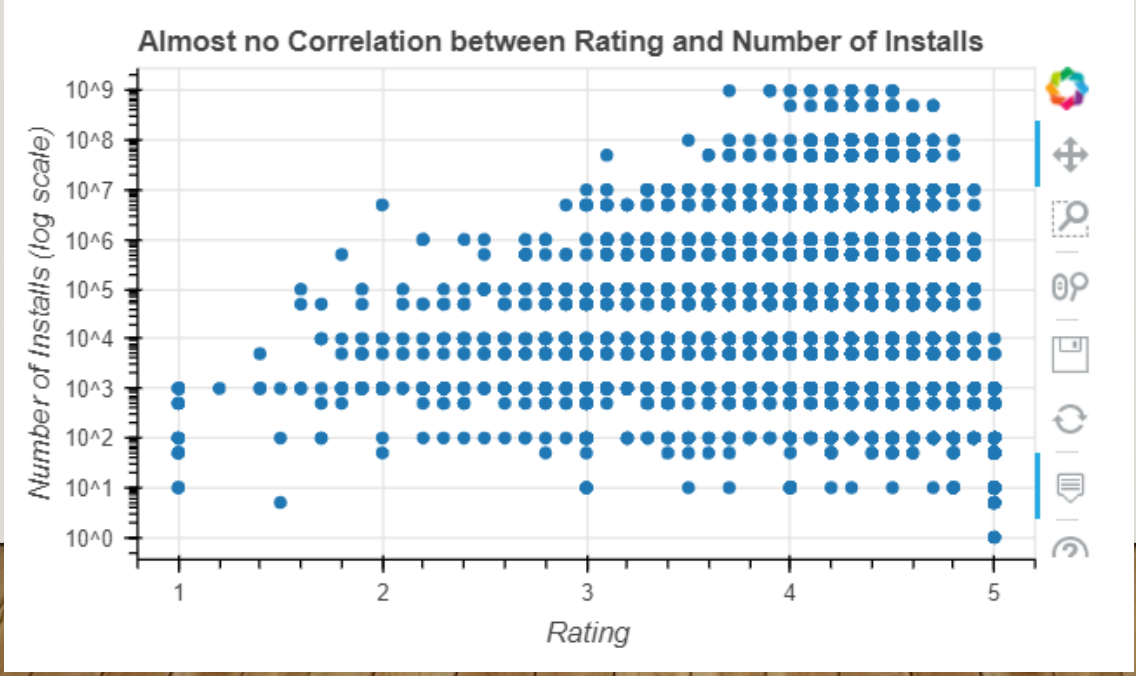
INSTALLS OF PAID APPS

- Social apps gives up top spot to Entertainment for average number of installs
  - Most social app installs are from free apps



DO RATINGS AFFECT THE INSTALLATION RATE?

- Plotted on log scale
  - Seems like there is a correlation, but low number of apps with high installs makes it look this way
  - Actual R^2 is only 0.007



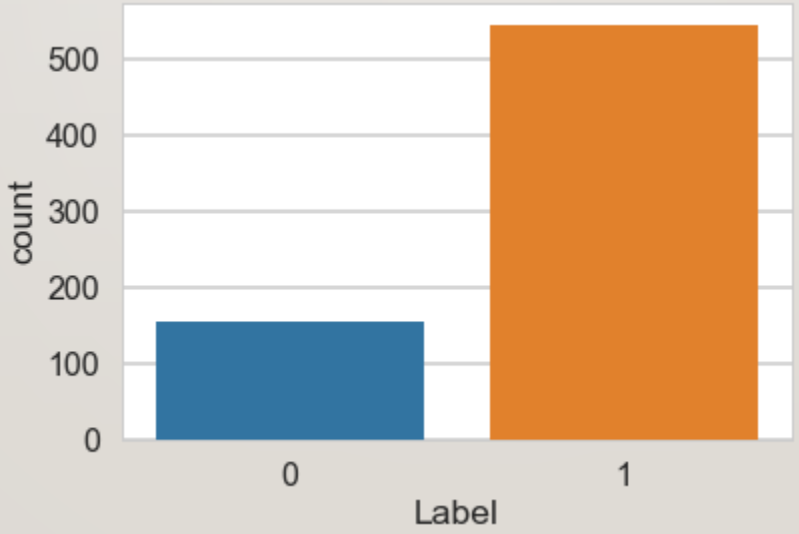
ANY CORRELATIONS OF MY CALCULATED FIELDS?

	Paid Install Percent	Size	Percent of Apps Paid	Number of Installs	Median Installs	Average Revenue	Median Revenue
Paid Install Percent	1.000000	-0.031083	0.882214	-0.291257	-0.309394	-0.234666	-0.089364
Size	-0.031083	1.000000	-0.009141	-0.054185	0.171366	0.319175	-0.230978
Percent of Apps Paid	0.882214	-0.009141	1.000000	-0.143792	-0.353803	-0.012397	-0.182487
Number of Installs	-0.291257	-0.054185	-0.143792	1.000000	0.434327	-0.042173	-0.302877
Median Installs	-0.309394	0.171366	-0.353803	0.434327	1.000000	0.327441	0.533757
Average Revenue	-0.234666	0.319175	-0.012397	-0.042173	0.327441	1.000000	0.502133
Median Revenue	-0.089364	-0.230978	-0.182487	-0.302877	0.533757	0.502133	1.000000

- 3 that I found interesting
  - Percent of Apps paid vs Paid Install Percent: already discussed
  - Percent of Apps Paid vs Median Installs: The more Paid apps in a category, the less likely they will be installed
  - Median number of Installs vs Median Revenue: The more Installs in general, the more money the apps will make

NATURAL LANGUAGE PROCESSING

- Hand labeled around 700 of the 30,000 reviews as positive or negative
- Used a "voting system" to determine the class of the other 29,300
- More positive than negative, but not necessary to over or under sample



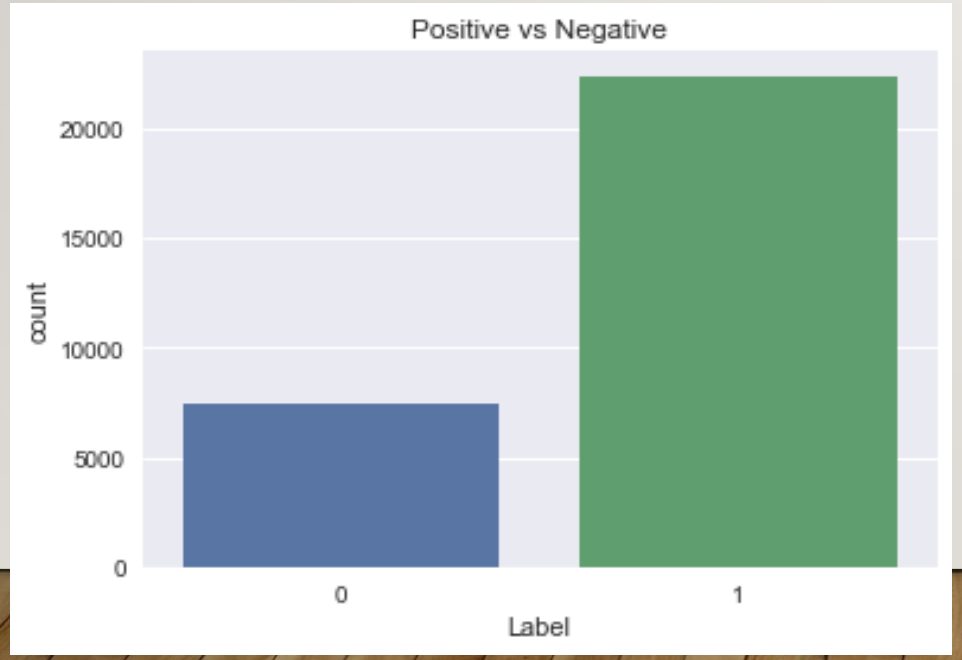
NATURAL LANGUAGE PROCESSING (CONT.)

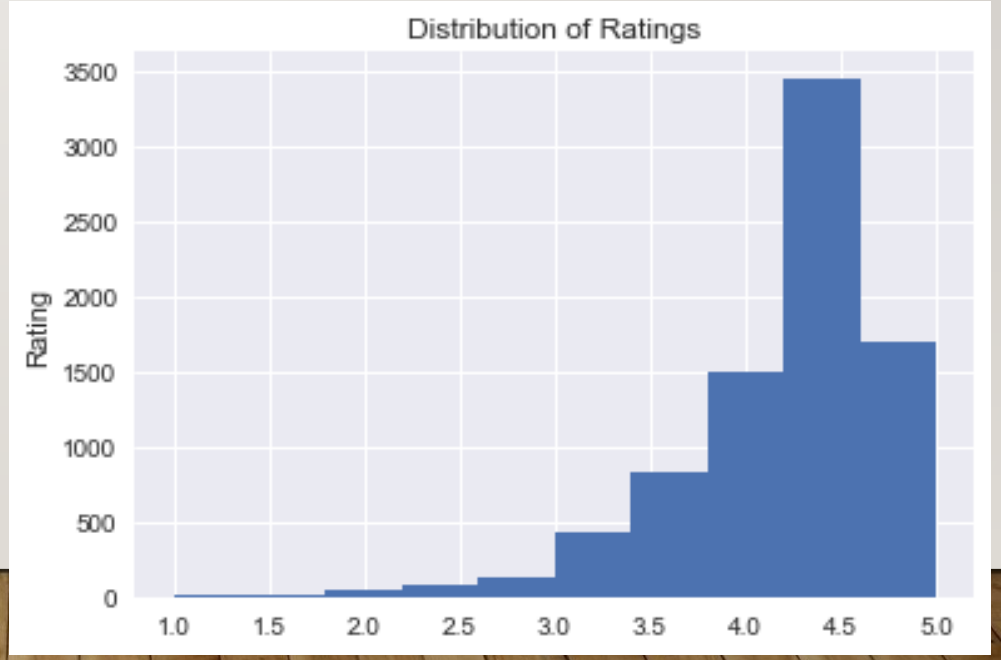
- Used Countvectorizer and a LemmaTokenizer to obtain counts of all lemmatized words in training set
- Used 5 as min_df
- Utilized MultinomialNB, BernoulliNB, GaussianNB, Logistic Regression, and SGD Classifier
  - Used VotingClassifier. If 3/5 models predicted one class, then final prediction is that class
- Accuracy of 0.86
- Precision of 0.86
- Recall of 0.85

These scores are pretty good

MOST REVIEWS HAD POSITIVE SENTIMENT

- This makes sense, as most apps had a rating of 4.5 or greater





SOCIAL APPS HAVE THE LOWEST PERCENTAGE OF POSITIVE RATINGS

- We have already decided that average rating is not correlated to installation rate
- But is there a correlation with average **percentage of positive ratings?**