



APPLE APP STORE

ANALYSIS, INSIGHTS & RECOMMENDATIONS

Amazon Media Products

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AGENDA

- Background
- Data Issues and Assumptions
- Descriptive Statistics
- Business Dashboard - Demo
- Exploratory Analysis & Insights
- Business Problem: Improving engagement and Revenue for App Store
- Recommendations & Future Work
- Appendix/ Resources



BACKGROUND

- Available Datasets:
 1. Number of Transactions (transaction.dat.csv): **3,607,509**
 - (Time Frame: June 6, 2016 to Sep 21, 2016)
 2. Number of Accounts (account_dat.csv): **100,00**
 3. Number of Apps (app_dat.csv): **1,000**
 4. Number of In-App Transactions (in-app_dat.csv): **2,376**
 5. Number of Device types: **3** (iPhone, iPad and Both)
 6. App Categories: **5** (Games, Photos & Videos, Utilities, Entertainment, Social Networking)



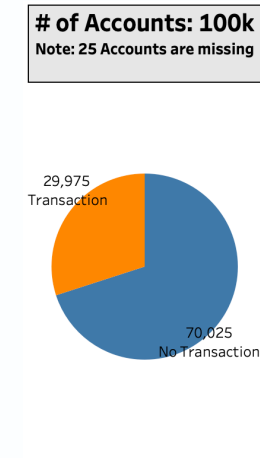
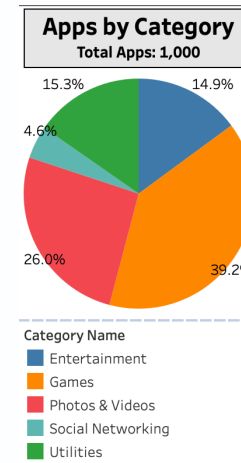
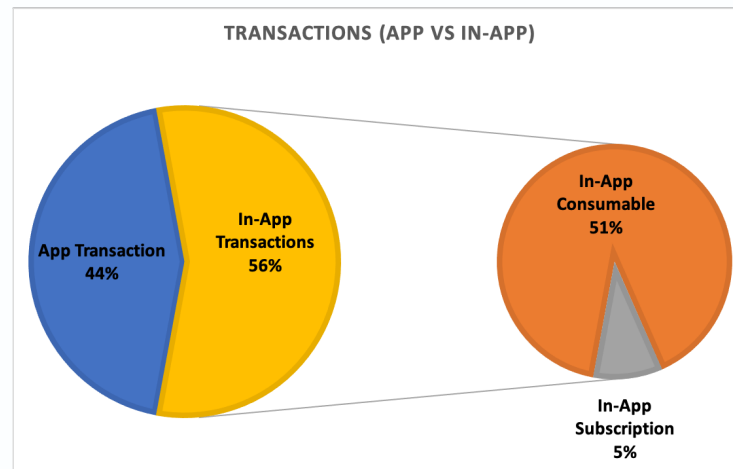
DATA ISSUES AND ASSUMPTIONS

- 2,365 duplicate transactions were eliminated
- 25 Accounts that made a transaction are missing in account_dat.csv dataset
- Account Tenure and Payment Type are missing for 2,741 transactions
- Only ~3 months transactions are available (no yearly seasonality captured)



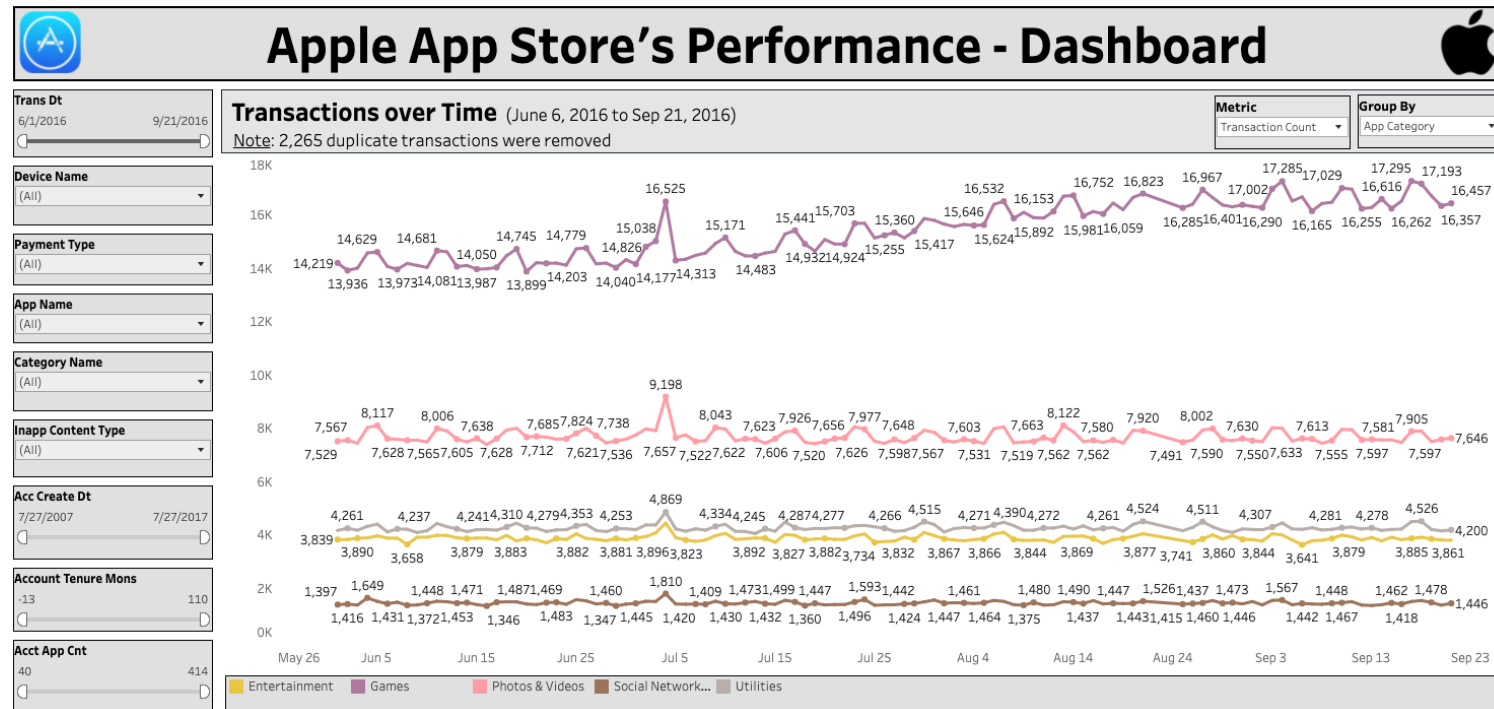
DESCRIPTIVE STATS

- Out of 3.6M transactions, 44% were App downloads (both Free and Paid) and 56% were in-App purchases (both consumable and subscription)
- Out of 1000 Apps, Games category was the highest (~40%) followed by Photos & Videos
- Out of 100k Accounts, ~30% accounts had at-least one transaction





INTERACTIVE DASHBOARD - DEMO



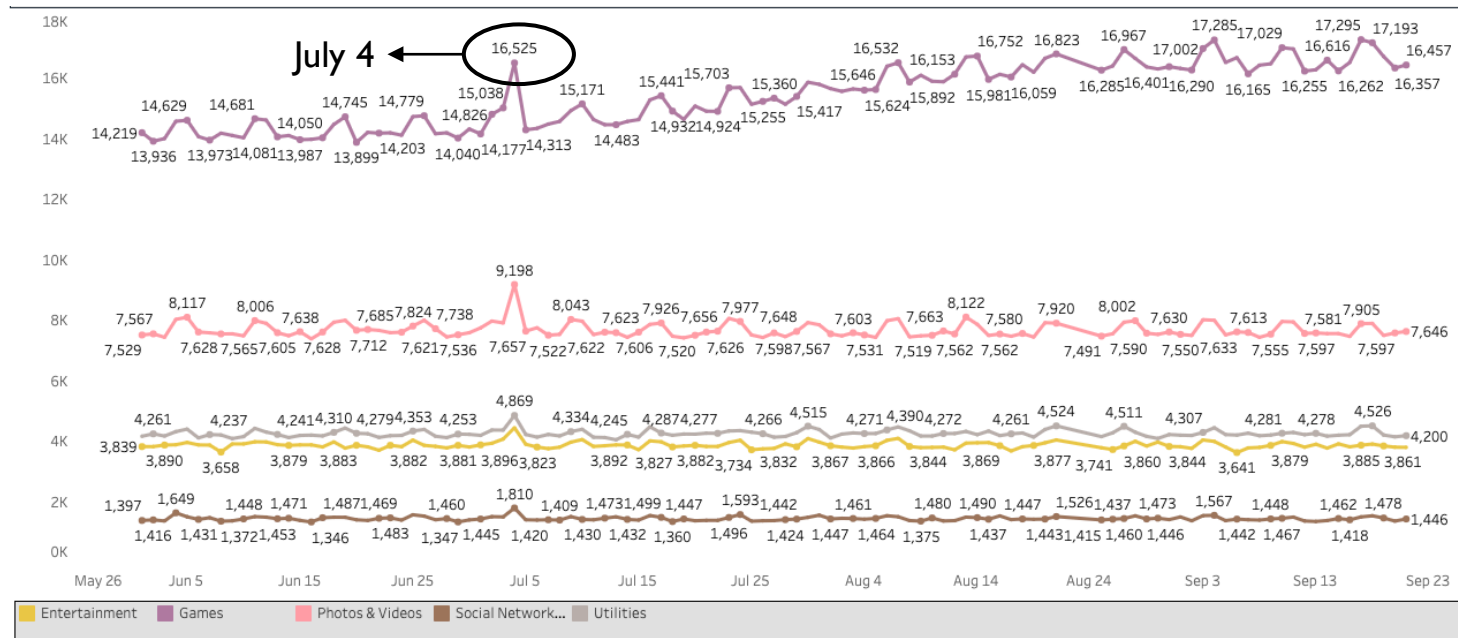
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EXPLORATORY ANALYSIS & INSIGHTS

WEEKLY TRENDS & HOLIDAY PEAK

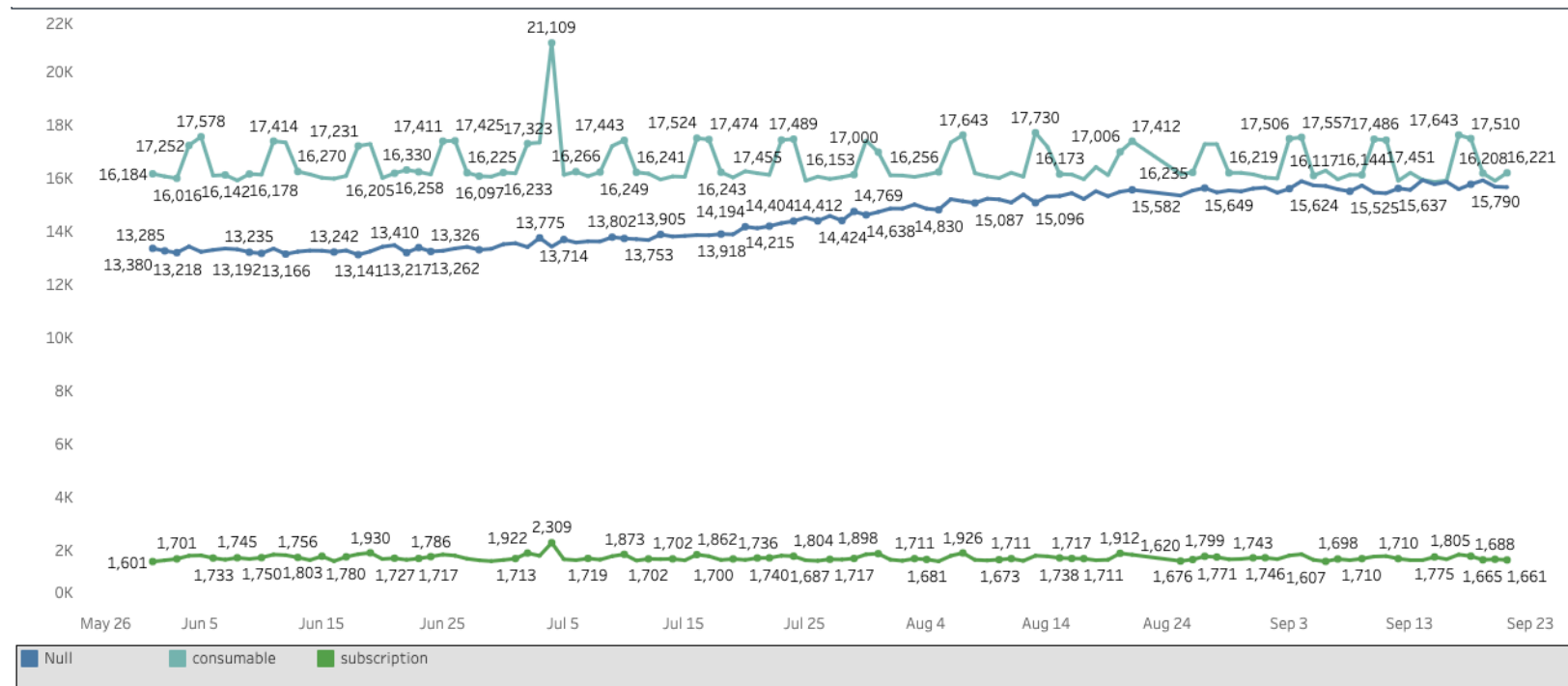
- Higher traffic during weekends and peak during public holidays
- Games Category has an increasing trend of number of downloads





EXPLORATORY ANALYSIS & INSIGHTS

FREE TRANSACTIONS ARE GOING UP WHILE PAID ARE CONSTANT

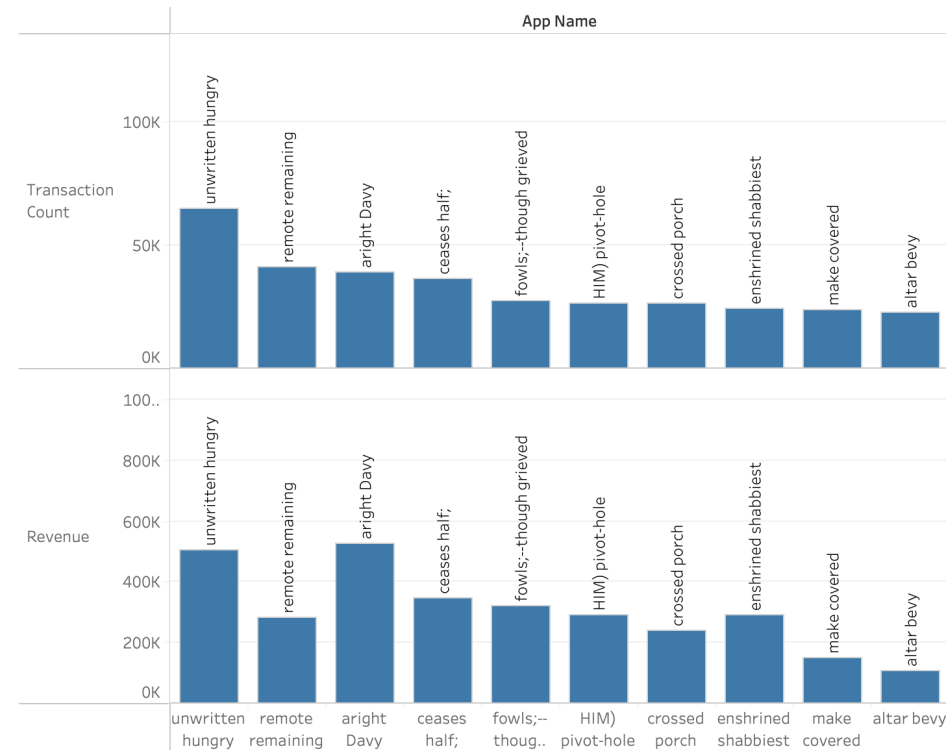




EXPLORATORY ANALYSIS & INSIGHTS

TOP 10 APPS – DOWNLOADS & REVENUE

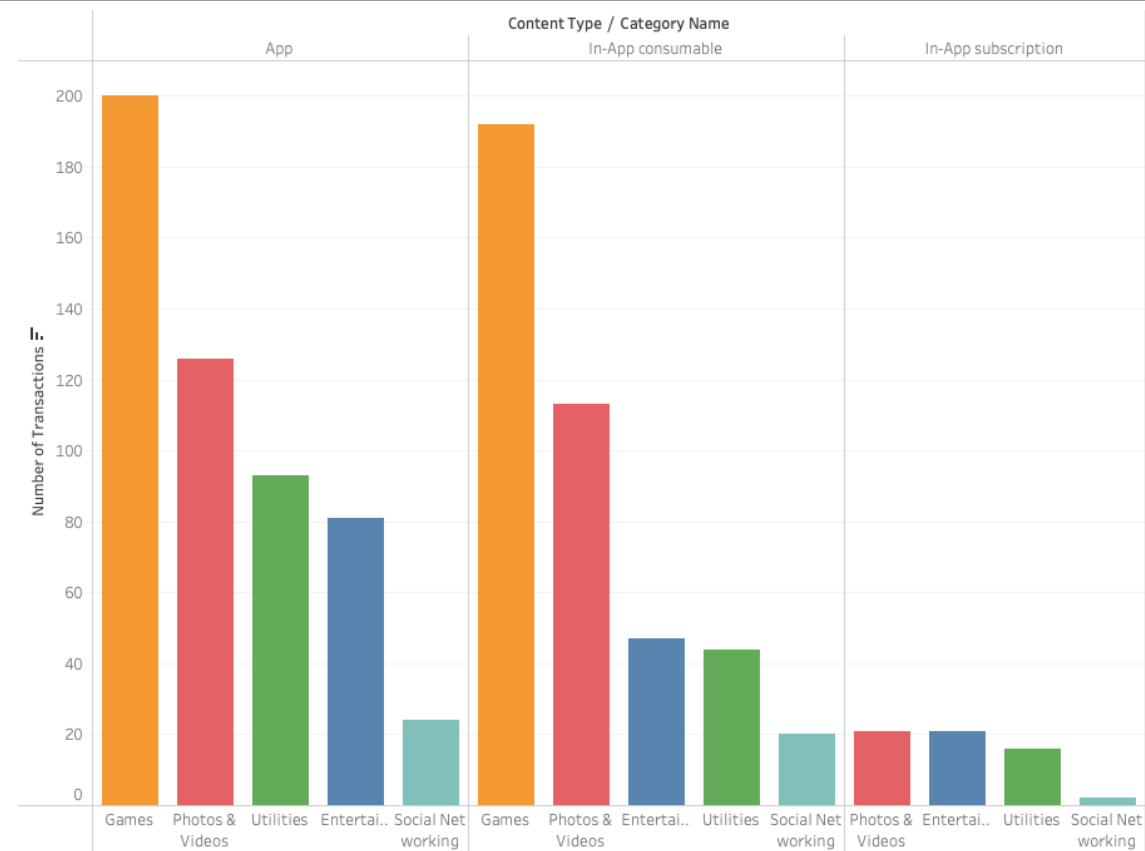
- App with the highest downloads is not necessarily bringing highest revenue





EXPLORATORY ANALYSIS & INSIGHTS

GAMES CATEGORY DOESN'T HAVE ANY SUBSCRIPTIONS

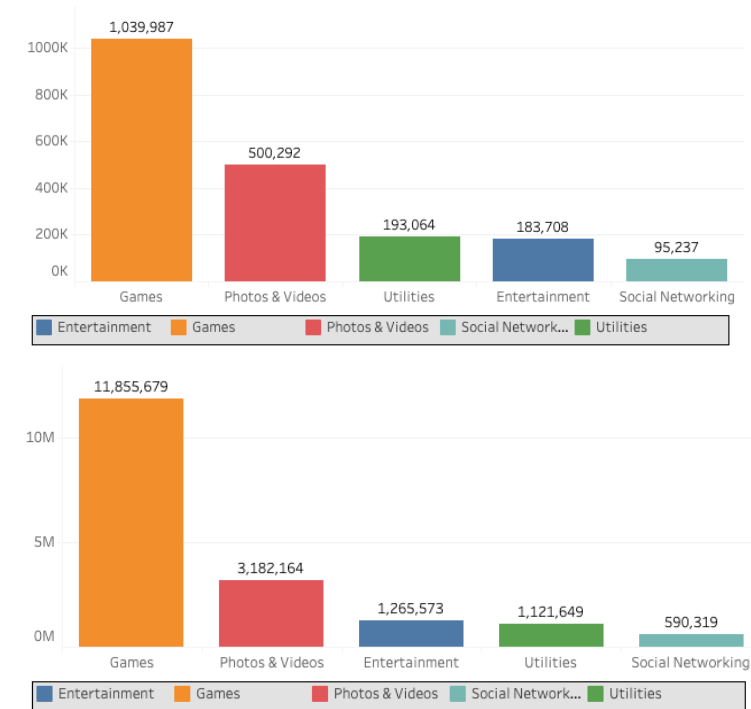
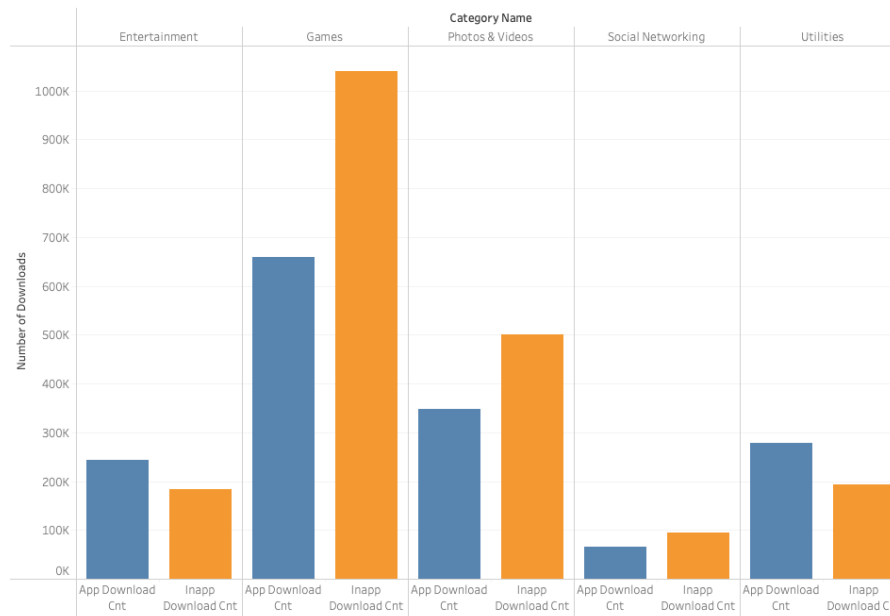




EXPLORATORY ANALYSIS & INSIGHTS

GAMES CATEGORY – ENTERTAINMENT & UTILITIES

- Utilities and Entertainment have lesser in-app purchases than app downloads
- Utility Apps have higher downloads than Entertainment Apps but Entertainment Apps have higher in-App purchases

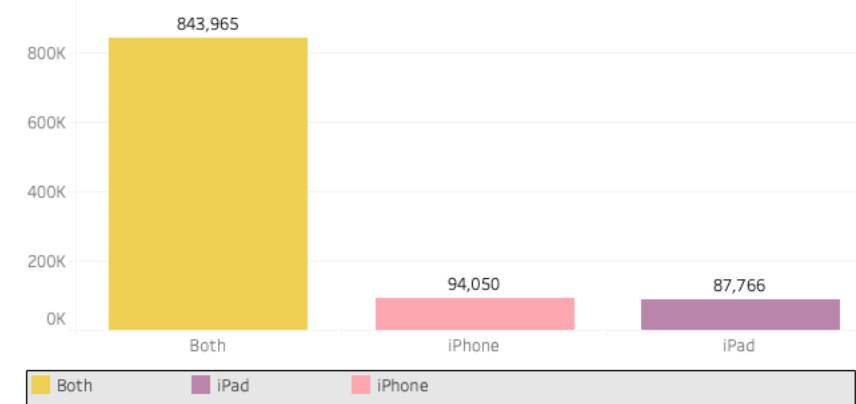
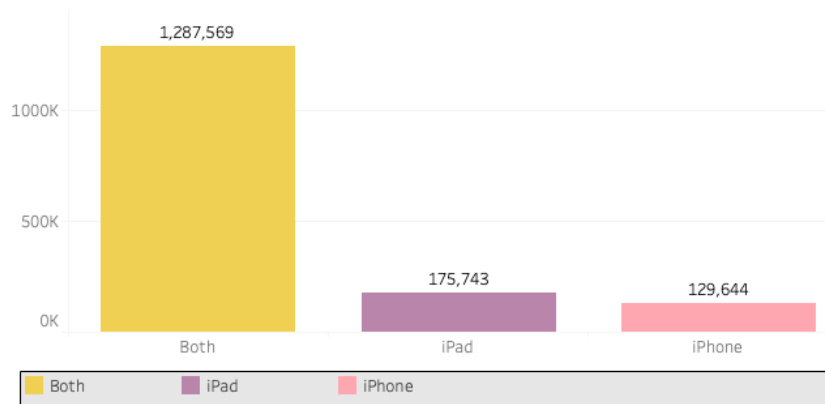




EXPLORATORY ANALYSIS & INSIGHTS

DEVICE TYPE – APP DOWNLOADS VS REVENUE

- iPad-only apps have higher downloads than iPhone-only apps. However, iPhone-only apps produce higher revenue

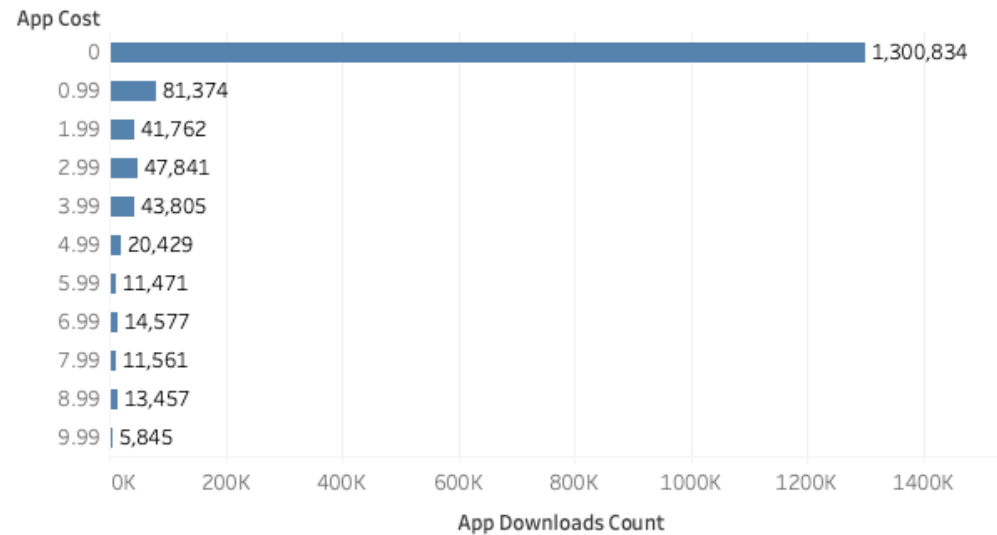




HOW TO IMPROVE ENGAGEMENT FOR APP STORE?

APP DOWNLOADS INCREASES AS THE COST PER APP DECREASES

App Downloads Vs Cost per Download

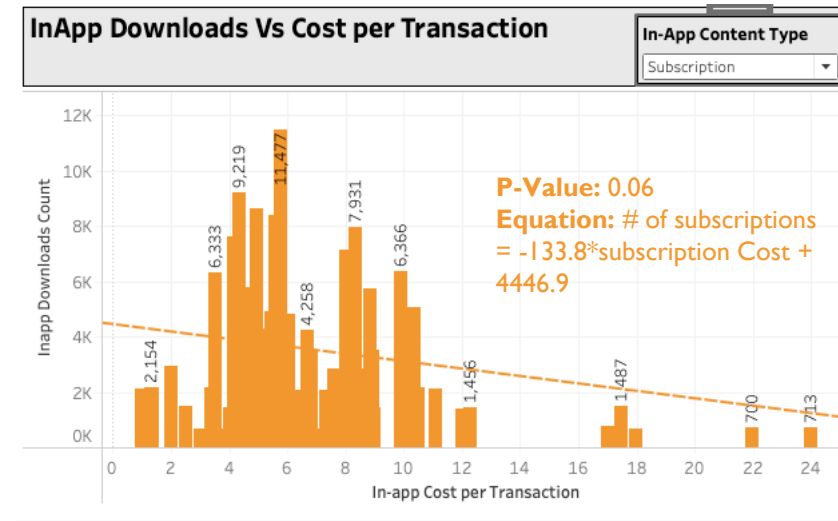
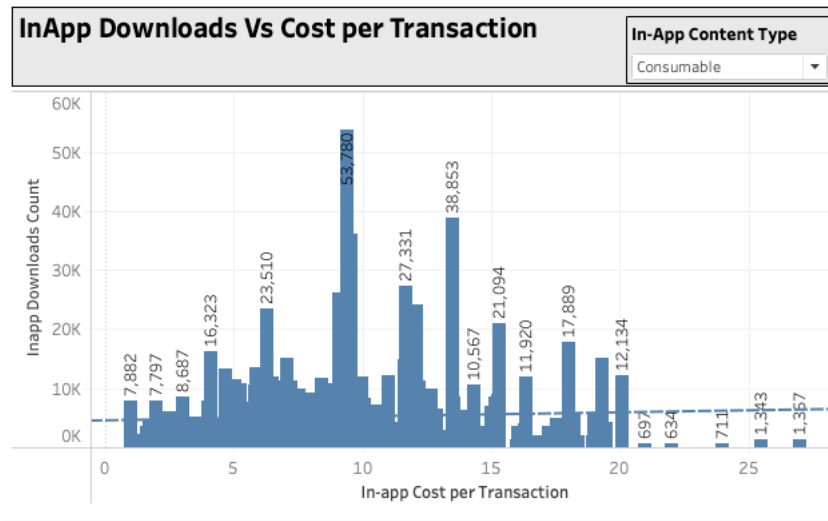




HOW TO IMPROVE ENGAGEMENT FOR APP STORE?

REDUCE THE SUBSCRIPTION COST

- In-App consumable stays normal irrespective of cost.
 - However, we see a significant decrease in # of subscriptions as subscription cost per app increases.
- (For every one dollar increase in subscription cost, the number of subscriptions reduces by 133)

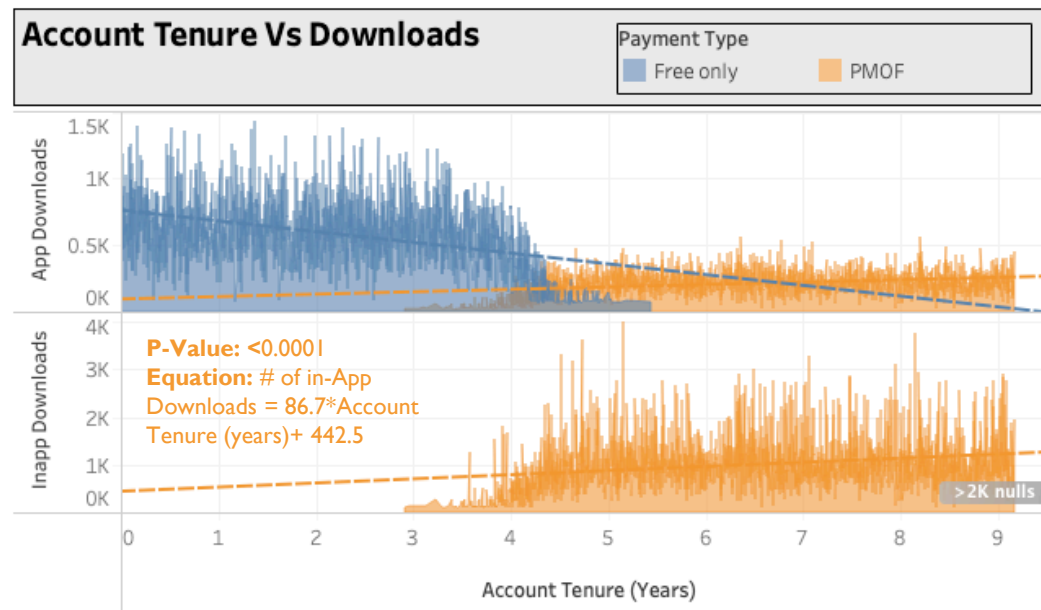




HOW TO IMPROVE ENGAGEMENT FOR APP STORE?

METRIC: NUMBER OF DOWNLOADS PER ACCOUNT

- Free only: As the Account Tenure increases, Number of App downloads decreases.
- Paid Only: As the Account Tenure increases, Number of App downloads increases.



- For every one additional year in account tenure, the number of in-app purchases increases by 86



HOW TO INCREASE REVENUE FROM APP STORE?

IDENTIFY DRIVERS THAT CAUSE IN-APP PURCHASES

- **Data Used:** 3.6 M Transactions between June 6, 2016 and Sep 21, 2016 after excluding duplicates
- **Target:** In-App purchase (56%) vs no in-App purchase (44%)
- **Input Variables:**
 1. App Category – Genre of the App (Games, Photos & Videos, Utilities, Entertainment, Social Networking)
 2. Device – iPhone/ iPad
 3. Payment Type – Free/ PMOF
 4. Day of the transaction – Weekday/ Weekend
 5. Account Tenure – at the time an in-app purchase was made
 6. Price – of the in-App transaction
 7. Account App Count – Number of Apps an account hold
- **Model Used:** Logistic Regression



HOW TO INCREASE REVENUE FROM APP STORE?

IDENTIFY DRIVERS THAT CAUSE THE IN-APP PURCHASES

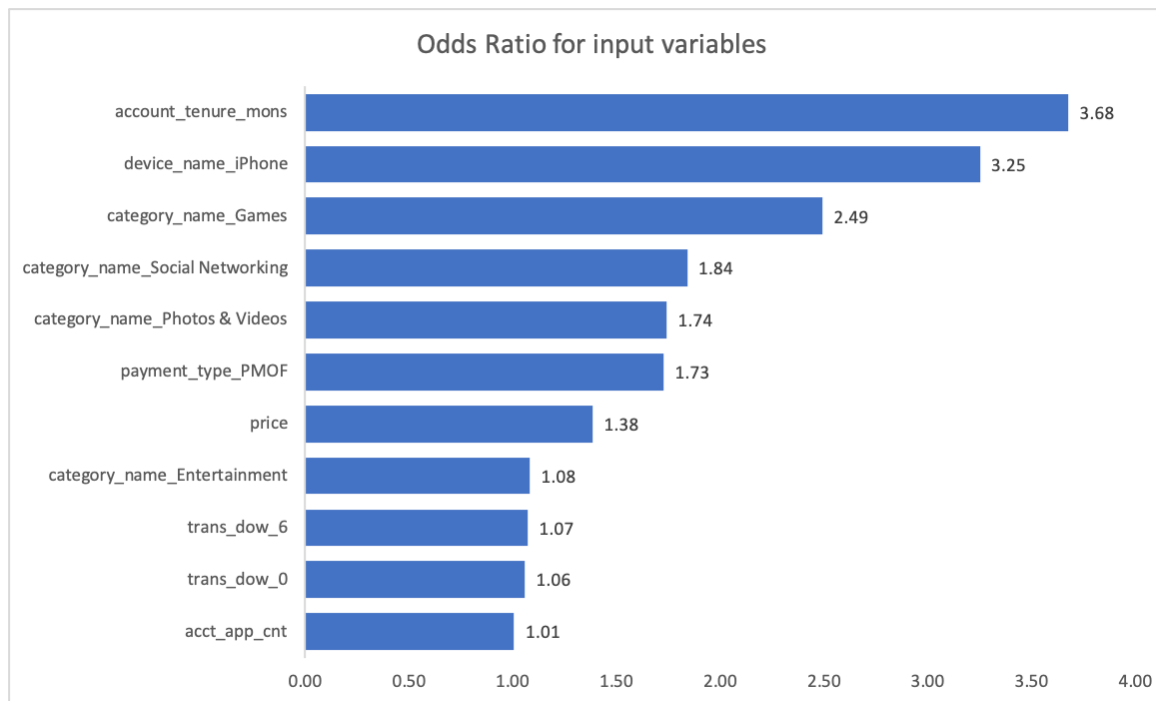
- **Steps Followed in Model Development:**

1. Data Preparation and Exploration
2. Missing values imputation for Account Tenure and Payment Type
3. Check Correlations between numeric input variables
4. Create Dummy variables for all categorical variables
5. Split the dataset into Training and Testing (70:30)
6. Build Logistic Regression on Training dataset
7. Interpret and Evaluate the Model results on testing dataset



HOW TO INCREASE REVENUE FROM APP STORE?

IDENTIFY DRIVERS THAT CAUSE THE IN-APP PURCHASES



- For every one extra month of Account Tenure, the likelihood of making an in-App purchase increases by 3.6x times
- The odds of an iPhone user makes an in-App purchase is 3.2x times higher compared to iPad users



HOW TO INCREASE REVENUE FROM APP STORE?

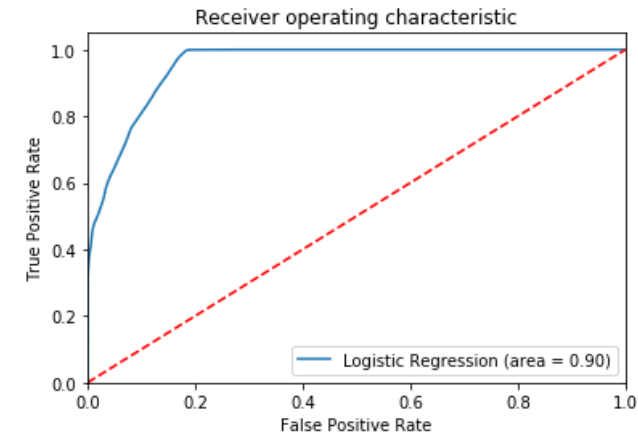
IDENTIFY DRIVERS THAT CAUSE THE IN-APP PURCHASES

Model Performance on Testing dataset:

- Accuracy: 91% of the total outcomes are correctly classified
- Precision: 97% of positive outcomes were actually correct
- Recall: 83% of actual positives were predicted correctly

Confusion Matrix	Predictions			
		Yes	No	Total
Actuals	Yes	TP = 396,558	FN = 81,902	478,460
	No	FP = 12,224	TN = 590,890	603,114
	Total	408,782	672,792	1,081,574

Precision:
 $TP / (TP + FP) = 97\%$



Recall:
 $TP / (TP + FN) = 83\%$

Accuracy:
 $(TP + TN) / (TP + FP + FN + TN) = 91\%$

F1 Score:
 $2 * (Precision * Recall) / (Precision + Recall) = 89\%$



RECOMMENDATIONS

- Target users of utility apps to increase in-App purchases because Utility Apps have higher downloads than Entertainment Apps but lesser in-App purchases.
- Can we introduce in-App subscriptions for Games Apps ?
- Promote iPad-only apps to increase revenue as they produce lesser than iPhone-only apps even though their number of downloads are higher.
- Do not increase subscription cost/ App cost as it is negatively correlated with engagement
- Target the below segments to increase likelihood of making an in-App purchase:
 - Paid Accounts
 - Longer tenure Accounts
 - iPhone users
 - Users that use Games Apps



FUTURE WORK

- Use at-least one year data to capture yearly seasonality
- Include more features to understand the behaviors better:
 - Account level attributes, App level attributes, Device/ user level attributes, Session level data, etc.,
- Include feature interactions and apply advanced deep learning techniques to improve model performance and accuracy



APPENDIX/ RESOURCES

App Store Dashboard on Tableau public:

https://public.tableau.com/views/Apple-AppStore/AppStore?:language=en-US&:display_count=n&:origin=viz_share_link

Git hub - code (SQL and python):

https://github.com/bmolaka/AppleDS_AppStore_Analysis.git



THANK YOU!

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