Kids Game Analysis Report

DSO 599 Game Analytics Project 2

Alex Furrow, Chengqin Kui, Juno Wen, Yangzi Zhang

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USC Marshall

School of Business

Executive Summary

This report is commissioned to provide recommendations to the CEO of a children's educational game company to improve the usage and the outcomes of the game. The following recommendations are suggested based on the analysis:

Level A Recommendations

1. Utilize the churn model the team developed to identify players that are at risk of churning in the next 30 days based on dozens of Key Performance Indicators (KPIs).
2. Investigate Difficulty Level 3 and 6 to see if the increment of difficulty is proportionate between all levels.
3. If the level design is reasonable, adjust the difficulty level assigning system to make the game better match a player's skills to avoid over-challenging the player.
4. Closely monitor player's day since last login and their recent login intervals. Encourage players to log in more often and send reminders like push notifications or emails to remind a player if he or she hasn't logged in for more than five days.

Level B Recommendations

1. Closely monitor completion rate and pass rate to quickly notice game issues.
2. Conduct user research or investigate in-game designs if the following KPIs in relation to churn is not expected:
    a. Number of sessions per active day
    b. Completion rate
    c. Stars and Points earned per session
    d. Level of concentration towards one difficulty level or one game type
    e. Idle time
    f. Rounds started, submitted, failed, and succeeded
    g. Age

Level C Recommendations

1. Offer incentives and tutorials to all players within the first weeks of signing up to encourage engagement and improve retention.
2. Launch a campaign similar to the one that boosted user base on June 27, 2017 if possible and within a reasonable budget.

Analysis

1 Data Overview

Two datasets are provided for this project: “anonymized_activity_play_data_2017_10_01.csv” and “anonymized_member_data.csv”. They were merged on MEMBER_ID before analysis. The merged dataset has 269,560 rows and 26 columns.

The raw data starts on March 15th, 2017 and ends on September 30th, 2017. Each row represents a continuous series of activities a player performed (referred to as session below). There are in total 12,696 users in this dataset. Other terminologies used in this report are:

- **Observation Window:** the six-and-half-month time span the dataset covers
- **Lifetime:** duration (days) between the first time and the last time a player logged in to the game during the observation window
- **Active Day:** any day that a player logged in to the game at least once
- **Interval:** days between two active days (0 means the two active days are consecutive)

KPIs created and used for analysis are:

- **Session Length:** the active duration of a session (the ACTIVE_DURATION column)
- **Completion Rate:** number of rounds completed / number of rounds started in a session
- **Pass Rate:** number of rounds passed / number of rounds completed in a session
- **Idle Rate:** idle time / total time played in a session
- **Success Rate:** number of rounds succeeded / number of rounds started in a session
- **Day Since Last Active**: days since the player’s last active day (0 means the player is active on the day of observation)
- **Most Difficulty %:** number of sessions played at the most played difficulty level / total number of sessions played on an active day
- **Most Game Type %:** number of sessions played at the most played game type / total number of sessions played on an active day

2 Churn Model

The team built a model to predict if a player will churn in the next 30 days. Since users who just come and go are not worth retaining, only players that satisfy the following criteria are studied:

- Logged in at least once in the last 30 days
- Have least played on three different days (including the day of observation)

A total of 28 KPIs were tested (see Appendix A for the full list of KPIs) and 24 turned out to be functional indicators of churn. The model achieved an overall Area under the Receiver Operating Characteristics Curve (AUC) of 0.824. Refer to Appendix B for the model output summary.

2.1 Four Key Indicators

The four most significant indicators of churn are as follows:

- For every additional 5 **days since last active day**, the likelihood of churning doubles.
- If the **average interval between the last three active days** is extended by 9 days, the likelihood of churning doubles.
- For every 16 more **active days** played, the likelihood of churning reduces by half.
- If the **Birthmonth Z-score** increases by 3, the likelihood of churning reduces by half.

It is recommended that the company should pay close attention to user logins because coming back to the game less frequently is a critical sign of churning. The company can deploy reminders such as push notifications and emails, or incentives such as consecutive login bonuses to encourage user engagement.

It's worth noting that the more days played already, the less likely the player will churn. Therefore, the company should put more effort into engaging early users rather than mature users. Tutorials to help ease the learning curve and incentives to encourage log in can be offered to users within the first one to two weeks of signing up.

Older users demonstrate more loyalty to the game. If this is in line with the game goal, then the company can market more towards older kids to enlarge the user base. If the game is intended to educate younger kids, the company should consider launching user research to understand how younger kids react to the game and potentially adjust the game design to accommodate their needs and preferences.

2.2 Other Indicators

2.2.1 Numerical Indicators

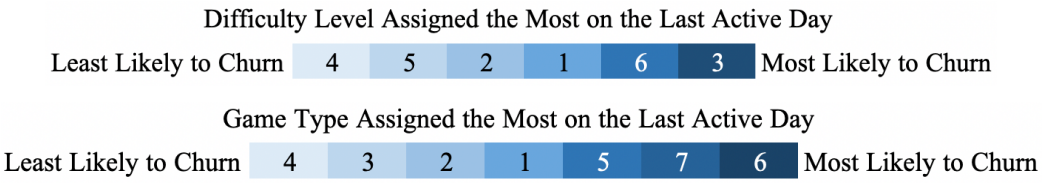
Table 2.1 below summarizes how the rest of the numerical KPIs can be interpreted to predict churn (see Appendix C for odds ratios). A positive correlation indicates that as the KPI increases, the player's probability of churning in the next 30 days is expected to increase. Whereas a negative correlation means that the probability of churning is expected to decrease as the KPI increases. If any of the KPI demonstrates an unexpected relationship with churn, the company should consider reviewing game design or launching user research to find out why.

Table 2.1: Correlation Between KPIs and Churn

KPI Type	KPI	Measurement	Explanation	Corr. to Churn
Engagement	Interval	Improvement	Difference between last two intervals	Positive
	# Sessions	Latest	Number of sessions played on the last active day	Negative
		Improvement	Difference between last active day and lifetime average	Positive
	Idle %	Latest	Proportion of time spent on idle on the last active day	Negative
Performance	Completion %	Latest	Avg completion rate on the last active day	Negative
		Improvement	Difference between last active day and lifetime average	Positive
	Stars	Latest	Avg stars earned per session on the last active day	Negative
		Improvement	Difference between last active day and lifetime average	Positive
	Points	Latest	Avg points earned per session on the last active day	Positive
		Improvement	Difference between last active day and lifetime average	Negative
	Failed Round	Latest	Avg number of rounds failed on the last active day	Negative
	Submits	Latest	Avg number of rounds submitted on the last active day	Positive
	Success %	Latest	Avg success rate on the last active day	Positive
Game Design	Most Difficulty Level %	Latest	Difficulty level degree of concentration on the last active day	Positive
		Assignment change	Difference between last active day and lifetime average	Negative
	Most Game Type %	Latest	Game type degree of concentration on the last active day	Positive
		Assignment change	Difference between last active day and lifetime average	Negative
	Round/Session	Latest	Avg number of rounds started on the last active day	Positive

2.2.2 Difficulty Level and Game Type

Both the most assigned difficulty level and the most assigned game type on the last active day are significant indicators of churn. Difficulty levels and game types are ranked by their associated likelihood of churning as follows[1] (see Appendix D for detailed odds ratios):

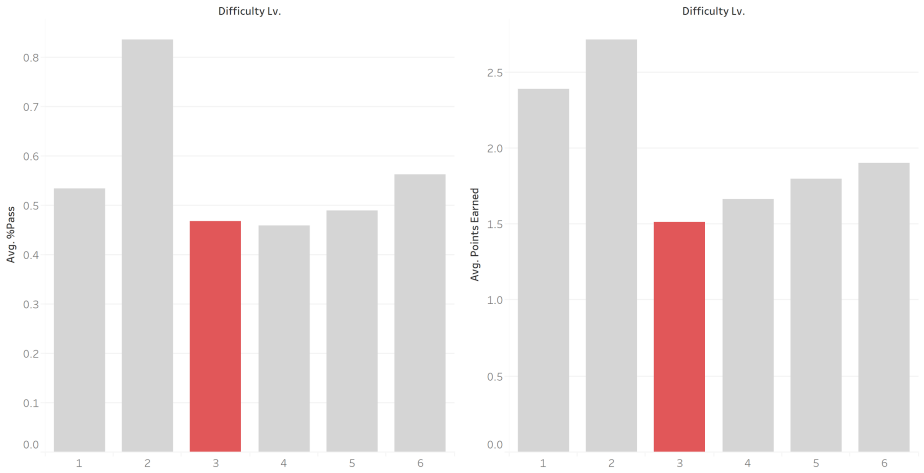


3 Is Difficulty Level 3 Too Hard?

As a medium level, Difficulty Level 3 has the lowest average points earned and the second-lowest average pass rate (See Figure 3.1). It can be problematic for that this level might be too hard to be fun for users. The churn model also indicates that if a player is assigned to Level 3 the most on his or her last active day, the chance of quitting is higher than if the player is assigned to other difficulty levels. If this is not intended by the game design, the company should investigate this issue and adjust the difficulty level.

[1] Game type 8 and 9 were introduced in September 2017, therefore were excluded from the model. Without data in October, it can not be determined if a user churned in the next 30 days, therefore no record in September, including those that involved game type 8 and 9, was used in building the model.

Figure 3.1: Average Pass Rate and Points Earned Per Session by Difficulty Level



4 Is Difficulty Level 6 Being Assigned Too Often?

As shown in Figure 4.1 below, Difficulty Level 6 has the second-highest session number, which is counterintuitive given that it the most difficult level in the game. Assigning this level too often may cause a fast churn due to the unreasonable difficulty. The churn model also indicates that, compared to Level 1, 2, 4 and 5, if users are assigned to Level 3 the most, they are more likely to churn. Hence, it is necessary to find out why so many users are assigned to Level 6.

Figure 4.1: Number of Sessions by Difficulty Level

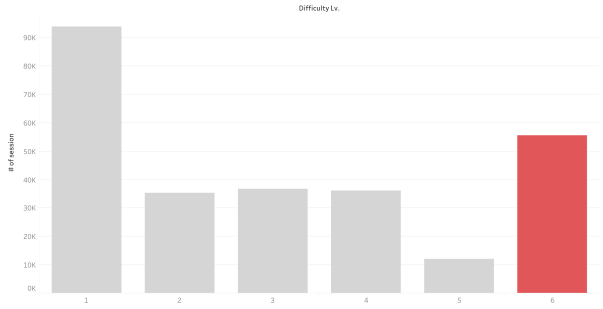
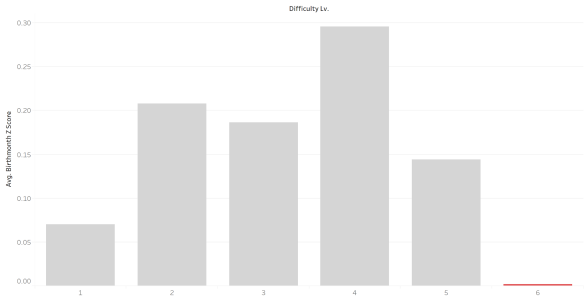


Figure 4.2: Average Birthmonth Z-Score by Difficulty Level



Further analysis revealed that on average, players of other difficulty levels are older than Level 6 players (see Figure 4.2). It looks like the system has been assigning the most difficult level to the youngest users. If such behavior is not intended, the assigning algorithm should be adjusted.

5 User Lifetime

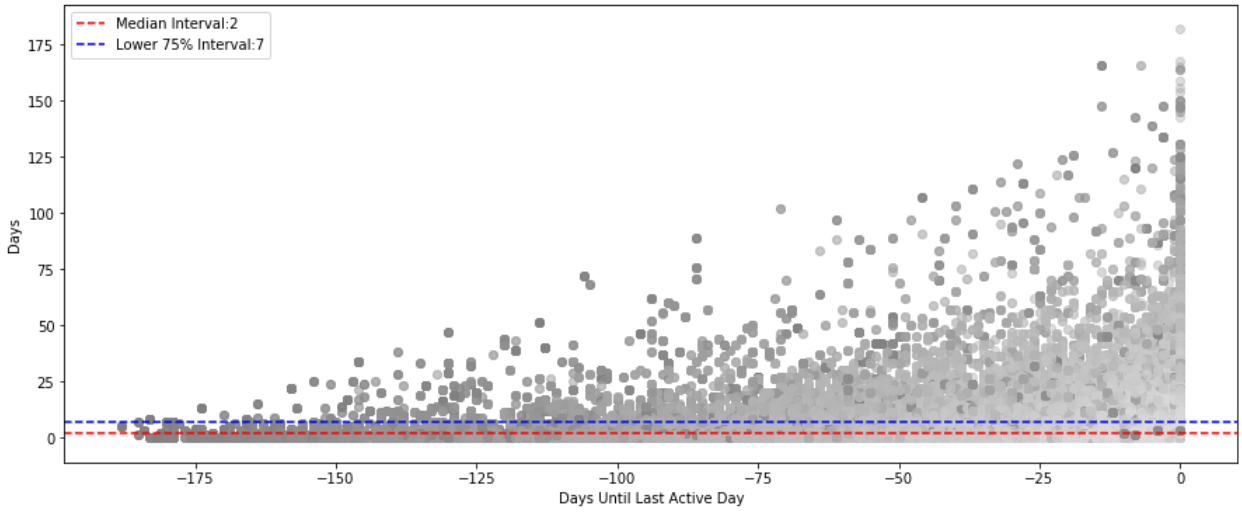
Within the observation window, a player's average lifetime in the game is 25 days with a median of 8 days, suggesting that the majority of players quit early on and a few players stayed for an extra-long time. More specifically, 34.4% of players left on the first day and 47.0% of players left within the first 5 days. Although it is typical of all games to lose most players early in the player's lifetime, methods to retain early users such as tutorials and incentives are still recommended.

6 Login Interval

Within the dataset, the average login interval between two active days is 6.8 days, while the median is 2 days. Three quarters of the records have a login interval of 7 days or shorter. However, 47.0% of users have returned to the game after 15 days of absence and 21.7% of users have returned after 30 days of absence. One user even came back to the game after not logging in once for six months. This is not common user behavior in games and thus is worth investigating.

As shown in Figure 6.1 below, as it gets closer to the last active day of a player, login intervals increase, meaning that players come back to the game less and less often. This pattern coincides with the result of the churn model.

Figure 6.1: Login Interval vs Days Until Last Active Day



7 Completion Rate and Pass Rate

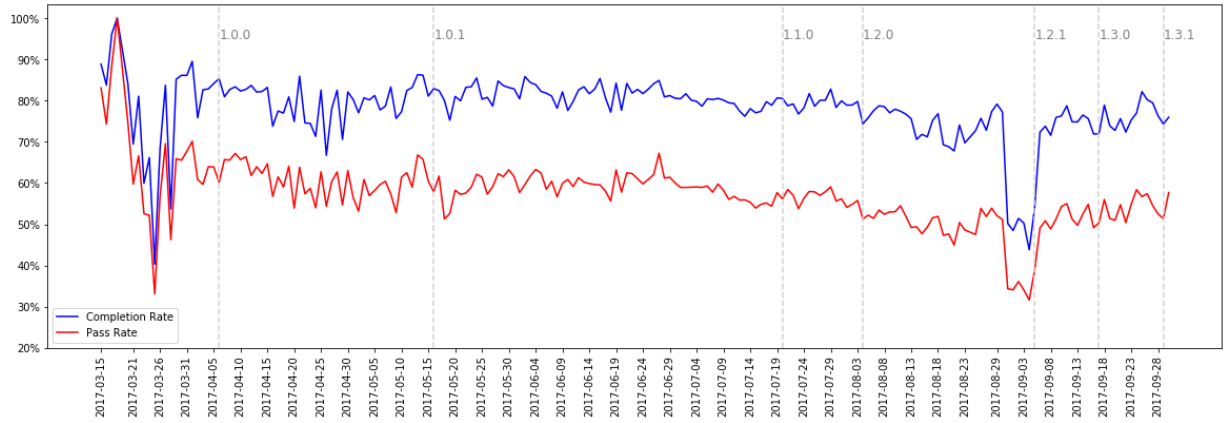
As shown in Table 7.1, the average completion rate across all sessions is 77.7%, while nearly 72% sessions are completed fully and 18.7% didn't finish any rounds started. The average pass rate is around 55.8%, with 41% sessions achieving full pass rate and 31.3% failed all rounds started.

Table 7.1: Summary Statistics of Completion Rate and Pass Rate

	Completion Rate	Pass Rate
Average	77.7%	55.8%
% of 100%	71.9%	41.0%
% of 0%	18.7%	31.3%

Looking at how the completion rate and pass rate changed over time, it is not surprising to see that when one got up, the other got up simultaneously (see Figure 7.2). One can also see that whenever there was a major version release, the pass rate was pumped up a little bit, probably intended by the release.

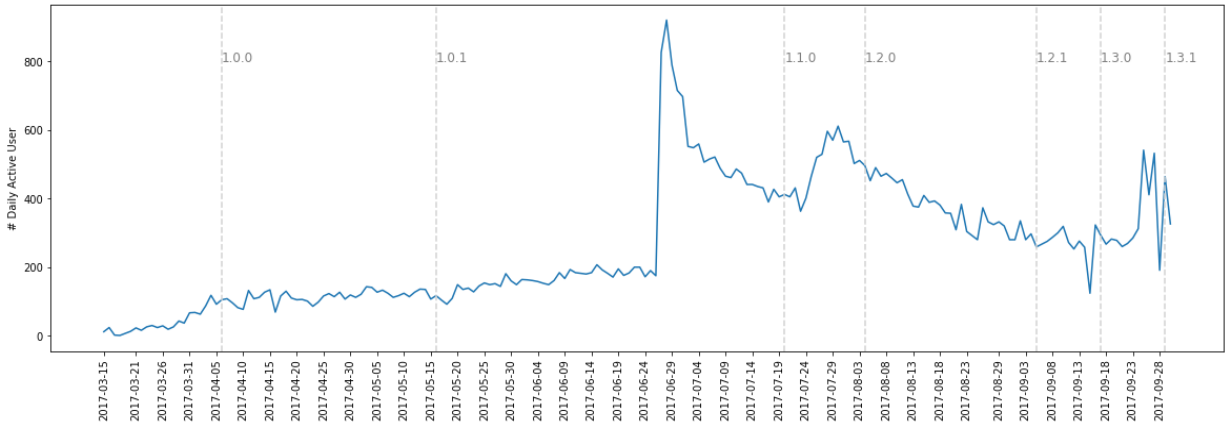
Figure 7.2: Completion Rate and Pass Rate Over Time



It is worth noting that in early September 2017, both rates took a steep dive. It is very likely some severe interruption happened in the game around that time and the release of Version 1.2.1 might have played a role in fixing this issue. In the future, the company should consider monitor completion rate and pass rate daily, if not lively, to ensure timely notice of any game issue.

8 Daily Active Users Over Time

Figure 8.1: Daily Active Users Over Time



The most noticeable thing in Figure 8.1 is the spike in Daily Active Users (DAU) on June 27, 2017. DAU went from 175 on June 26 to 826 on June 27 all of a sudden. If what made that happen is replicable at a reasonable cost, the company should consider launching a similar campaign to attract more users.

9 Number of Sessions per Active day and Session Length

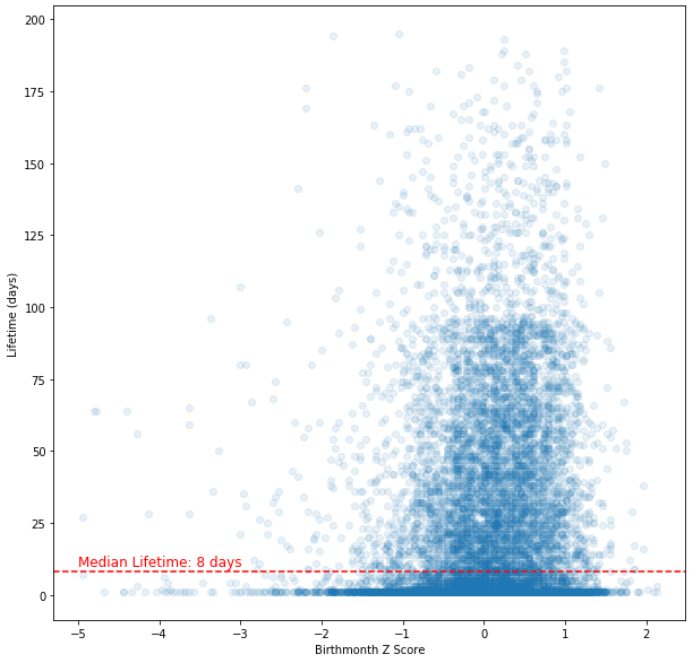
Users played around 5.2 sessions per active day on average, although half of the time, only three sessions or less are played on an active day. The largest number of sessions played in one day is 202. The average session length is around 129 seconds, with a median of 100 seconds and a maximum of 50 minutes.

10 Birthmonth Z-score

Among the 12,696 users in the dataset, 86.7% (11,012) are provided with age information. Birthmonth Z-score ranges from -20.7 to 2.1 with an average around zero. Figure 10.1 plots lifetime against age for users with Birthmonth Z-score greater than -5 (0.3% excluded). It can be observed that the majority of users have a Birthmonth Z-score between -0.5 and 1, and most of them have a lifetime of somewhere between 1 and 100 days.

It is interesting to see that when Birthmonth Z-score goes beyond 1, the number of users (number of dots) and their lifetime (height of dots) both drop instantly. While on the other side, when Birthmonth Z-score goes left of -0.5, the number of users and their lifetime decline relatively slower. It shows that the game has greater potential attracting younger users than older ones.

Figure 10.1: Lifetime vs Birthmonth Z-score



Appendix A

List of All KPIs Tested

KPI	Explanation
ACC_ACTIVE_DAYS	Accumulated active days played
DAY_SINCE_LAST_ACTIVE	Days since last active day
AVG_INTERVAL_BTW_LAST3	Average interval between last three active days
INTERVAL_CHG_LAST3	Difference between the two intervals between the last three active days
CHG_AVG_INTERVAL	Difference between the average interval between last three active days and lifetime average interval
LAST_#_SESSIONS	Number of sessions played on the last active day
CHG_AVG_#_SESSIONS	Difference between the number of sessions played on the last active day and lifetime average number of sessions played
LAST_AVG_SESSION_LENGTH	Average session length on the last active day
CHG_AVG_SESSION_LENGTH	Difference between the average session length on the last active day and lifetime average session length
LAST_AVG_COMPLETION_RATE	Average completion rate on the last active day
CHG_AVG_COMPLETION_RATE	Difference between the average completion rate on the last active day and lifetime average completion rate
LAST_AVG_PASS_RATE	Average pass rate on the last active day
CHG_AVG_PASS_RATE	Difference between the average pass rate on the last active day and lifetime average pass rate
LAST_AVG_STARS	Average stars earned per session on the last active day
CHG_AVG_STARS	Difference between the average stars earned per session on the last active day and lifetime average stars earned per session
LAST_AVG_POINTS	Average points earned per session on the last active day
CHG_AVG_POINTS	Difference between the average points earned per session on the last active day and lifetime average points earned per session
LAST_MOST_DIFFICULTY%	Difficulty level degree of concentration on the last active day
CHG_MOST_DIFFICULTY%	Difference between the difficulty level degree of concentration on the last active day and lifetime average degree of concentration
LAST_MOST_GAMETYPE%	Game type degree of concentration on the last active day
CHG_MOST_GAMETYPE%	Difference between the game type degree of concentration on the last active day and lifetime average degree of concentration
LAST_AVG_IDLE%	Proportion of time spent on idle on the last active day
LAST_AVG_ROUNDS_STARTED	Average number of rounds started per session on the last active day
LAST_AVG_FAILED_ROUNDS	Average number of rounds failed per session on the last active day
LAST_AVG_SUBMITS	Average number of rounds submitted per session on the last active day
LAST_AVG_SUCCESS%	Average success rate on the last active day
LAST_MOST_DIFFICULTY	Most assigned difficulty level on the last active day
LAST_MOST_GAMETYPE	Most assigned game type on the last active day
BIRTHMONTH_Z_SCORE	Birthmonth of the player z scaled

Appendix B

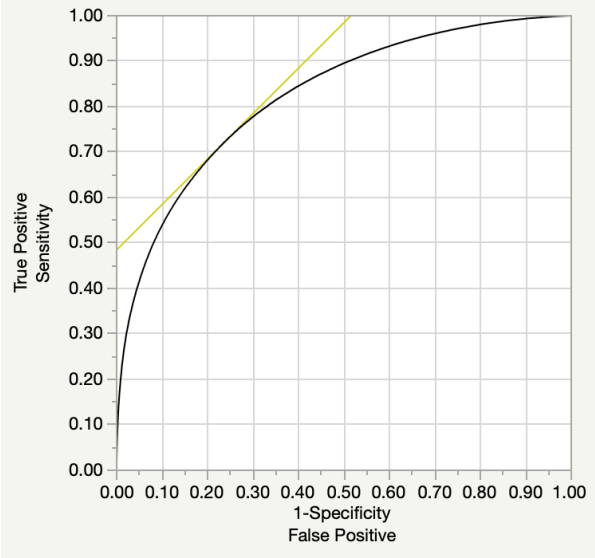
Churn Model Output Summary

Whole Model Test

Model	LogLikelihood	DF	ChiSquare	Prob>ChiSq
Difference	32614.01	33	65228.02	<.0001*
Full	93740.59			
Reduced	126354.60			

RSquare (U)	0.2581
AICc	187549
BIC	187893
Observations (or Sum Wgts)	183731

Receiver Operating Characteristic



AUC = 0.82422

Parameter Estimates

Term	Estimate	Std Error	ChiSquare	Prob>ChiSq
Intercept	-1.3860797	0.0699498	392.65	<.0001*
ACC_ACTIVE_DAYS	-0.0429912	0.0017735	587.60	<.0001*
DAY_SINCE_LAST_ACTIVE	0.14853981	0.0008004	34444	<.0001*
AVG_INTERVAL_BTW_LAST3	0.07462247	0.0012544	3539.0	<.0001*
INTERVAL_CHG_LAST3	0.00770511	0.0006755	130.12	<.0001*
LAST_#_SESSIONS	-0.0280368	0.0025643	119.54	<.0001*
CHG_AVG_#_SESSIONS	0.01275657	0.0023612	29.19	<.0001*
LAST_AVG_COMPLETION_RATE	-0.6093631	0.0755863	64.99	<.0001*
CHG_AVG_COMPLETION_RATE	0.2050036	0.0703886	8.48	0.0036*
LAST_AVG_STARS	-0.3265207	0.0247608	173.90	<.0001*
CHG_AVG_STARS	0.38621905	0.0260636	219.58	<.0001*
LAST_AVG_POINTS	0.17331642	0.0177246	95.62	<.0001*
CHG_AVG_POINTS	-0.2414235	0.0179552	180.79	<.0001*
LAST_MOST_DIFFICULTY%	0.31683139	0.0522763	36.73	<.0001*
CHG_MOST_DIFFICULTY%	-0.3858294	0.0616251	39.20	<.0001*
LAST_MOST_GAMETYPE%	0.20370406	0.0499998	16.60	<.0001*
CHG_MOST_GAMETYPE%	-0.1743217	0.0586621	8.83	0.0030*
LAST_AVG_IDLE%	-0.4905182	0.0573125	73.25	<.0001*
LAST_AVG_ROUNDS_STARTED	0.04642441	0.0070704	43.11	<.0001*
LAST_AVG_FAILED_ROUNDS	-0.1105648	0.0093083	141.09	<.0001*
LAST_AVG_SUBMITS	0.01108977	0.0011562	91.99	<.0001*
LAST_AVG_SUCCESS%	0.13762057	0.0376627	13.35	0.0003*
LAST_MOST_DIFFICULTY[1]	0.00991565	0.0160515	0.38	0.5367
LAST_MOST_DIFFICULTY[2]	-0.0543509	0.0165262	10.82	0.0010*
LAST_MOST_DIFFICULTY[3]	0.13417267	0.0134897	98.93	<.0001*
LAST_MOST_DIFFICULTY[4]	-0.088507	0.0158263	31.28	<.0001*
LAST_MOST_DIFFICULTY[5]	-0.0781187	0.0261951	8.89	0.0029*
LAST_MOST_GAMETYPE[1]	-5.1186e-5	0.0194642	0.00	0.9979
LAST_MOST_GAMETYPE[2]	-0.0052465	0.0164385	0.10	0.7496
LAST_MOST_GAMETYPE[3]	-0.0071716	0.0138161	0.27	0.6037
LAST_MOST_GAMETYPE[4]	-0.173532	0.0206397	70.69	<.0001*
LAST_MOST_GAMETYPE[5]	0.00279971	0.0268419	0.01	0.9169
LAST_MOST_GAMETYPE[6]	0.10934943	0.0425129	6.62	0.0101*
BIRTHMONTH_Z_SCORE	-0.2076125	0.0097049	457.64	<.0001*

Appendix C

Odds Ratios of Numerical Variables

Unit Odds Ratios

Term	Odds Ratio	Lower 95%	Upper 95%	Reciprocal
ACC_ACTIVE_DAYS	0.95792	0.954596	0.961255	1.0439287
DAY_SINCE_LAST_ACTIVE	1.160139	1.158321	1.16196	0.8619657
AVG_INTERVAL_BTW_LAST3	1.077477	1.074832	1.08013	0.9280938
INTERVAL_CHG_LAST3	1.007735	1.006402	1.00907	0.9923245
LAST_#_SESSIONS	0.972353	0.967478	0.977252	1.0284335
CHG_AVG_#_SESSIONS	1.012838	1.008162	1.017536	0.9873245
LAST_AVG_COMPLETION_RATE	0.543697	0.468833	0.630516	1.8392595
CHG_AVG_COMPLETION_RATE	1.227529	1.069343	1.409116	0.8146444
LAST_AVG_STARS	0.721429	0.687254	0.757304	1.386137
CHG_AVG_STARS	1.471407	1.39813	1.548525	0.6796216
LAST_AVG_POINTS	1.189242	1.148638	1.231282	0.8408715
CHG_AVG_POINTS	0.785509	0.758346	0.813644	1.2730601
LAST_MOST_DIFFICULTY%	1.372771	1.239083	1.520883	0.7284536
CHG_MOST_DIFFICULTY%	0.679887	0.602533	0.76717	1.4708337
LAST_MOST_GAMETYPE%	1.225935	1.111495	1.352158	0.8157037
CHG_MOST_GAMETYPE%	0.840027	0.74879	0.942381	1.1904384
LAST_AVG_IDLE%	0.612309	0.54725	0.685102	1.6331624
LAST_AVG_ROUNDS_STARTED	1.047519	1.033103	1.062136	0.9546367
LAST_AVG_FAILED_ROUNDS	0.895328	0.879142	0.911813	1.1169087
LAST_AVG_SUBMITS	1.011151	1.008863	1.013446	0.9889715
LAST_AVG_SUCCESS%	1.14754	1.065882	1.235453	0.8714293
BIRTHMONTH_Z_SCORE	0.812522	0.797213	0.828125	1.2307361

Range Odds Ratios

Term	Odds Ratio	Lower 95%	Upper 95%	Reciprocal
ACC_ACTIVE_DAYS	0.126999	0.107483	0.150059	7.8740728
DAY_SINCE_LAST_ACTIVE	86.15899	82.19826	90.31056	0.0116064
AVG_INTERVAL_BTW_LAST3	7.78437	7.275468	8.328869	0.1284625
INTERVAL_CHG_LAST3	1.563453	1.447896	1.688231	0.6396101
LAST_#_SESSIONS	0.103211	0.068695	0.155071	9.6888713
CHG_AVG_#_SESSIONS	4.824929	2.726046	8.539819	0.2072569
LAST_AVG_COMPLETION_RATE	0.543697	0.468833	0.630516	1.8392595
CHG_AVG_COMPLETION_RATE	1.487736	1.138736	1.943699	0.6721621
LAST_AVG_STARS	0.375475	0.324603	0.434321	2.66329
CHG_AVG_STARS	8.115344	6.152286	10.70477	0.1232234
LAST_AVG_POINTS	2.000237	1.740735	2.298425	0.4999408
CHG_AVG_POINTS	0.159734	0.122258	0.208696	6.2604266
LAST_MOST_DIFFICULTY%	1.302162	1.195594	1.418229	0.7679534
CHG_MOST_DIFFICULTY%	0.626527	0.541218	0.725282	1.5961014
LAST_MOST_GAMETYPE%	1.181361	1.090337	1.279983	0.8464815
CHG_MOST_GAMETYPE%	0.812282	0.708195	0.931667	1.2311003
LAST_AVG_IDLE%	0.61235	0.547296	0.685138	1.6330517
LAST_AVG_ROUNDS_STARTED	1.321208	1.215798	1.435757	0.7568831
LAST_AVG_FAILED_ROUNDS	0.575323	0.525165	0.630272	1.7381547
LAST_AVG_SUBMITS	15.13476	8.686633	26.36938	0.066073
LAST_AVG_SUCCESS%	1.14754	1.065882	1.235453	0.8714293
BIRTHMONTH_Z_SCORE	0.056226	0.043193	0.073193	17.785325

Appendix D

Odds Ratios of Difficulty Level and Game Type

Odds Ratios for LAST_MOST_DIFFICULTY

Level1	/Level2	Odds Ratio	Prob>Chisq	Lower 95%	Upper 95%
2	1	0.937755	0.0076*	0.8945562	0.98304
3	1	1.1323069	<.0001*	1.0846904	1.1820136
3	2	1.2074655	<.0001*	1.1557553	1.2614893
4	1	0.9062658	<.0001*	0.8639312	0.9506748
4	2	0.9664206	0.1682	0.9205967	1.0145254
4	3	0.8003712	<.0001*	0.7672424	0.8349305
5	1	0.9157295	0.0130*	0.8543004	0.9815756
5	2	0.9765124	0.5061	0.9104329	1.0473881
5	3	0.8087291	<.0001*	0.7573409	0.863604
5	4	1.0104425	0.7645	0.9440419	1.0815134
6	1	1.0692661	0.0014*	1.026171	1.1141711
6	2	1.1402404	<.0001*	1.0926204	1.1899357
6	3	0.9443254	0.0016*	0.9112688	0.9785812
6	4	1.1798593	<.0001*	1.1328741	1.2287932
6	5	1.167666	<.0001*	1.0953422	1.2447653
1	2	1.0663766	0.0076*	1.0172526	1.1178727
1	3	0.8831528	<.0001*	0.8460139	0.9219221
2	3	0.828181	<.0001*	0.7927138	0.8652351
1	4	1.103429	<.0001*	1.0518844	1.1574995
2	4	1.0347461	0.1682	0.9856826	1.0862519
3	4	1.2494203	<.0001*	1.1977045	1.3033691
1	5	1.0920256	0.0130*	1.0187702	1.1705484
2	5	1.0240525	0.5061	0.954756	1.0983786
3	5	1.2365081	<.0001*	1.1579381	1.3204093
4	5	0.9896654	0.7645	0.9246302	1.059275
1	6	0.9352209	0.0014*	0.8975282	0.9744965
2	6	0.8770081	<.0001*	0.8403815	0.9152309
3	6	1.058957	0.0016*	1.0218876	1.097371
4	6	0.8475587	<.0001*	0.8138066	0.8827106
5	6	0.8564093	<.0001*	0.8033643	0.9129567

Odds Ratios for LAST_MOST_GAMETYPE

Level1	/Level2	Odds Ratio	Prob>Chisq	Lower 95%	Upper 95%
2	1	0.9948182	0.8242	0.950245	1.0414822
3	1	0.9929048	0.7476	0.9507587	1.0369193
3	2	0.9980767	0.9172	0.9624838	1.0349858
4	1	0.8407333	<.0001*	0.7944185	0.8897483
4	2	0.8451125	<.0001*	0.8029521	0.8894866
4	3	0.8467411	<.0001*	0.806461	0.889033
5	1	1.002855	0.9360	0.9354855	1.0750761
5	2	1.0080786	0.8082	0.9446839	1.0757276
5	3	1.0100212	0.7556	0.9485546	1.0754709
5	4	1.1928336	<.0001*	1.1119518	1.2795986
6	1	1.1156092	0.0400*	1.0049966	1.238396
6	2	1.1214202	0.0272*	1.0130118	1.2414299
6	3	1.1235812	0.0205*	1.0181134	1.2399745
6	4	1.3269477	<.0001*	1.1951921	1.4732278
6	5	1.1124332	0.0619	0.9947118	1.2440866
7	1	1.0767026	0.0135*	1.0154019	1.1417042
7	2	1.082311	0.0037*	1.0260135	1.1416975
7	3	1.0843966	0.0005*	1.0360512	1.134998
7	4	1.2806708	<.0001*	1.2064437	1.3594648
7	5	1.0736374	0.0516	0.9995175	1.1532538
7	6	0.9651253	0.4947	0.8716435	1.0686328
1	2	1.0052088	0.8242	0.9601701	1.0523601
1	3	1.0071459	0.7476	0.9643952	1.0517916
2	3	1.001927	0.9172	0.9661969	1.0389785
1	4	1.1894378	<.0001*	1.1239133	1.2587824
2	4	1.1832744	<.0001*	1.124244	1.2454043
3	4	1.1809986	<.0001*	1.1248176	1.2399856
1	5	0.9971532	0.9360	0.9301667	1.0689636
2	5	0.9919861	0.8082	0.9296034	1.0585552
3	5	0.9900782	0.7556	0.9298253	1.0542355
4	5	0.8383399	<.0001*	0.7814951	0.8993195

Odds Ratios for LAST_MOST_GAMETYPE Continued

Level1	/Level2	Odds Ratio	Prob>Chisq	Lower 95%	Upper 95%
1	6	0.8963712	0.0400*	0.8074961	0.9950282
2	6	0.8917264	0.0272*	0.8055227	0.9871553
3	6	0.8900114	0.0205*	0.8064682	0.9822089
4	6	0.7536092	<.0001*	0.6787816	0.8366856
5	6	0.8989304	0.0619	0.8038025	1.0053163
1	7	0.9287615	0.0135*	0.8758836	0.9848317
2	7	0.9239489	0.0037*	0.8758888	0.9746461
3	7	0.9221718	0.0005*	0.8810589	0.9652033
4	7	0.7808408	<.0001*	0.7355836	0.8288824
5	7	0.9314131	0.0516	0.8671118	1.0004827
6	7	1.0361349	0.4947	0.9357751	1.1472581