Pixel Art
Version Peformance

1. Tutorial performance between 2 versions
2. Decision to 100% roll out new version
3. Ideas to improve user performance
4. Predictive models for user retention

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Dashboard overview

Pixel Art Game Version Peformance

Install

Version	
1.5.2	6,663
1.6.0	6,903

DAU

Version	
1.5.2	476.50
1.6.0	494.93

Section Length

Version	
1.5.2	779.6
1.6.0	987.3

Section Count

Version	
1.5.2	2.51
1.6.0	2.83

Win Loss Rate

Version	Win	Lost
1.5.2	52.65%	47.35%
1.6.0	51.11%	48.89%

Tutorial Performance

Event ..	Quanti...	1.5.2 UserCount	1.5.2 %	1.6.0 UserCount	1.6.0 %
tutorial	-2	6,341	95.70%	6,571	95.86%
	-1	6,626	100.00%	6,855	100.00%
	0	336	5.07%	356	5.19%
	1	6,465	97.57%	6,686	97.53%
	2	6,395	96.51%	6,630	96.72%
	3	6,372	96.17%	6,612	96.46%
	4	6,350	95.83%	6,601	96.29%
	5			6,594	96.19%
	6			6,587	96.09%
	7			6,583	96.03%
	8			6,573	95.89%
Grand Total		6,626	100.00%	6,855	100.00%

Member Count

Version	Day Diff 0	1	2	3	4	5	6	7
1.5.2	6,663	1,780	891	517	385	275	202	183
1.6.0	6,903	1,981	1,036	714	520	423	334	289
Grand ..	13,566	3,761	1,927	1,231	905	698	536	472

DAU

7 Day Retention

Version	Day Diff 0	1	2	3	4	5	6	7
1.5.2	100.0%	26.7%	13.4%	7.8%	5.8%	4.1%	3.0%	2.7%
1.6.0	100.0%	28.7%	15.0%	10.3%	7.5%	6.1%	4.8%	4.2%
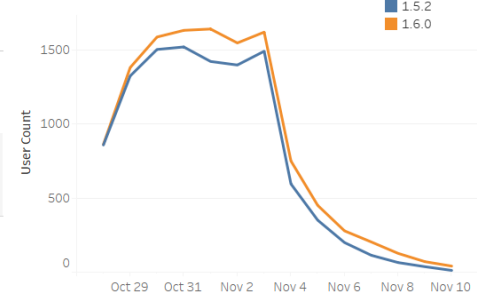
Level Segment

LevelSegment	1.5.2	1.6.0
<=10	6,664	6,907
<=50	1,747	2,004
<=100	122	156
<=200	40	54
<=300	11	14
<=400	6	4
<=500		3
>500		1

Tutorial performance

Tutorial Performance

Event ..	Quanti..	1.5.2 UserCount	%	1.6.0 UserCount	%
tutorial	-2	6,341	95.70%	6,571	95.86%
	-1	6,626	100.00%	6,855	100.00%
	0	336	5.07%	356	5.19%
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Grand Total		6,626	100.00%	6,855	100.00%

Version 1.6.0 shows a **slightly better completion rate**

DAU Version		Section Length Version		Section Count Version	
1.5.2	476.50	1.5.2	779.6	1.5.2	2.51
1.6.0	494.93	1.6.0	987.3	1.6.0	2.83

The **higher Daily Active User, Section Length** and **Section Count** in version 1.6.0 suggests that users are spending more time in the game.

7 Day Retention

Version	0	1	2	3	4	5	6	7
				Day Diff				
1.5.2	100.0%	26.7%	13.4%	7.8%	5.8%	4.1%	3.0%	2.7%
1.6.0	100.0%	28.7%	15.0%	10.3%	7.5%	6.1%	4.8%	4.2%

The **higher retention rates** in version 1.6.0 suggest that users more likely to return and continue playing after their initial session.

Conclusion: Version 1.6.0 has impacted the user experience better than version 1.5.2

New version roll out 100%

Install		DAU		Section Length		Section Count		Win Loss Rate		
Version		Version		Version		Version		Version	Win	Lost
1.5.2	6,663	1.5.2	476.50	1.5.2	779.6	1.5.2	2.51	1.5.2	52.65%	47.35%
1.6.0	6,903	1.6.0	494.93	1.6.0	987.3	1.6.0	2.83	1.6.0	51.11%	48.89%

- **Install**: new version is slightly higher => no impact in user acquisition when change to the new version.
- **DAU**: both versions show similar trends => the transition to new version is not negatively affecting overall DAU
- **Section length**: new version is higher (16.45mins) compare to old version (12.99mins) => users spend more time
- **Section count**: new version is higher => users are more engaged
- **Win rate**: new version is marginally lower, this could be related to new players learning the game =>does not affect engagement or retention.

Event ..	Quanti..	1.5.2		1.6.0	
		UserCount	%	UserCount	%
tutorial	-2	6,341	95.70%	6,571	95.86%

7 Day Retention

Version	Day Diff							
	0	1	2	3	4	5	6	7
1.5.2	100.0%	26.7%	13.4%	7.8%	5.8%	4.1%	3.0%	2.7%
1.6.0	100.0%	28.7%	15.0%	10.3%	7.5%	6.1%	4.8%	4.2%

Level Segment

LevelSegment	1.5.2	1.6.0
<=10	6,664	6,907
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<=100	122	156
<=200	40	54
<=300	11	14
<=400	6	4
<=500		3
>500		1

- **Tutorial completion rate**: version 1.6.0 slightly outperforming version 1.5.2 => users are engaging well with the new tutorial
- **7-day retention:** version 1.6.0 are consistently better than version 1.5.2 => strong indicator of improved long-term player satisfaction
- **Level segment**: more users achieve higher levels with the new version => the new tutorial may help users to understand the game better

Conclusion: It seems safe to roll out 100% the new version based on the above performance

Ideas to improve user performance

Version 1.5.2

Version 1.6.0
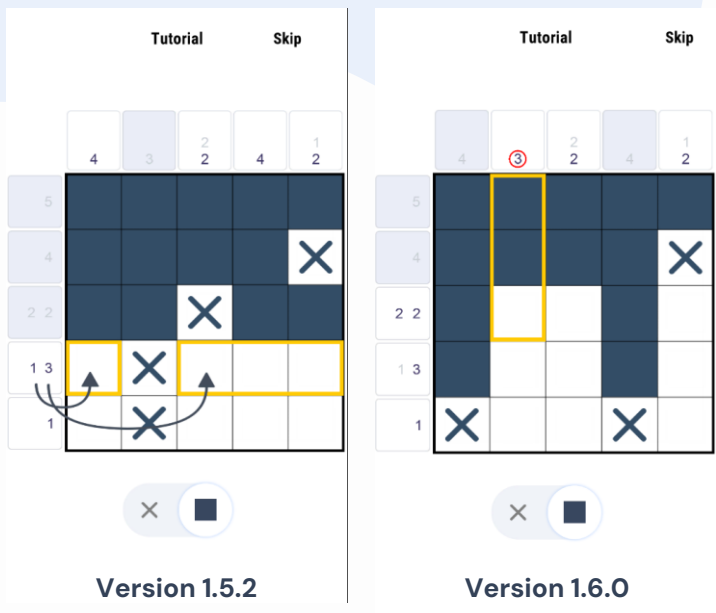
1. **Adding hints/tips in the tutorial:** if a player struggles to complete the tutorial steps within a certain time limit, additional hints as textual guides could appear, guiding them to the right action.

2. **Incentive to complete the tutorial**: Reward more lives or hints if users complete the tutorial. Show progress (ex: "Step 3 of 5") to give users a sense of accomplishment as they move through the tutorial.

3. **Reconfirm the skip option**: if new users choose to skip the tutorial, a pop-up message could say, "Are you sure? Completing the tutorial will give you bonus rewards!"

4. **In-game feedback:** when a user makes a mistake or delays in completing a step, can show feedback like flashing the correct square in yellow or display a tooltip that says, "Try here!" or "Next step!" to guide users without being overly directive.

5. **Tutorial revisit**: Based on how well or poorly users perform in the first few levels, the game could offer users to revisit specific tutorial steps. This would ensure that users who might have skipped or rushed through the tutorial still get the necessary guidance later on.

	Day0Tutorial	Day0WinCount	Day0LostCount	Day0MaxLevel	Day0SectionCount	Day0SectionLength	MaxDayDiff	MinDayDiff
0	Completed	6.472291	3.974930	6.899565	1.443573	332.699938	1.123331	0.000000
1	Not completed	5.810056	2.135475	6.761173	1.222067	321.202514	1.086592	0.062849

Predict Member Retention Using Classification Models

DataForML

User	Retained_Target_Col	Day0Tutorial	Version	MinDayDiff	MaxDayDiff	Day0MaxLevel	Day0SectionCount	Day0SectionLength	Day0WinCount	Day0LostCount
c05f8bf5-2724-4...	Yes	Completed	1.6.0	0	7	61	12	9,722	60	17
e02360c9-0ed6-...	Yes	Completed	1.6.0	0	6	23	11	2,333	22	30
a3efde6b-07b0-...	Yes	Completed	1.5.2	0	1	36	11	4,049	35	44
9deafdd6-771f-4...	Yes	Completed	1.6.0	0	5	53	10	8,844	52	8
6b5bfd49-a62c-...	Yes	Completed	1.5.2	0	4	28	10	4,325	27	40
6a3f7e6d-7875-...	No	Completed	1.6.0	0	0	51	10	4,124	50	79
25053223e7d21...	Yes	Completed	1.6.0	0	5	21	10	4,428	40	80
7df868c0-a481-...	Yes	Completed	1.6.0	0	1	18	9	903	17	11
715ff2c0994bad...	No	Completed	1.6.0	0	0	11	9	683	10	21
e97b538e-66ec-...	Yes	Completed	1.5.2	0	4	18	8	1,399	17	45
d9f8beb8-984a-...	Yes	Not completed	1.6.0	0	6	15	8	356	14	2
c211085c-7e30-...	Yes	Completed	1.5.2	0	4	18	8	3,617	17	53
bed48819-972b-...	Yes	Completed	1.6.0	0	7	61	8	21,404	61	13
ba679d42-17ab-...	Yes	Completed	1.6.0	0	7	56	8	9,617	55	82
b7b6ab30-1e99-...	Yes	Completed	1.5.2	0	7	29	8	1,741	29	32
91bd4cf5-cd5a-4.	Yes	Completed	1.5.2	0	5	56	8	6,709	55	41
7f580481b0cd5.	Yes	Completed	1.6.0	0	2	23	8	3,867	23	63
71a9c2cc-9b03-...	Yes	Completed	1.6.0	0	2	34	8	4,697	33	109
6498cb17efe705.	Yes	Completed	1.6.0	0	7	48	8	5,895	47	53
516bc01e-7afd-...	Yes	Not completed	1.5.2	0	2	24	8	4,810	23	66
43fce03f-b6ba-4.	Yes	Completed	1.6.0	0	1	13	8	995	12	9
1a0e7901-ed0f-...	Yes	Completed	1.6.0	0	1	18	8	2,985	17	25
097ff51bce3dc4.	Yes	Completed	1.6.0	0	6	7	8	292	7	13
e0db29dd-2220-...	No	Completed	1.6.0	0	0	16	7	1,700	15	25
cb2d5e31-21e6-...	Yes	Completed	1.6.0	0	4	25	7	4,233	24	108
c94b2222-74de-...	No	Completed	1.5.2	0	0	13	7	509	12	15
b7950162-96fc-...	No	Completed	1.6.0	0	0	18	7	4,276	17	63
b2f378b835378...	Yes	Completed	1.5.2	0	1	13	7	383	12	5

	Version	Retained_Target_Col	Day0WinCount	Day0LostCount	Day0MaxLevel	Day0SectionCount	Day0SectionLength	MaxDayDiff	MinDayDiff
0	1.5.2	No	4.878845	2.215334	5.264789	1.268575	170.466162	0.000000	0.000000
1	1.5.2	Yes	8.775869	6.416360	9.294888	1.635583	548.805317	2.704294	0.010634
2	1.6.0	No	4.918647	2.151433	5.333252	1.289880	176.914237	0.000000	0.000000
3	1.6.0	Yes	8.918890	6.640449	9.478581	1.702949	608.244733	3.033357	0.006671

Exclude DayDiff, other features and version seems to have impact on member retention

Predict Member Retention Using Classification Models

```
              precision    recall  f1-score   support

         0       0.76      0.80      0.78      1685
         1       0.64      0.59      0.61      1035

  accuracy                          0.72      2720
 macro avg       0.70      0.69      0.69      2720
weighted avg     0.71      0.72      0.71      2720
```

```
Optimization terminated successfully.
        Current function value: 0.638606
        Iterations 7
                    Logit Regression Results
==============================================================================
Dep. Variable:     Retained_Target_Col   No. Observations:         13244
Model:                          Logit   Df Residuals:             13238
Method:                           MLE   Df Model:                     5
Date:                Fri, 20 Sep 2024   Pseudo R-squ.:           0.07869
Time:                        16:03:19   Log-Likelihood:          -8457.7
converged:                       True   LL-Null:                 -9180.0
Covariance Type:            nonrobust   LLR p-value:           2.870e-310
==============================================================================
                     coef    std err          z      P>|z|      [0.025      0.975]
------------------------------------------------------------------------------
const             -1.1370      0.047    -23.956      0.000      -1.230      -1.044
Version            0.1798      0.037      4.903      0.000       0.108       0.252
Day0LostCount      0.0103      0.003      3.045      0.002       0.004       0.017
Day0MaxLevel       0.1089      0.006     17.835      0.000       0.097       0.121
Day0SectionCount   0.2264      0.027      8.397      0.000       0.174       0.279
Day0SectionLength -0.0002   6.53e-05     -3.244      0.001      -0.000    -8.38e-05
==============================================================================
```

- **Overall accuracy is 72%,** means that in 72% of cases, the model correctly classified the retention status.
- **Recall class 0 is 80%**, means that 80% of the actual non-retained players were correctly identified by the model.
- **Precision class 0 is 76%**, means that when the model predicted "not retained," it was correct 76% of the time.
- Version, LostCount, MaxLevel, SectionCount, SectionLength at day 0 of the members are all important predictors of retention (p-value <0.05)
- The R-squared value is low (0.07869), means that the model explains about 7.87% of the variation in the dependent variable. While the predictors are statistically significant, there is still a lot of unexplained variance in retention, and **additional factors or additional data for longer period** may be needed to improve the model's performance.

Thank you!