Game Time

Prepared by Katherine

Agenda

Introduction

Background Information &
Business Case

Analysis

Our datasets

Modelling

Model Selection &
Predictions

Conclusion

Future Work

Introduction

Torch Light

Business Case

Fairness

Popularity based
Avoid long-tail problem

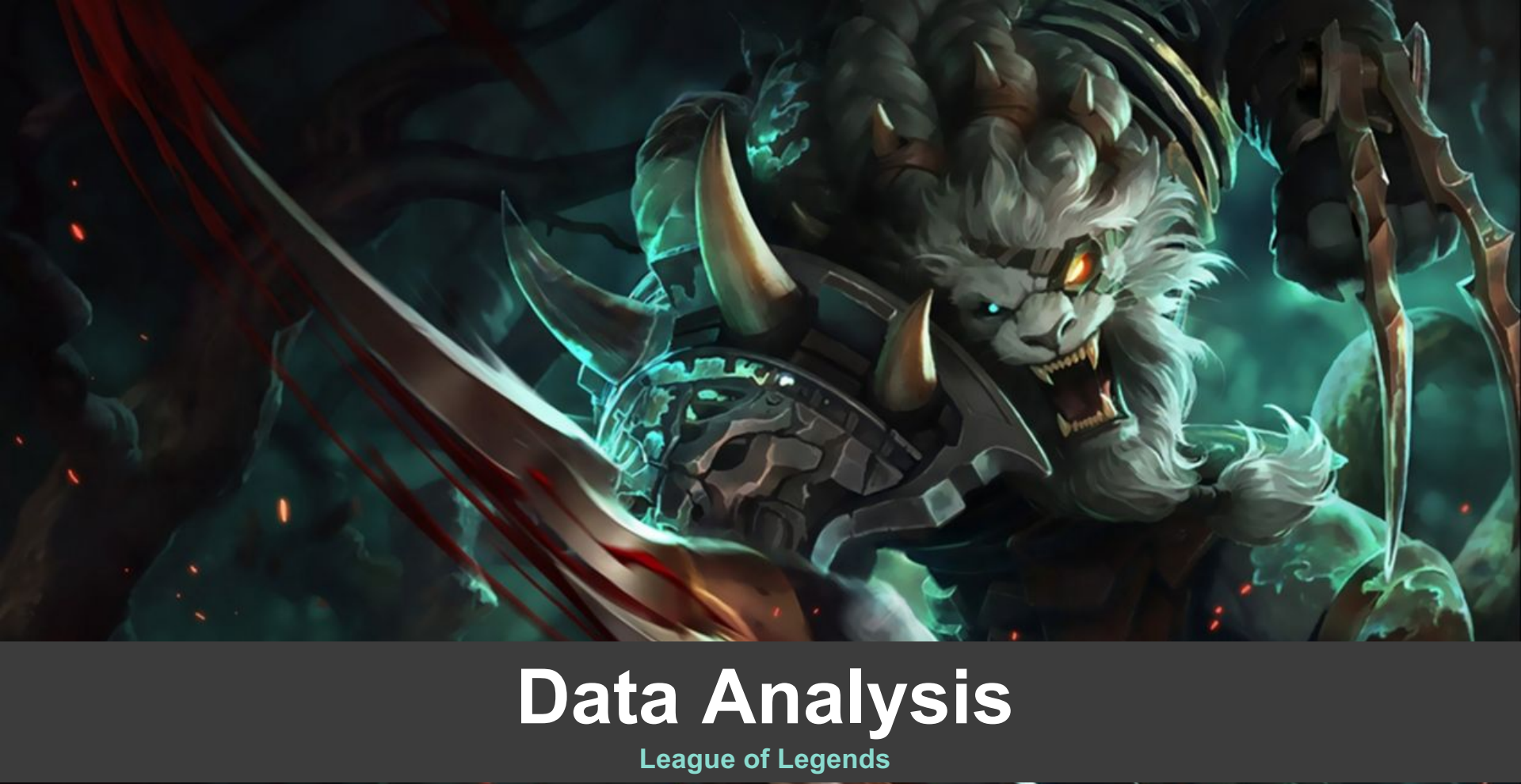
Personalization

Avoid
one-size-fits-all

~90,000 games

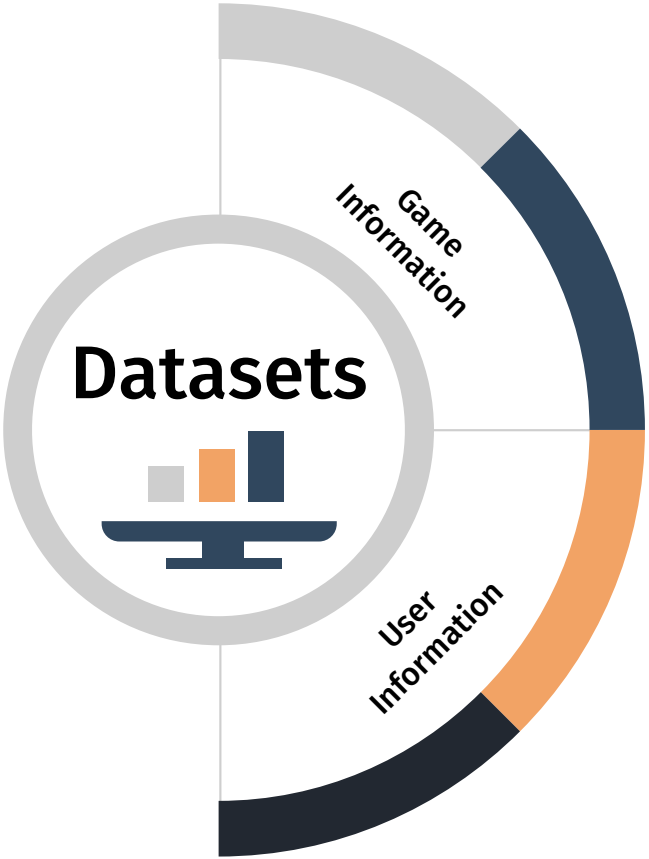
Sales

Improve cart value
Boost revenue



Data Analysis

League of Legends



01

21,000 games

02

40 game features
incl. game time, genres etc.

03

12400 users

04

70,000 entries of user record
Games purchased, hours played

Features Used

User Id

- Played >= 5 games

Game Id

- Game name

User Ratings

- Continuous value between 1-5

Description

- TF-IDF matrix
- 24494 vocabulary

Modelling

Reaper of Souls

Recommenders

Collaborative Filtering

Matrix factorization & dimension reduction

Singular value decomposition(SVD) : $A=USV^T$

- A = Matrix of user ratings
- U = Relationship between user and latent factors
- S = Strength of each latent factor
- V = Similarity between items and latent factors

✓ **Finding users with similar profiles**
✓ **Predicting user ratings**

Hybrid Model

Wisdom of crowds

Input Layer
User, user rating,
TF-IDF game description

User embedding

Game embedding

TF-IDF dimension reduction

Concatenate layer

Dense Layer

Dropout Layer

Output Layer
Predict user rating

Some Predictions

Collaborative Filtering

```
1 get_top_n(predictions, 43284145)
```

executed in 38ms, finished 22:14:07 2021-01-25

```
Recommendatin 1: Total War ROME II - Emperor Edition
Recommendatin 2: Mount & Blade Warband
Recommendatin 3: Empire Total War
Recommendatin 4: Napoleon Total War
Recommendatin 5: Left 4 Dead 2
```

```
1 users[users['userid']==43284145][['userid','name',
```

executed in 10ms, finished 22:14:07 2021-01-25

	userid	name	user_score
47879	43284145	Napoleon Total War	3.050656
47880	43284145	Total War ROME II - Emperor Edition	2.428392
47881	43284145	Mount & Blade Warband	2.413364
47882	43284145	Rising Storm/Red Orchestra 2 Multiplayer	2.397789
47883	43284145	Tomb Raider	2.364829

Hybrid

```
1 get_top_k(predicted_ratings, 1232)
```

executed in 3ms, finished 22:14:54 2021-01-25

```
Recommendation 1: PAYDAY 2
Recommendation 2: The Wolf Among Us
Recommendation 3: Tropico 4
Recommendation 4: LUFTRAUSERS
Recommendation 5: Psychonauts
```

```
1 predicted_ratings[predicted_ratings['userid']==1232]
```

executed in 21ms, finished 22:59:09 2021-01-25

	userid	name	user_score
41501	1232	BioShock Infinite	2.787020
36843	1232	Tropico 4	2.520993
40370	1232	XCOM Enemy Unknown	2.508929
39941	1232	Saints Row The Third	2.470551
39793	1232	Recettear An Item Shop s Tale	2.347346

Evaluation Matrix

1

Mean Absolute Error

It is the difference between the predicted ratings and user true ratings.

- The lower the better

2

Precision @5

$$\frac{\text{\# of qualified labels recommended}}{\text{\# of recommendations made (5)}}$$

- Threshold = 2.0
- Vales between 0 -1
- Closer to 1 the better

True label	Predicted	Qualified?	Precision@2
3.0	3.8	yes	1/1 = 1
1.5	2.0	no	1/2 = 0.5

Evaluation Matrix

1	**Mean Absolute Error**	It is the difference between the predicted ratings and user true ratings.	The lower the better
2	**Precision @5**	$\frac{\text{\# of true labels recommended}}{\text{\# of recommendations made (5)}}$	Vales between 0 -1 Closer to 1 the better
3	**Average Precision @5**	$\frac{\text{sum of all precision @5}}{\text{\# of users in our dataset}}$	Vales between 0 -1 Closer to 1 the better

Performance

Collaborative Filtering

Mean Absolute Error

0.55

Average Precision@5

37.49%

Hybrid Model

Mean Absolute Error

0.64

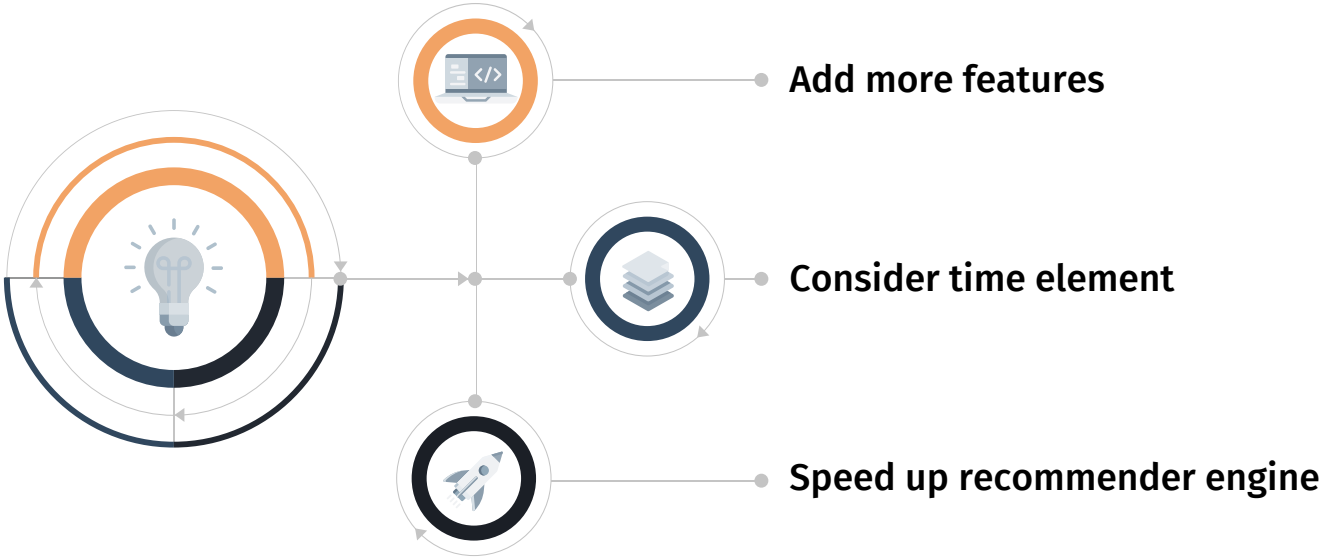
Average Precision@5

60.82%

Conclusion

Let's go, fellas!

Future Work


Add more features
Consider time element
Speed up recommender engine


Thank You!

Backup slides