

GA CAPSTONE PROJECT

RECOMMENDER SYSTEM

For Champions in League of Legends

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01

BACKGROUND

Riot Games and League of Legends



RIOT GAMES

Gaming company founded in California, started their first game known as League of Legends, a competitive counterpart to DotA.^[1]

The background of the image is a dynamic, high-contrast illustration. It features several League of Legends champions in action. In the upper left, a champion with long white hair and a blue aura (likely Anivia) is shown. In the upper center, a champion with a red and black helmet (likely Zed) is visible. In the upper right, a champion with blue wings and a blue aura (likely Ahri) is depicted. In the lower right, a champion with blonde hair and a green aura (likely Lux) is shown. The bottom of the image is filled with intense orange and yellow flames, suggesting a battle or destruction. The overall color palette is dominated by blues, purples, and oranges, creating a dramatic and intense atmosphere.

LEAGUE^{of} LEGENDS[®]



VERSION 6.68c

- Four new heroes, two new items and various gameplay improvements.

- Follow the Razer Global Challenge tournament at DotA-League.com

- Congratulations to the WCG champions StarsBoba (BoKinhVan, David21, Hamchoi, MangaQ, NeverSmile, SoSoon) and to EHome (820, 357, AAA, KJ, Xl!) for their undefeated streak at the ESWC.

- For guides to your favorite hero, visit PlayDotA.com/guides

- Send me an email at IceFroz@email.com for anything you'd like to see for 6.69

\$0

FREE-TO-PLAY MODEL





PITFALLS

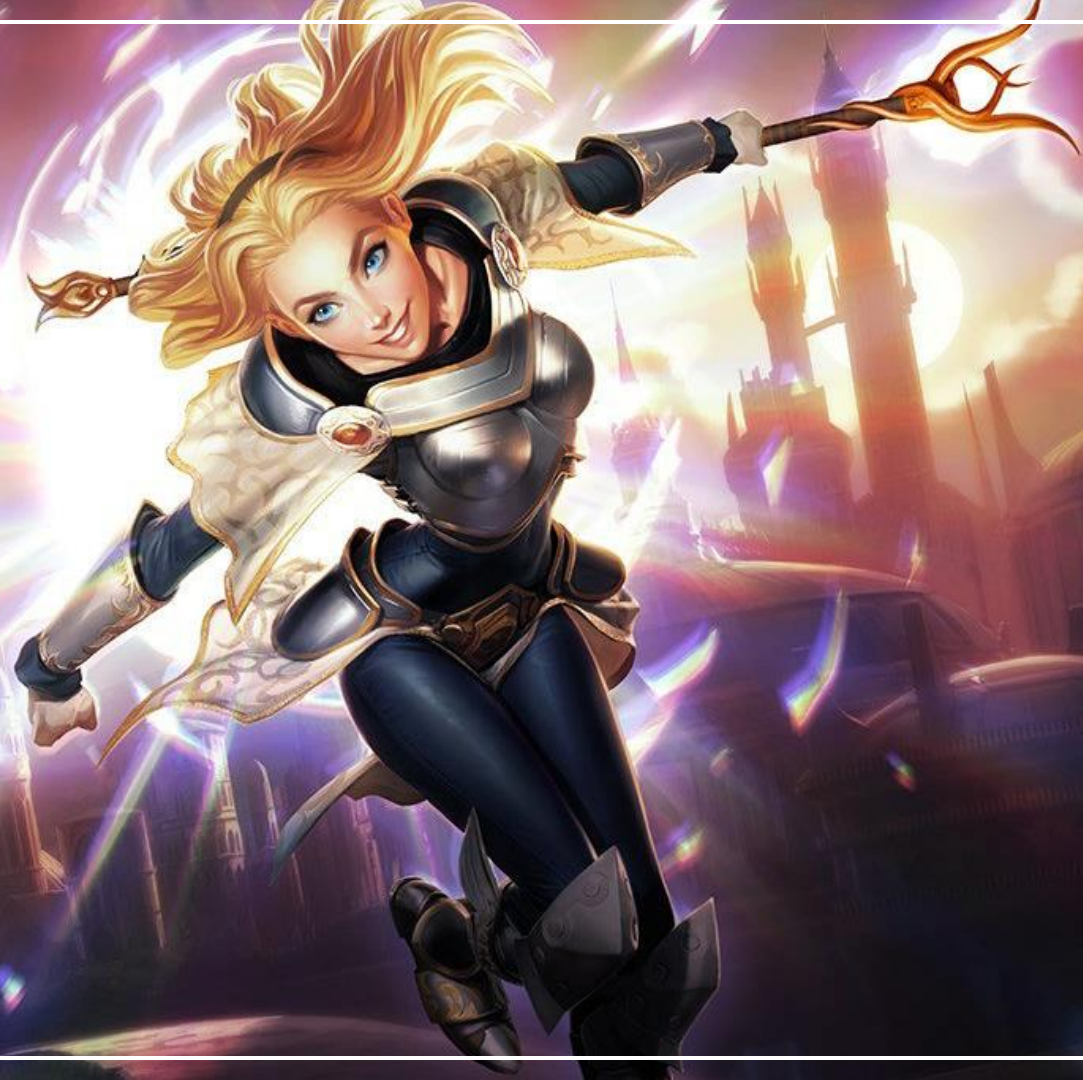
A lack of proper monetization
would bankrupt Riot

THE FIX

Purchasable cosmetic-only 'skins'



19 SKINS



SALES GENERATOR





2020

Saw Worlds 2020,
wanted to try out LoL



2023

Graduated Uni, reached
Emerald rank



2024

Got a job & obtained
purchasing power



MEET GARY

CURRENT STATE



NARROW

Mains 1 or 2
champions



LOW

Owens a few skins
for his
main champion



DIVERSE

Mains a pool of
champions



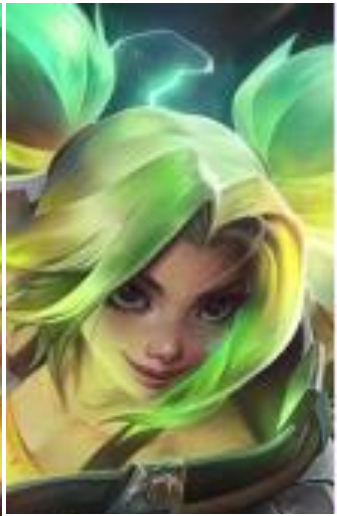
HIGH

Buying skins for
every new
champion he plays

DESIRED FUTURE STATE

THE SOLUTION

Build a League of Legends
champion recommender based
on userbase



**How can one build a LoL
champion recommender system
to increase user play time and
improve skin sales?**

—Problem Statement



02

DATASETS

Riot API and LoL Wiki

MY DATASETS



RIOT DEVELOPER API

Using Riot's in-house API, user accounts and champion masteries were obtained

LOL WIKIPEDIA

Champion Stats, Traits and Style were obtained from LoL Wikipedia^[2]



OVERVIEW



5293 ACCOUNTS

820 from each rank (excluding M, GM, Chal)



167 CHAMPIONS

Every champion currently available in game



MASTERIES

Champion Mastery on each account was obtained



STATS

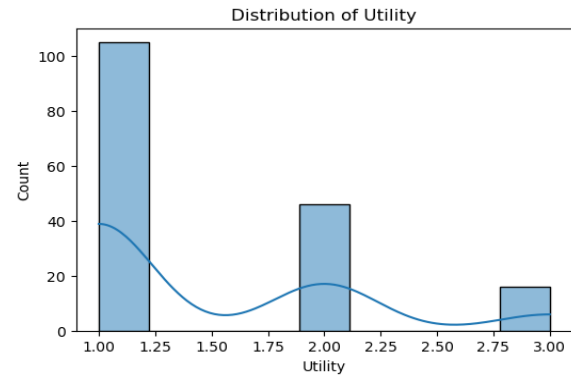
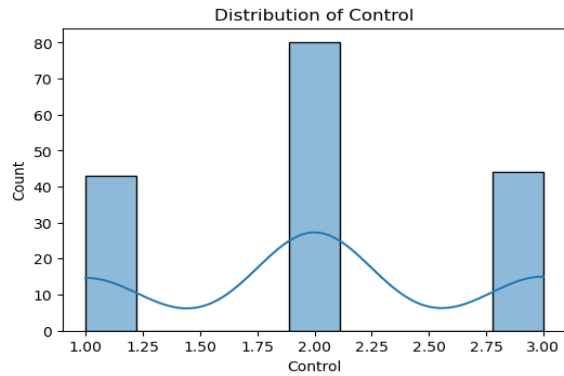
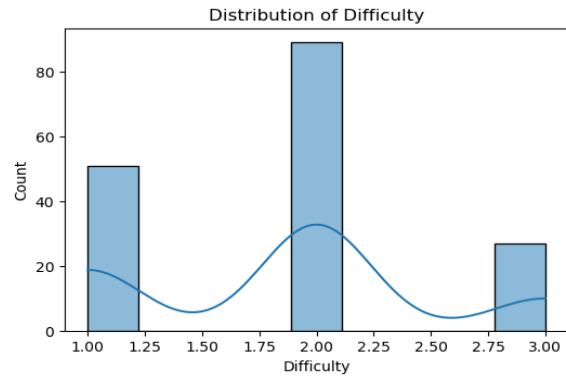
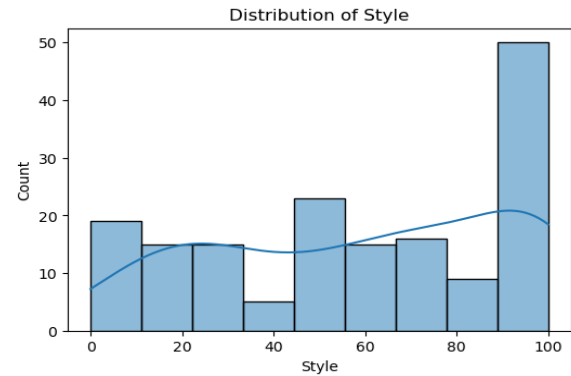
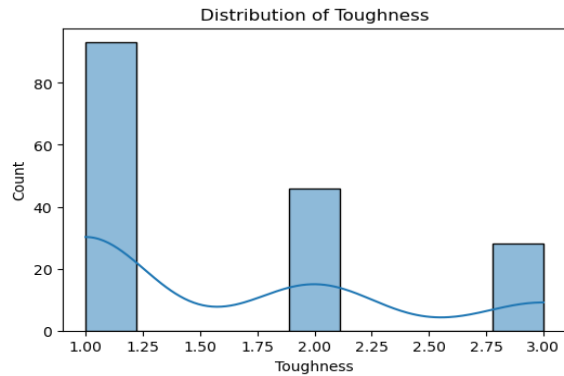
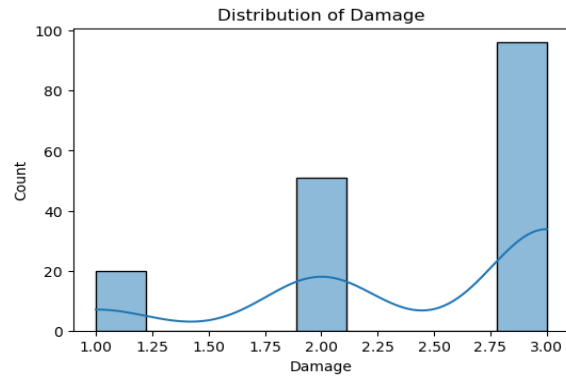
Stats like Traits, Style, Position & Metrics

03

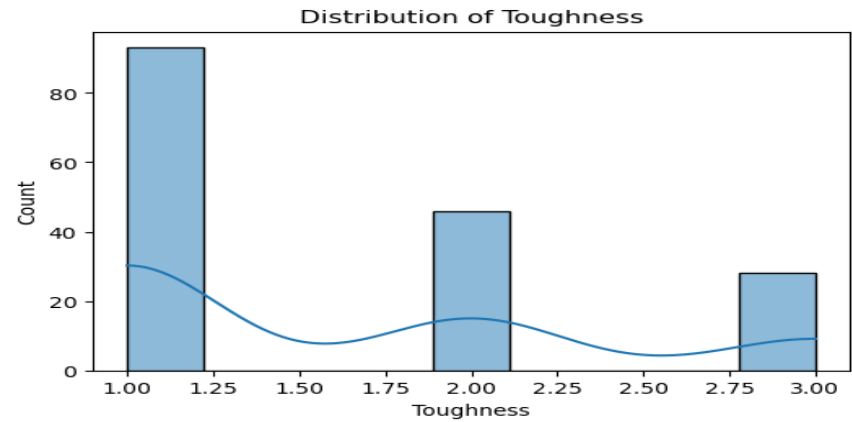
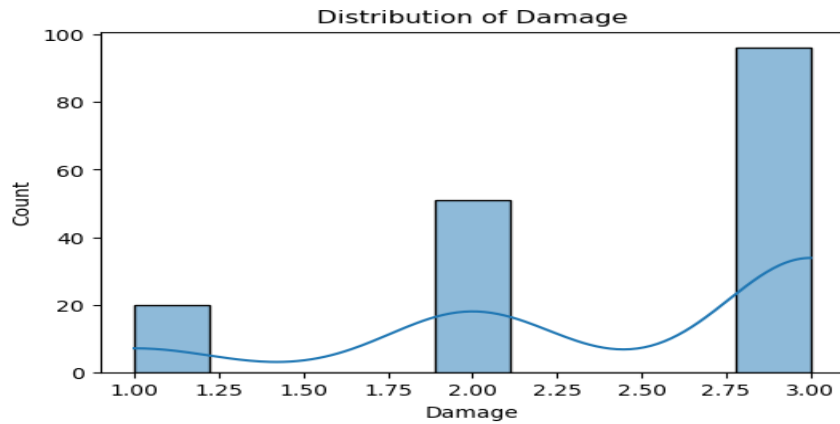
EDA

Exploring the datasets

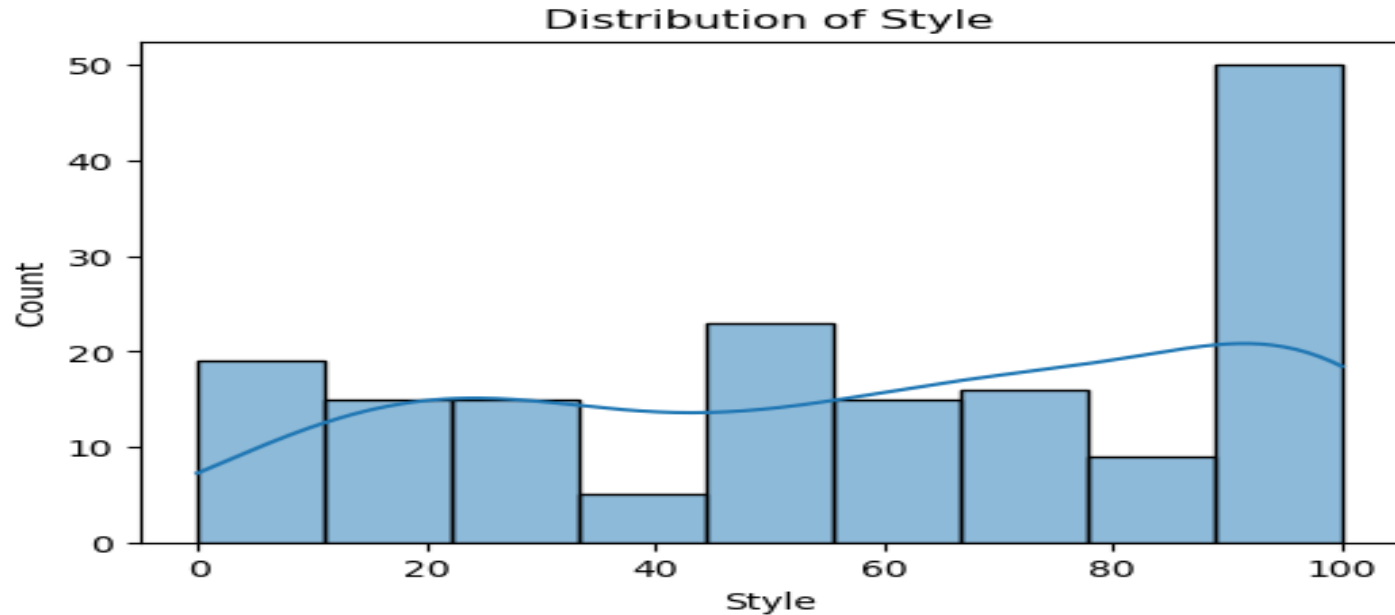
CHAMPION STAT DISTRIBUTION



CHAMPION STAT DISTRIBUTION

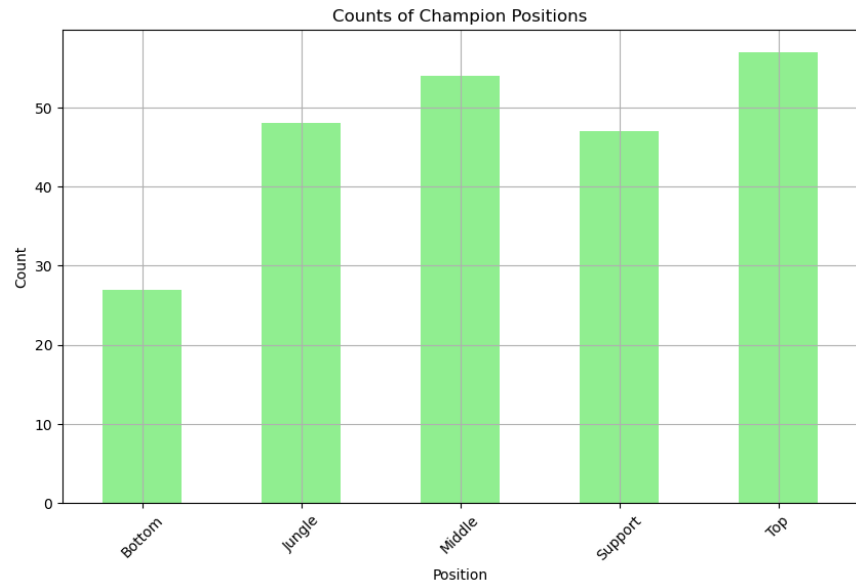
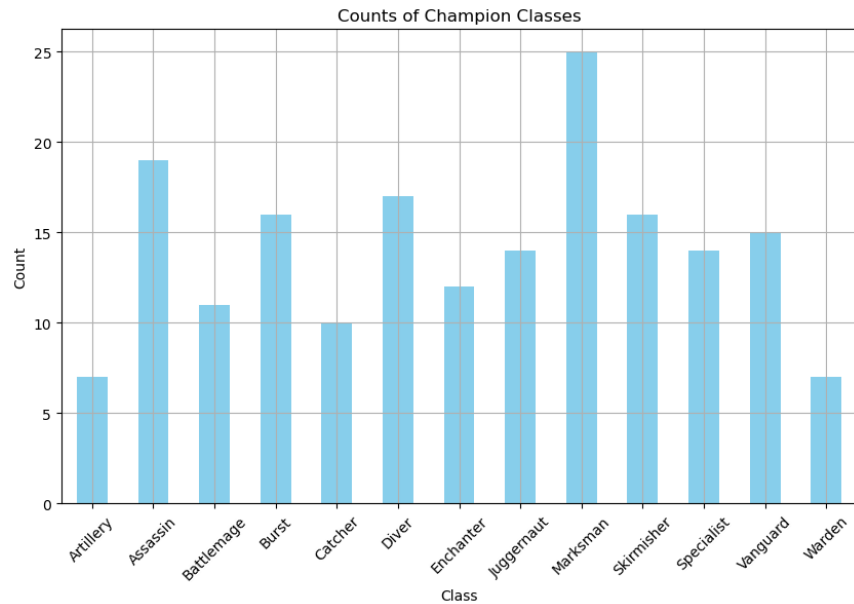


CHAMPION STAT DISTRIBUTION

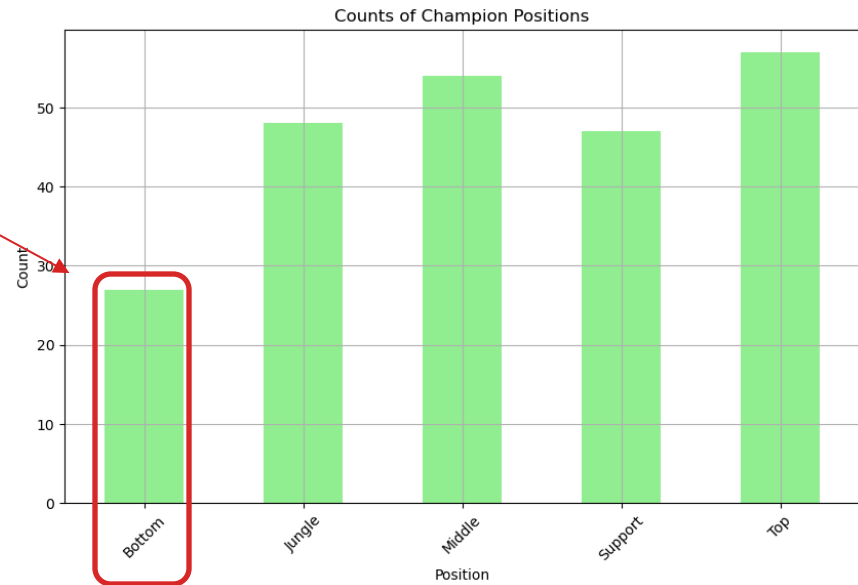
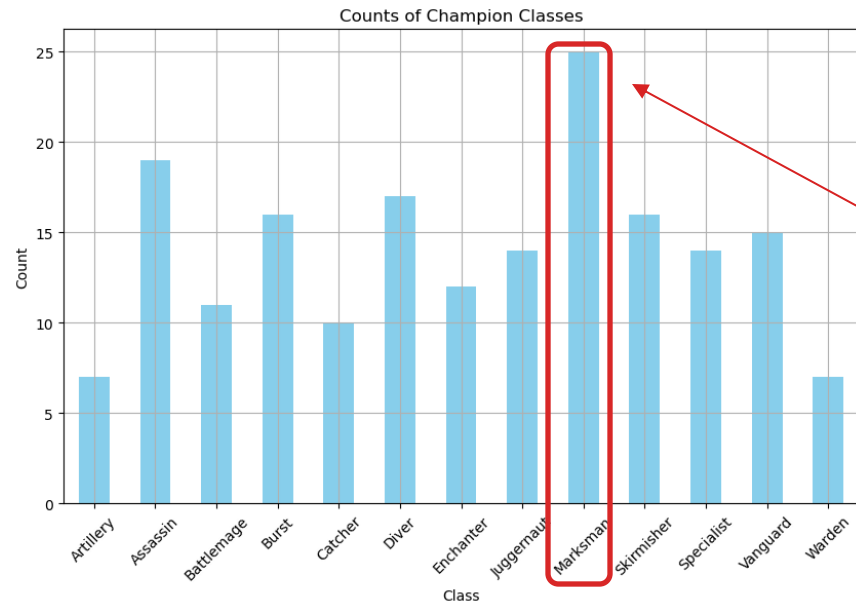


Style : A champion's tendency to depend on attacks (0) or abilities (100)

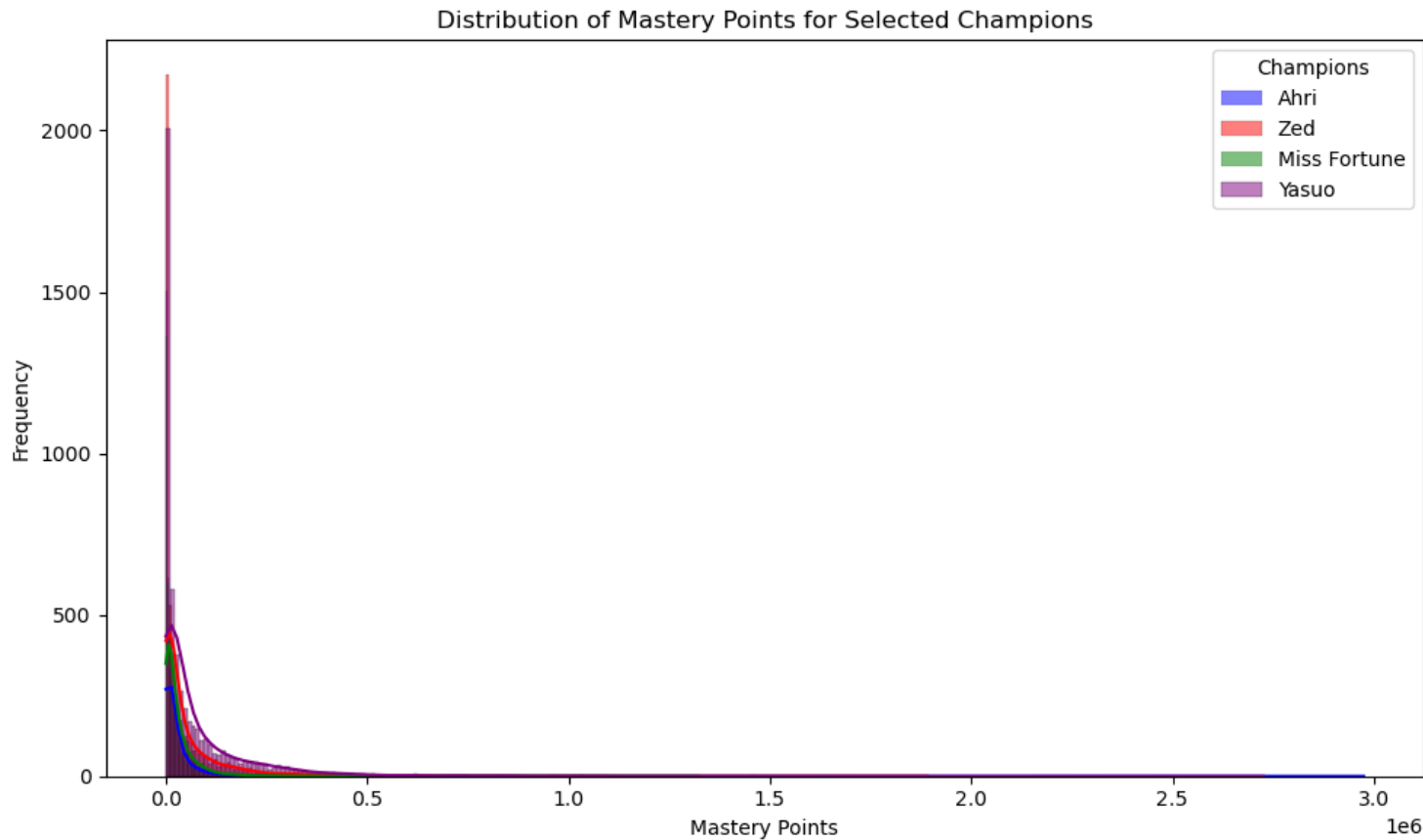
CHAMPION STAT DISTRIBUTION



CHAMPION STAT DISTRIBUTION

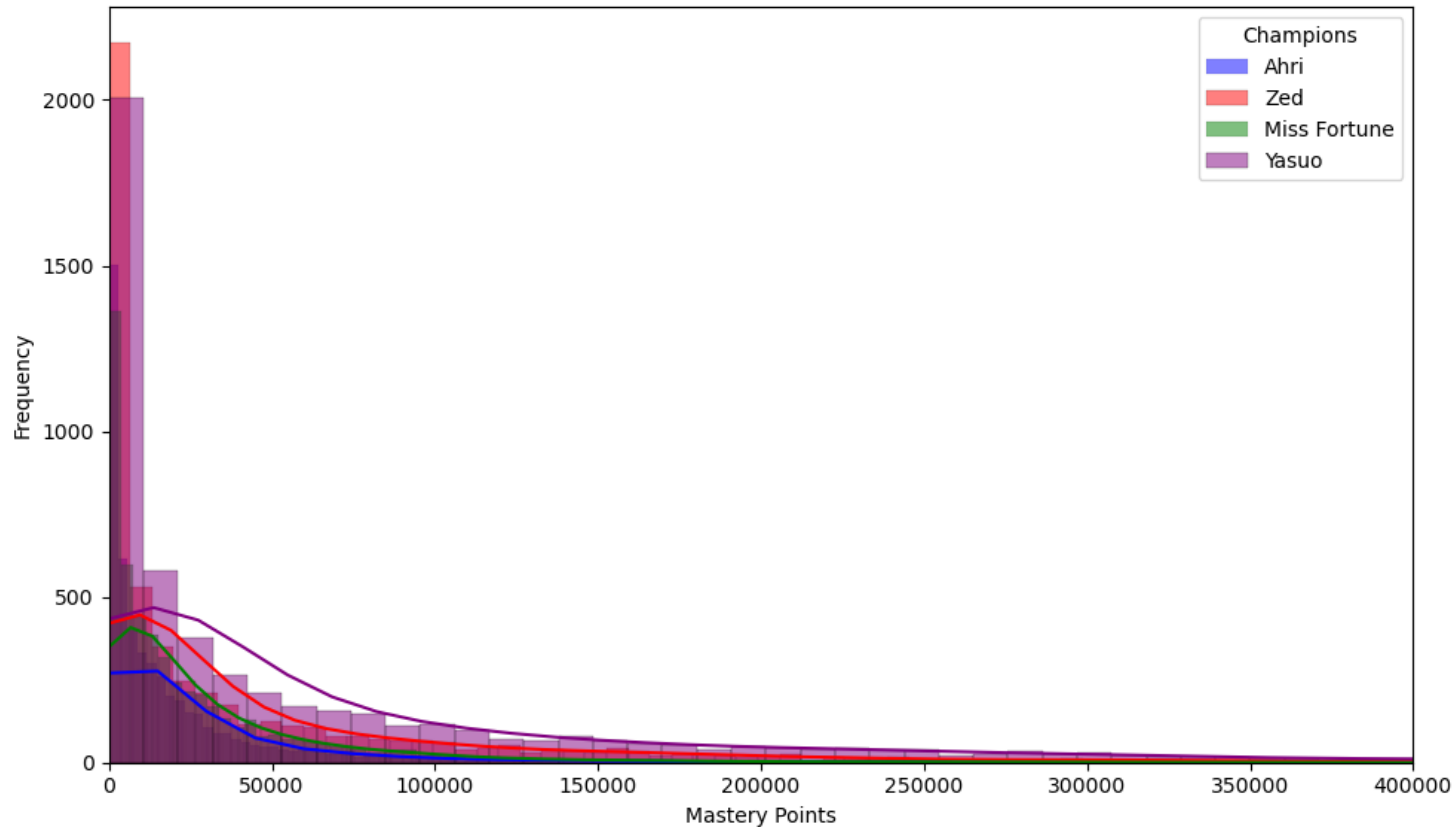


MASTERY POINTS DISTRIBUTION



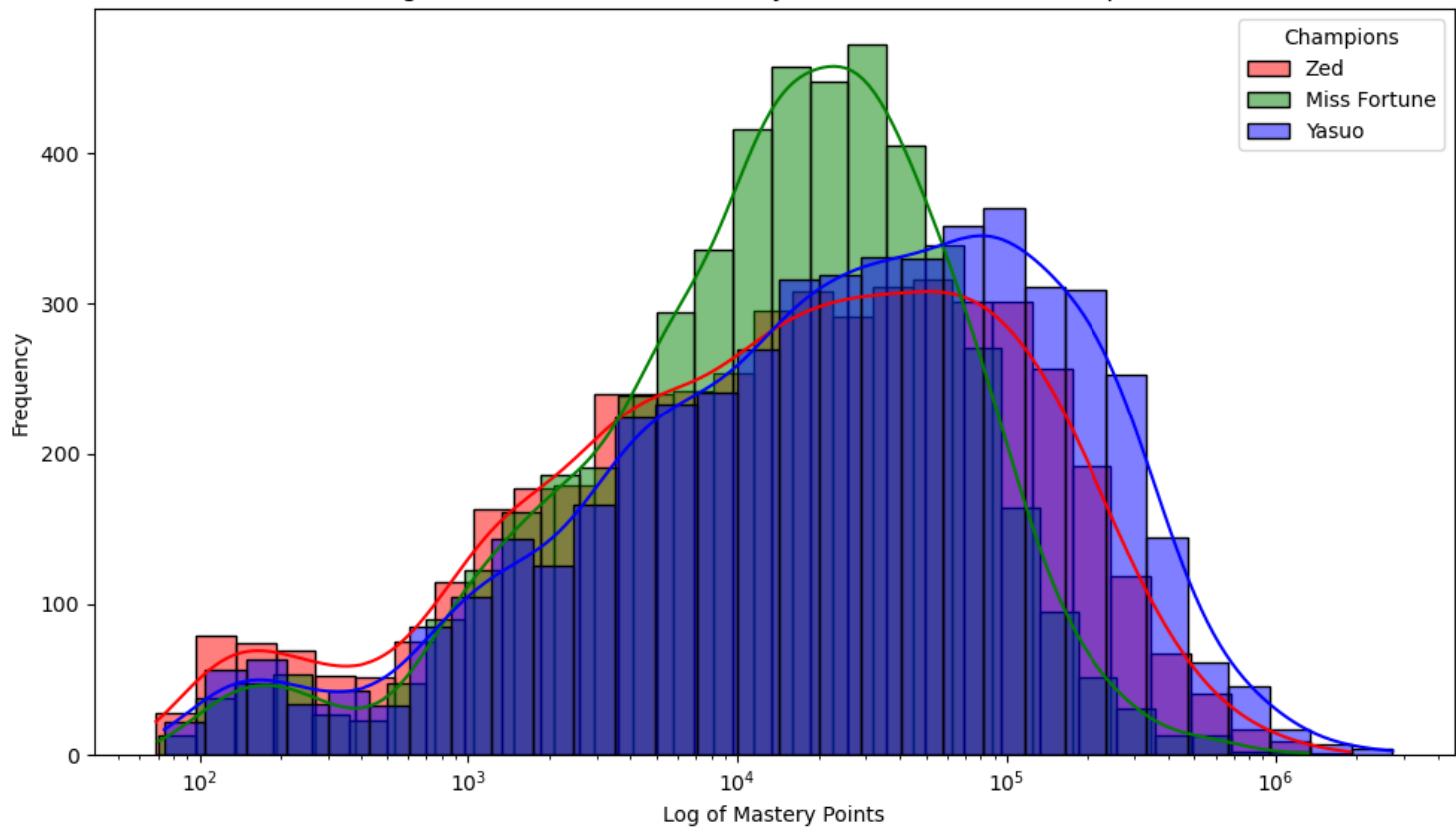
MASTERY POINTS DISTRIBUTION

Distribution of Mastery Points for Selected Champions

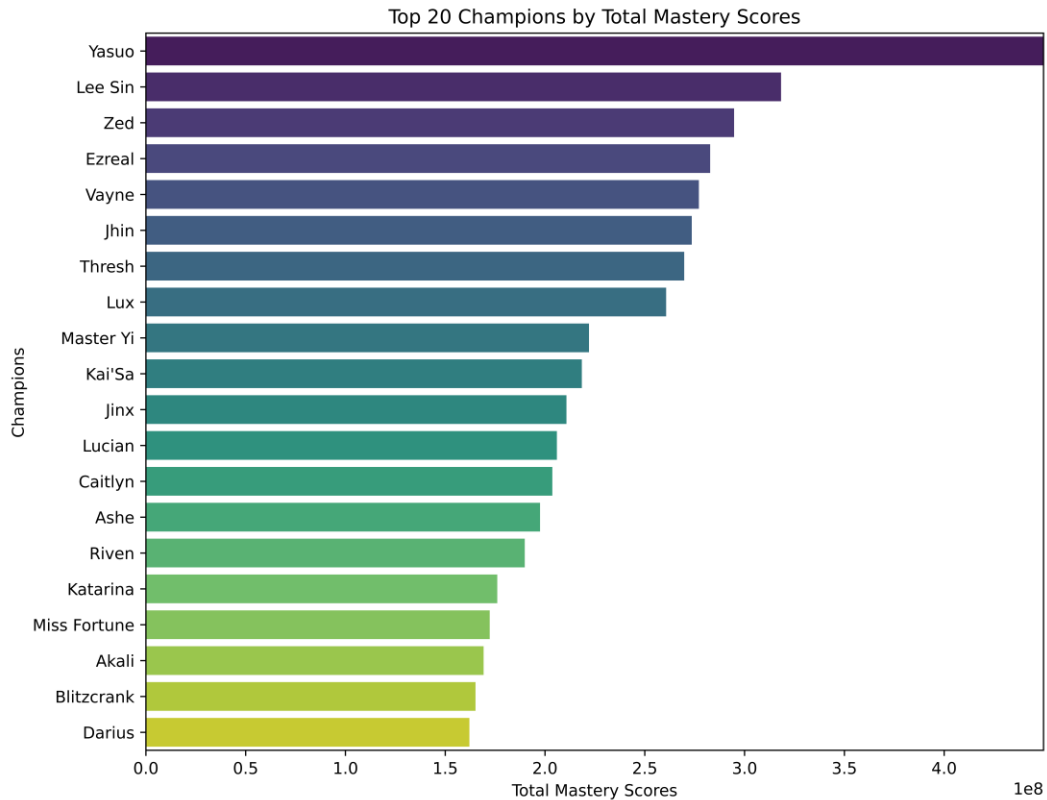


MASTERY POINTS DISTRIBUTION

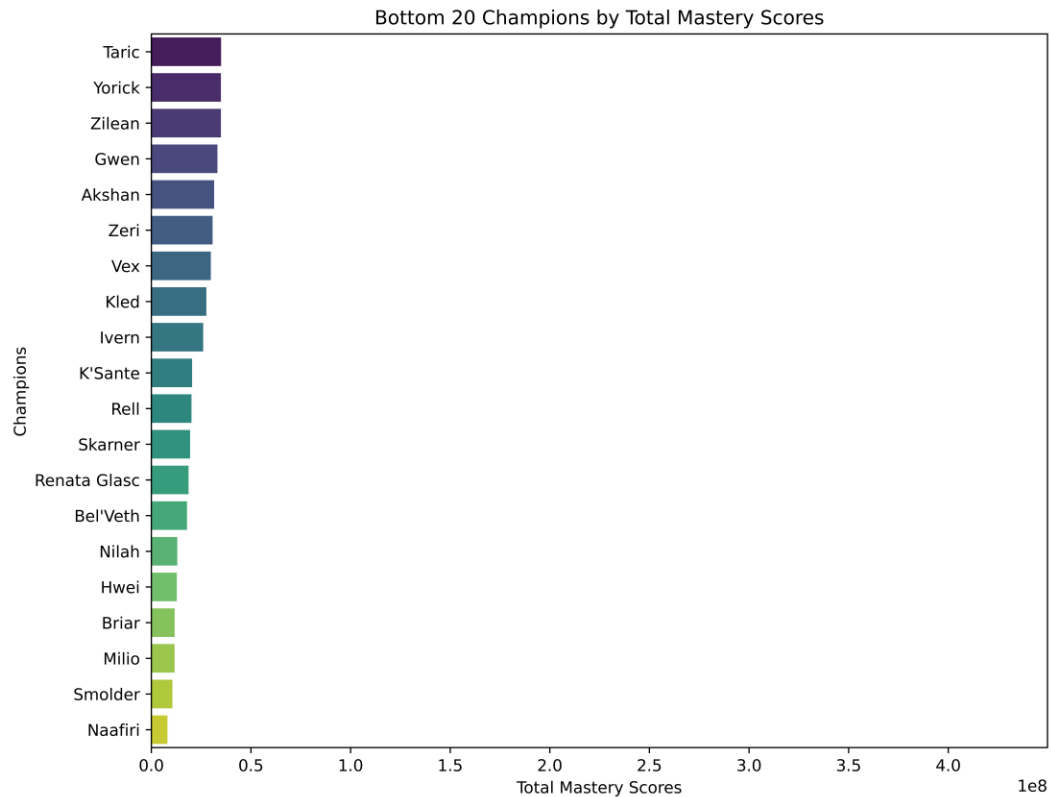
Log-Scale Distribution of Mastery Points for Selected Champions



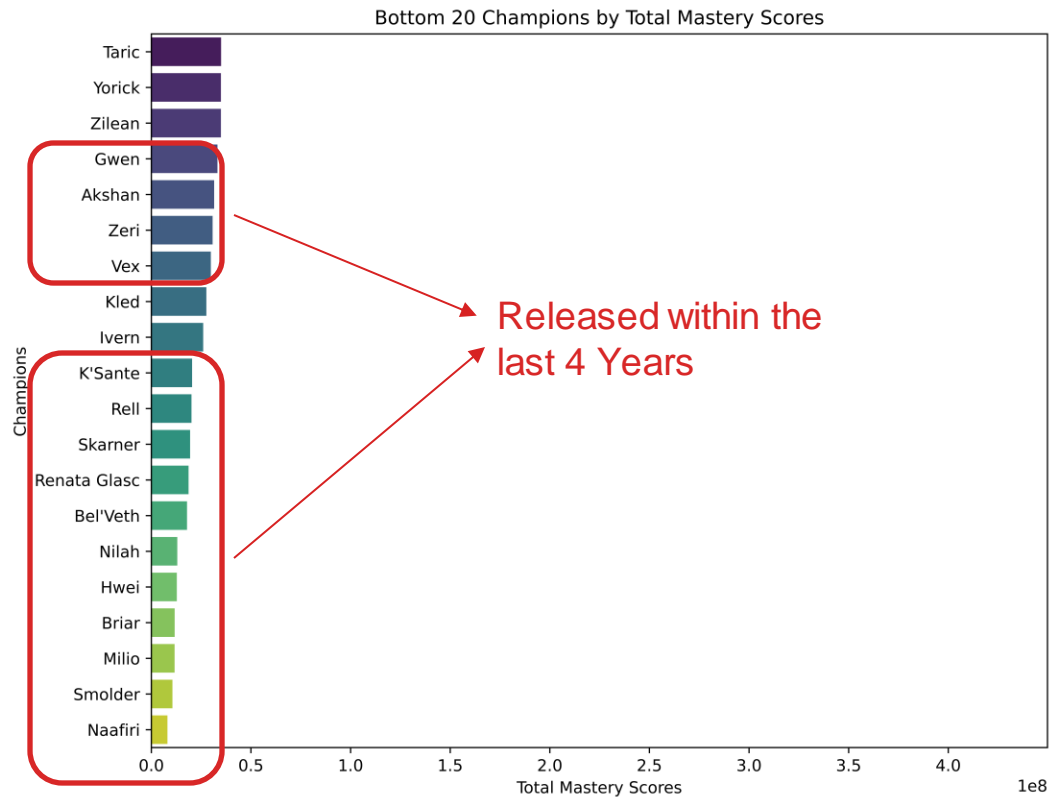
ACCOUNT DISTRIBUTION



ACCOUNT DISTRIBUTION

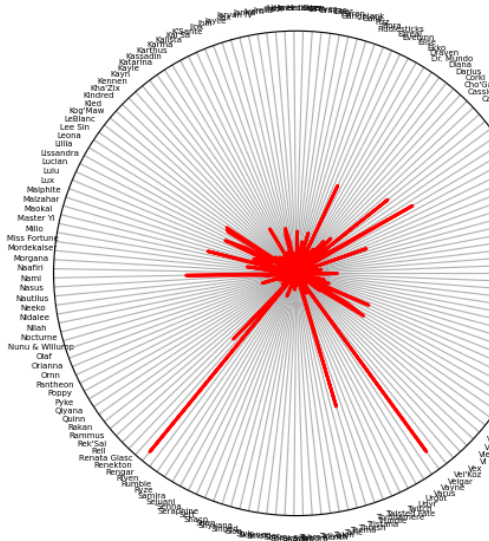


ACCOUNT DISTRIBUTION

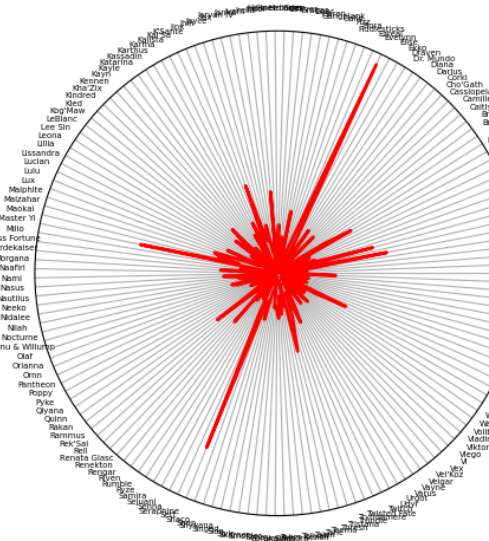


3 EXAMPLE ACCOUNTS

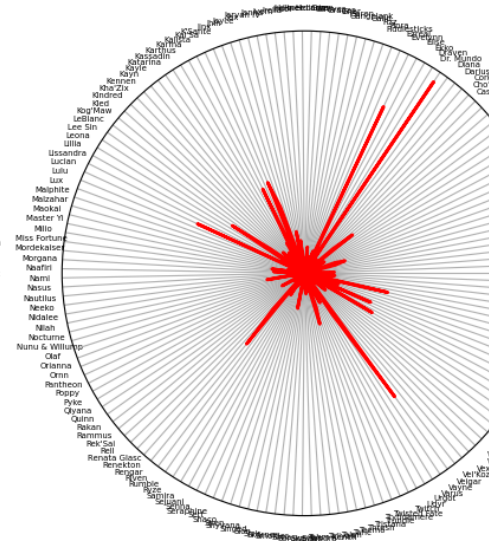
Rank Silver - Total Mastery: 2361197



Rank Emerald - Total Mastery: 7370244



Rank Challenger - Total Mastery: 10500678



04

INITIAL MODEL

Collaborative Filtering System

OVERVIEW OF PROCESS



SIMILARITY

Uses Cosine
Similarity to
obtain 5 most
similar accounts



USER ACCOUNT

Obtained from
riot ID#Tag



COMPARE

Compares the
aggregated
Mastery Scores

MAIN ISSUES



TOO GENERAL

Using only account mastery scores was not sufficient



RANK

Account rank was not factored in



BAD RESULTS

Some accounts would not have champion recommendations

05

FINAL MODEL

Hybrid system



COLLABORATIVE FILTERING

Uses Singular Value Decomposition (SVD) to reduce account dimensionality



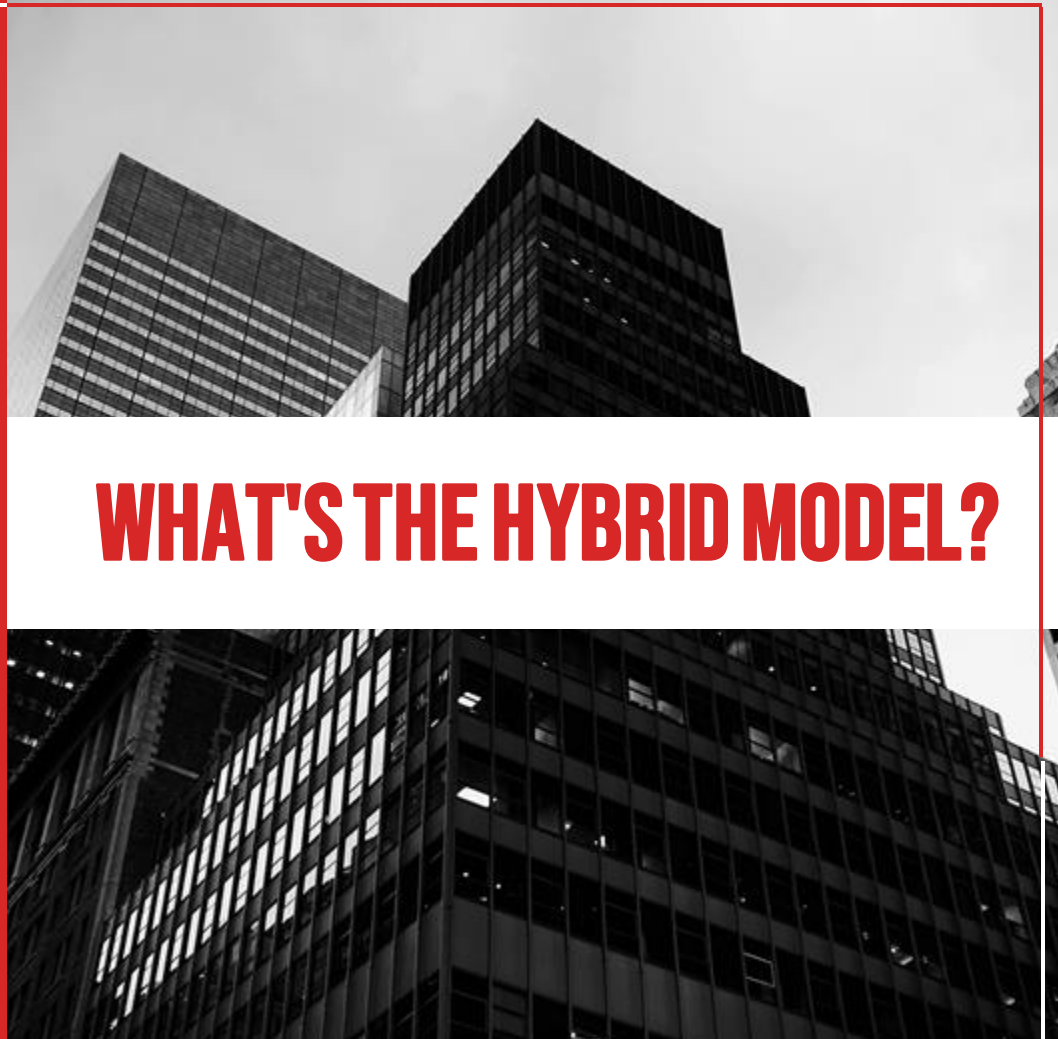
CONTENT-BASED FILTERING

Uses Cosine Similarity to compare champion stats



RECOMMENDER SYSTEM

Marries the results of both filters to output a list of recommended champions



WHAT'S THE HYBRID MODEL?



SVD MODEL

90%

**CEV WITH
111 FEATURES**

ADDED IMPROVEMENTS



DATASETS

Account as well as
Champion data



MODEL

Uses SVD model



RANK FACTOR

Rank weightages
were added



A young man with short blonde hair is shown in profile, wearing a black headset with a microphone. He is looking intently at a computer monitor which displays a game. His hands are on a backlit keyboard and a mouse. A blue can is on the desk in front of him. The scene is dimly lit, with light from the screen and keyboard illuminating his face and hands.

06

CONCLUSION

What's next for Gary?



KEEP
CALM
AND
GAME
ON

SURVEY



AIM

Generate list &
gather feedback

RECOMMENDER

Generated the top
10 champions

EVALUATION

Asked them to rate
each champion on a
scale of 1 to 10

TOP 3

HIT RATIO

83.3% HR within the top 3

MEAN SCORE

7.17 mean score within the top 3

ALL 10

MEAN AVERAGE PRECISION (MAP)

0.974 MAP across users

NEW MAIN CHAMPION?

Every user found a new main champion within the first 7 options

EVALUATION

FUTURE IMPROVEMENTS

UPDATE DATASET

Include Dataset from other regions of the world

IMPROVE FEATURES

New features such as 'recent champions



BETTER EVALUATION

Add more metrics and upgraded ratings

INTEGRATION

Build an app for online use or direct integration into LoL client

CONCLUSION



MARKETING

**RECOMMENDER
SYSTEM**



GROWING PLAYER BASE

THANKS

Do you have any questions?

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