

HOPE YOU'RE NOT

GETTING B?



# GETTING B?



BLENDING CONTENT-BASED AND COLLABORATIVE FILTERING RECOMMENDER  
SYSTEMS TO GENERATE PERSONALIZED BOARD GAME SUGGESTIONS

BGG

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# BGG ARTIST SERIES

GALLERY-QUALITY ART PRINTS

JOELLE DRANS

Explore Dashboard

## Cardboard Creations

**Lost Ruins of Arnak - Cardboard Creations**

by candidrum

**Re: March Store Update: March Madness = New GeekUp Sets! Also, big sale on Artist Series**

by salem's lot • News

**BGG.CON 2024 Registration Opens March 14**

by CaptainQwyx • BGG.CON

**Designer Diary: Siege of Valeria**

by gamesandbourbon • BoardGameGeek News

**Preview: Ultimatch, or The Best Game from GAMA Expo 2024**

by W Eric Martin • BoardGameGeek News

Online platform where users can search and rate different board games.  
And a platform where they can be redirected to purchase channels

## WHAT DO THE NUMBERS SAY?

**\$35B**

BOARD GAMES  
INDUSTRY MARKET  
SIZE BY 2030

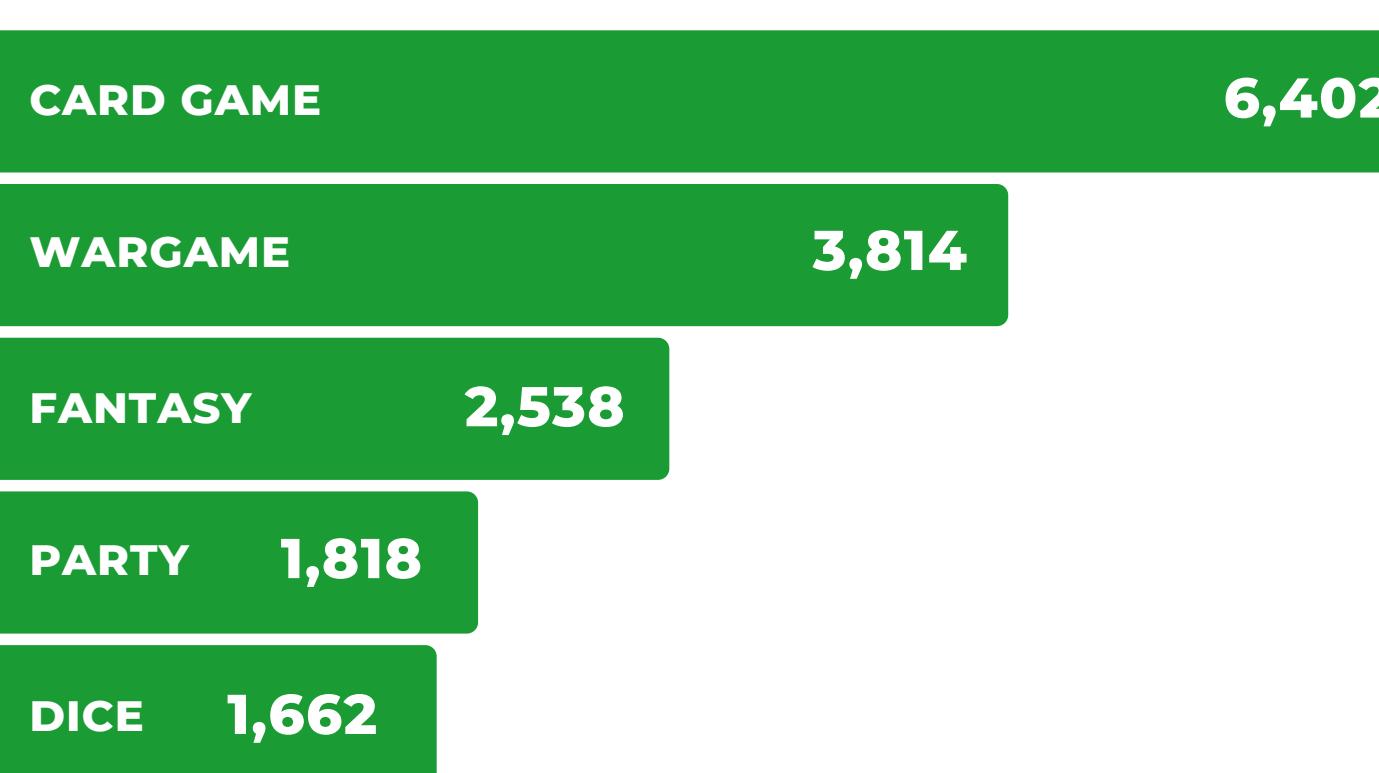
**5K**

NEW GAMES  
INTRODUCED IN  
2020 ALONE

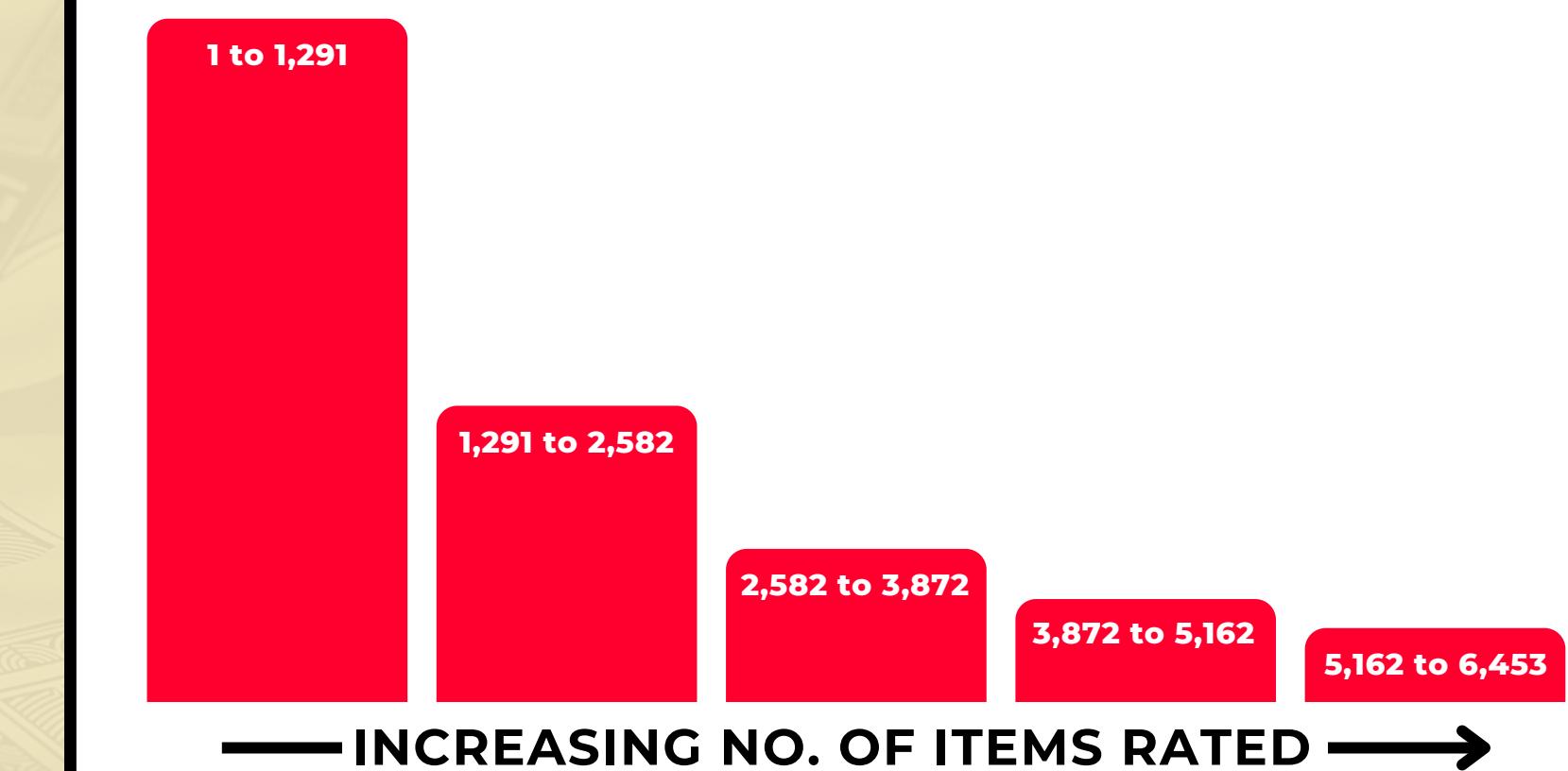
**36K**

BOARD GAMES  
AVAILABLE ON  
BGG IN 2020

## TOP AVAILABLE BOARD GAMES



## NO. OF RATINGS VS. USERS



There are a lot of users who have few rated items. Given this, users have yet to explore a significant portion of the vast options of board games.

## PROBLEM STATEMENT



## RECOMMEND BOARD GAMES

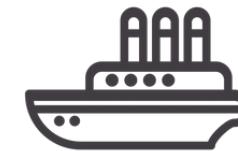
Can we **create a hybrid recommendation system to boost BoardGameGeek's user-traffic by offering personalized board game suggestions and simplifying redirection to purchase platforms?**

## UPSELL



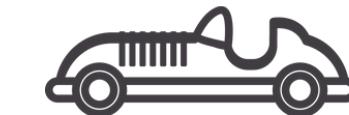
**Increase user purchases  
on BGG based on a  
user's profile**

## TAILOR FIT



**Personalize  
experience for users  
on the BGG website**

## OPTIMIZE



**Optimize user  
purchase flow to  
partner stores.**

**Bringing the right board games to the right users  
will benefit BoardGameGeek in profit and user traffic**



WHAT ARE THE  
**CONSIDERATIONS**  
WHEN LOOKING FOR A BOARD GAME?

MISTER  
**MONOPOLY**

**“When I look at reviews, I find what’s fun. No matter the theme, as long as our friend group will like it.”**

**SERENDIPITY**



**Mr. Soliman-nybags**  
“CERTIFIED BOARD GAME GEEK”  
ENTHUSIAST FOR 8 YEARS



## **COL. MOSHTARD**

“A MORE CERTIFIED BOARD GAME GEEK”  
ENTHUSIAST FOR 15 YEARS

# COLONEL **MUSTARD**

“BGGs are more likely to look for something they already like. Whatever mechanic, as long as it’s the same theme.”

## **RELEVANCE**

SCORE	SCORE	SCORE	SCORE	SCORE	SCORE	SCORE	SCORE	SCORE	SCORE					
			DOUBLE WORD SCORE					DOUBLE WORD SCORE						
	TRIPLE LETTER SCORE	S	E	R	E	N	D	I	P	I	T	Y	TRIPLE LETTER SCORE	
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Combine two recommender systems to account for both requirements

SCORE	SCORE	SCORE	DOUBLE WORD SCORE	M				DOUBLE WORD SCORE			SCORE	SCORE
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		DOUBLE LETTER SCORE			H			DOUBLE LETTER SCORE			DOUBLE LETTER SCORE	
	TRIPLE LETTER SCORE				Y				TRIPLE LETTER SCORE		TRIPLE LETTER SCORE	
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DOUBLE LETTER SCORE			DOUBLE WORD SCORE		R	E	L	E	V	A	N	C
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TRIPLE			DOUBLE							DOUBLE		TRIPLE

META LEVEL HYBRID

# RECOMMENDER

“Meta-level hybrid recommender system is one of the most widely used types of recommender system. Output of one system is the input of the other ”

WHAT ARE WE GOING TO DO?

# METHODOLOGY

ART

WHAT ARE WE GOING TO DO?

# METHODOLOGY

## STEP 1

### COLLECT

Extract data from  
Kaggle, then  
combine datasets in  
an SQL database

## STEP 2

### PREPARE

Build and clean  
ratings dataset, then  
generate the item  
profile matrix

## STEP 3

### IMPLEMENT

Run Meta hybrid  
recommender system  
using latent-based,  
then content-based

## STEP 4

### GENERATE

Produce  
recommendations  
that are relevant and  
serendipitous

WHAT DO WE NEED?

# DATASET

DATA  
ART

## WHAT DO WE NEED?

# DATA SET



### USER ID

10,000 users sampled from the BGG website



### ITEM ID

9,481 unique board games on BoardGameGeek



### RATINGS

Around 1 Million user ratings considered



### GAME GENRES

83 unique categories grouping board games

### SAMPLE GENRES

CARD GAMES 6,402

WAR GAMES 3,814

FANTASY 2,538

PARTY GAMES 1,818

DICE GAMES 1,662

SCI-FI GAMES 1,636

FOR CHILDREN 1,635

FIGHTING 1,629

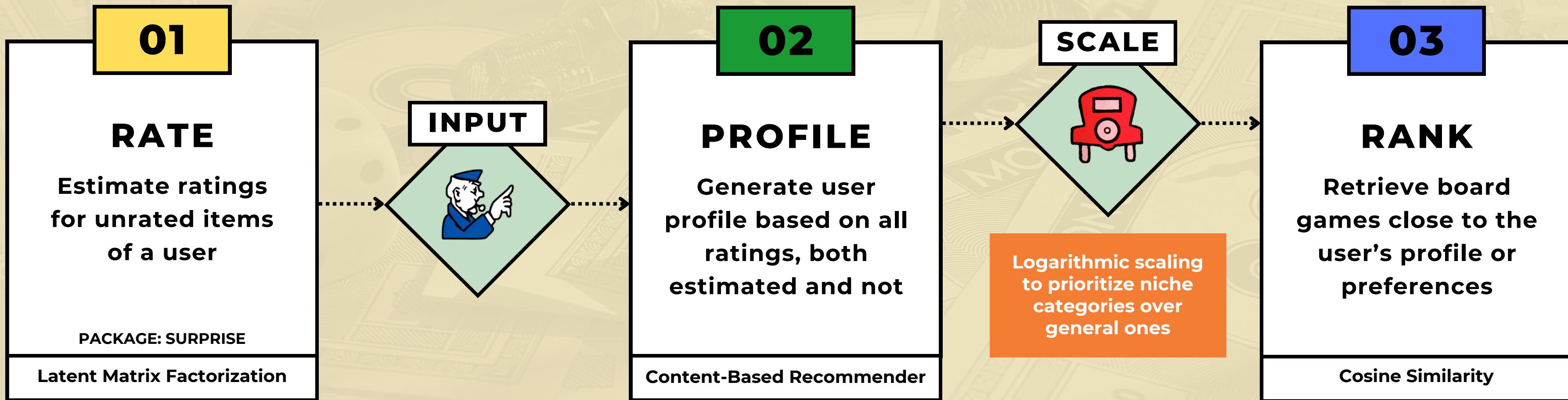
ABS. STRATEGY 1,545

ECONOMIC 1,474

We need two things: **Ratings Dataset** consisting of user id, item id, & the rating, and **Item Profiles** which has the item id and game categories

## META HYBRID

# RECOMMENDER



OUTPUT IS THE TOP 'N' RECOMMENDED ITEMS



HOW DO WE EVALUATE

# SUCCESS

START

## SUCCESS METRICS

# EVALUATION

MEAN ABSOLUTE ERROR	MAE	0.94
How far off, on average, a set of predictions are from the actual values.	1.71 Normal Predictor Recommender	Meta Hybrid Recommender
NORM. DISC. CUMULATIVE GAIN	nDCCG	0.80
How well the system lines up items to what you find most relevant	0.77 Content-Based Only	Meta Hybrid Recommender

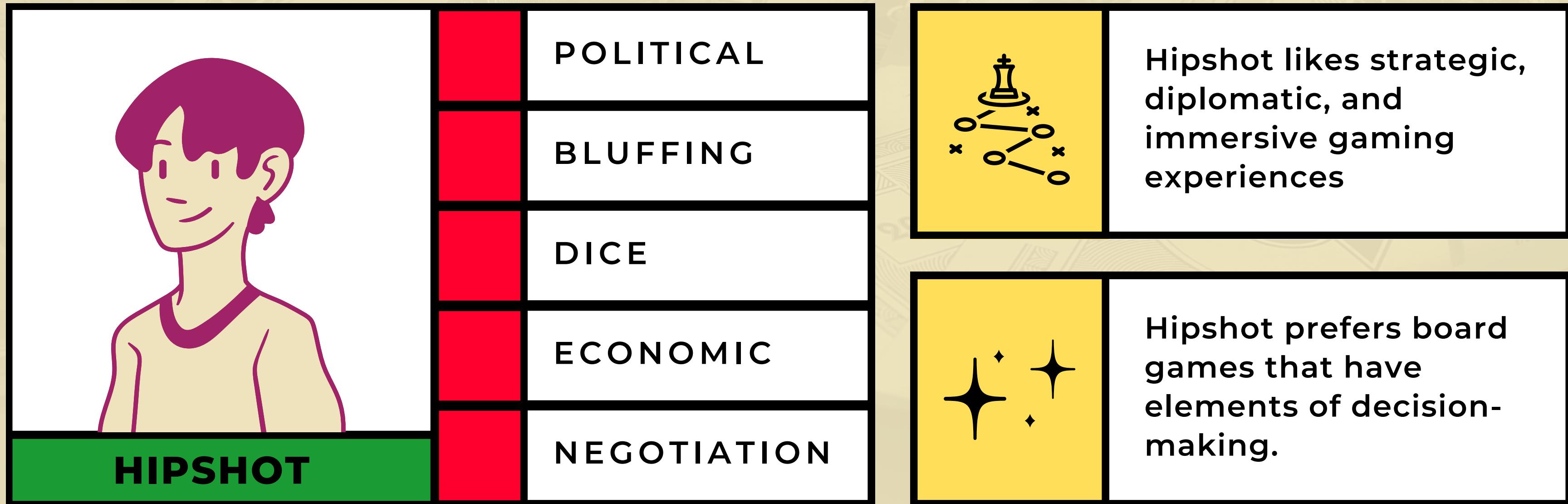
Our meta-hybrid recommender system beats ratings based on popularity and using only content-based recommender system

**LET'S MAKE SOME  
RECOMMENDATIONS**

LET'S MEET:

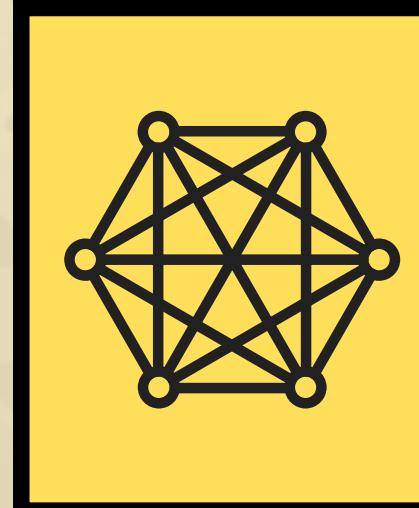
HIPSHOT

# WHAT ARE THEIR PREFERENCES?

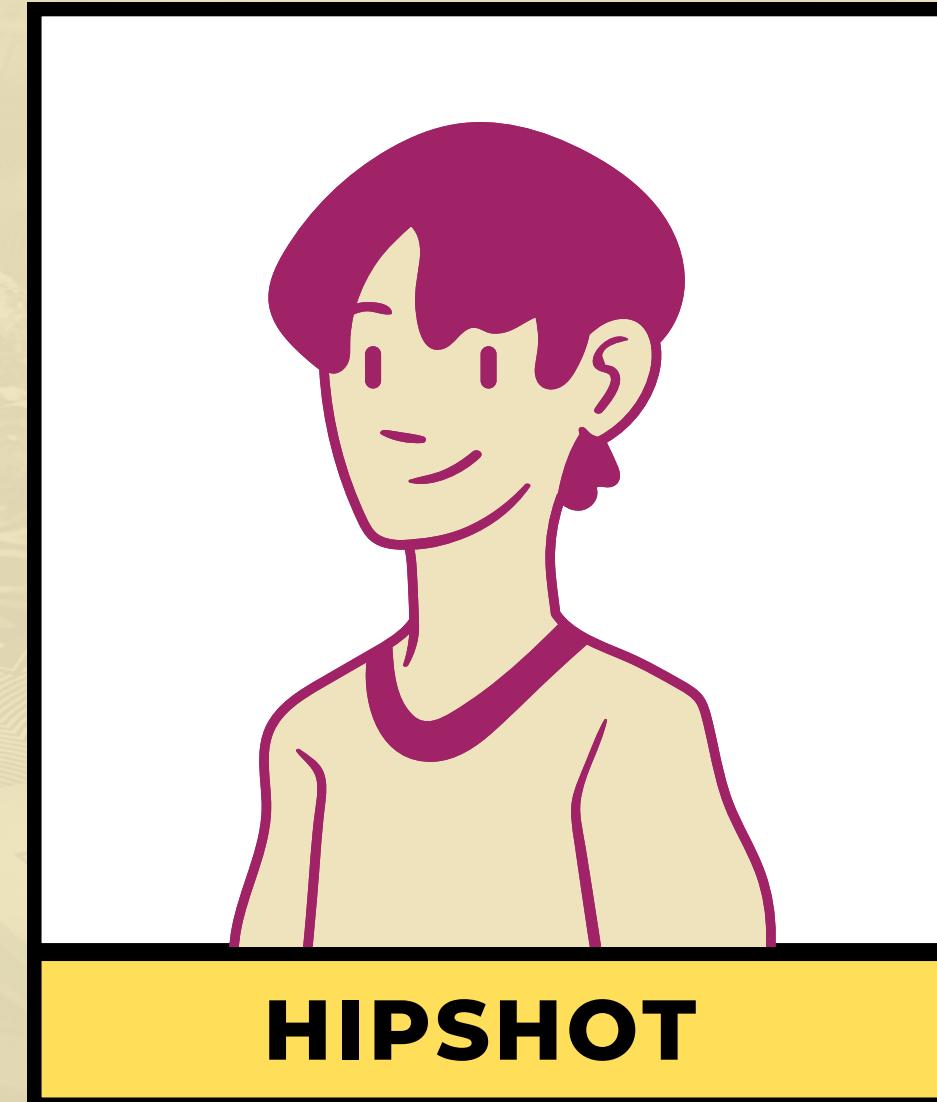




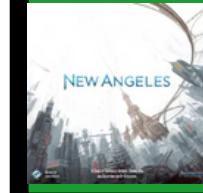
Emphasize intricate diplomacy, negotiation, and strategic alliances with rich settings



Involve complex player interactions and political maneuvering that are immersive



Babylon 5 Component Game



New Angeles Board Game



Junta: Las Cartas



A Game of Thrones (AGOT)



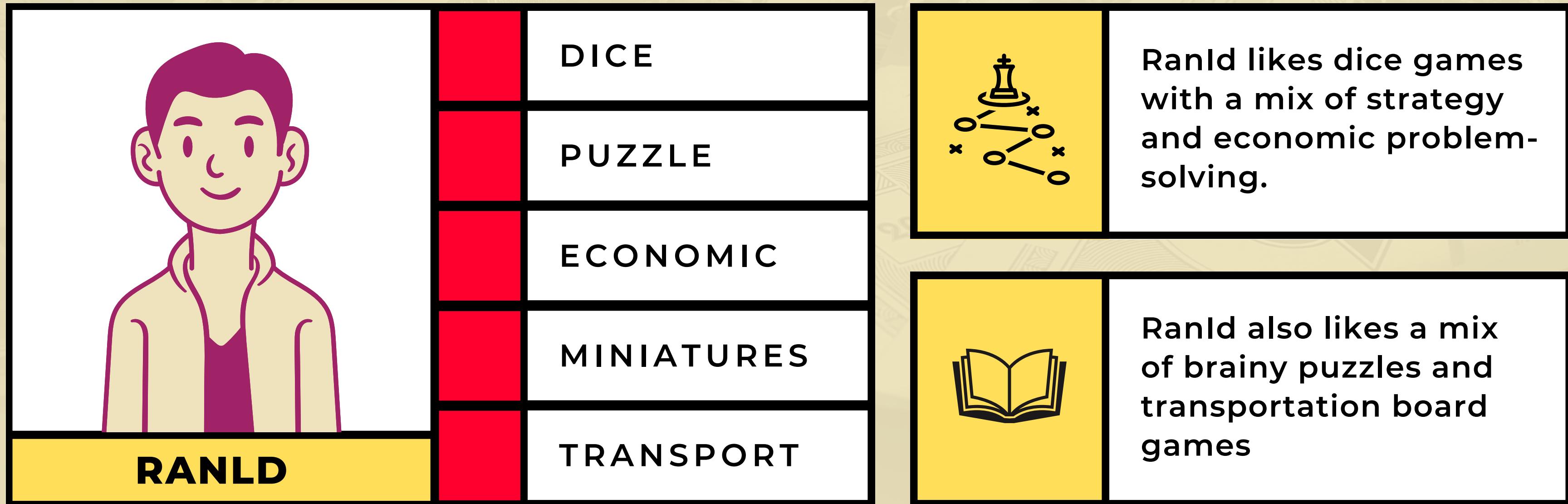
AGOT: The Board Game

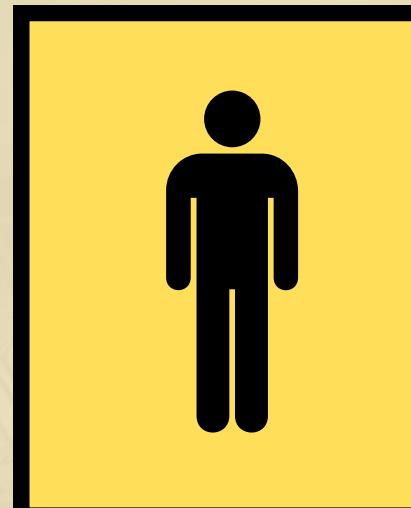
## WHAT DO WE RECOMMEND?

HOW ABOUT...

R A N L D

# WHAT ARE THEIR PREFERENCES?





Most of the recommendations are board games with miniature elements



Prioritize character progression and strategic decision-making as essential elements.

		Dadaocheng Board Game
		Mothership: Tabletop Combat
		Arena: The Contest
		Sine Tempore Board Game
		Incursion Board Game

## WHAT DO WE RECOMMEND?

RECOMMENDATIONS FOR

# FUTURE RESEARCH

START



## OTHER HYBRID

META-LEVEL IS JUST ONE OF THE HYBRID MODELS  
CONSIDER OTHERS SUCH AS WEIGHTED AND MIXED

## FEATURES

MECHANICS  
SUB-CATEGORIES  
GAMEPLAY INFORMATION  
COMMUNITY STATS

## CONSULT

ENGAGE WITH INDUSTRY EXPERTS ON HOW THE CURRENT MODEL CAN BE IMPROVED

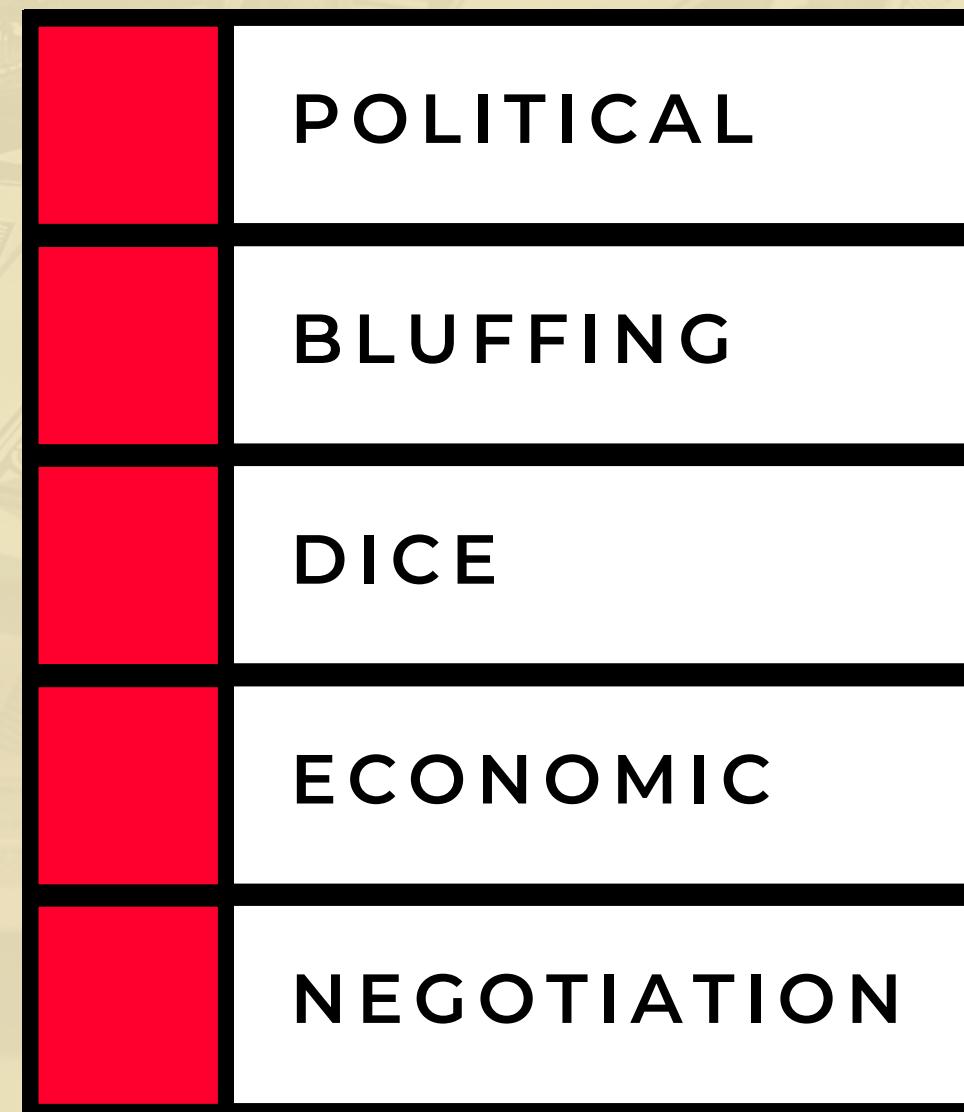
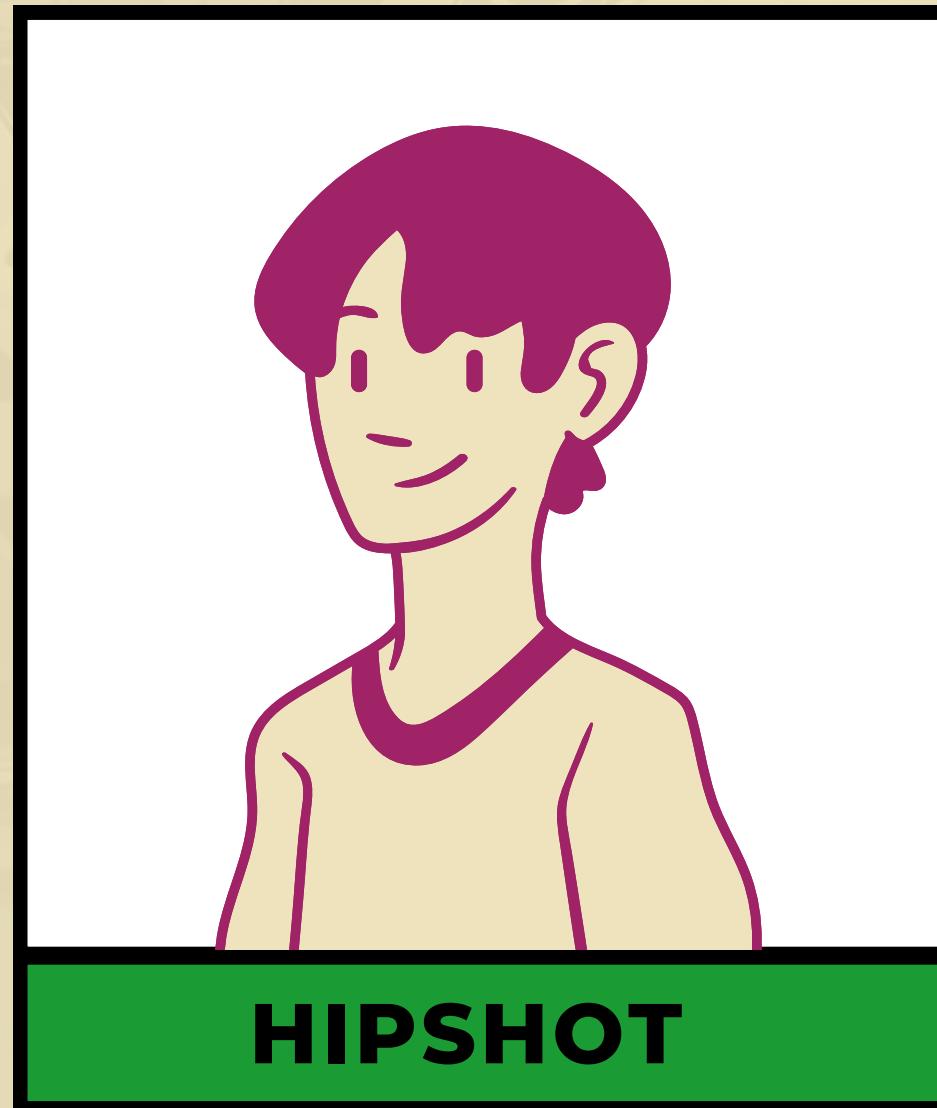
## PARAMETERS

TRY OPTIMIZING MODEL HYPERPARAMETERS FOR BETTER RESULTS AND ROBUSTNESS

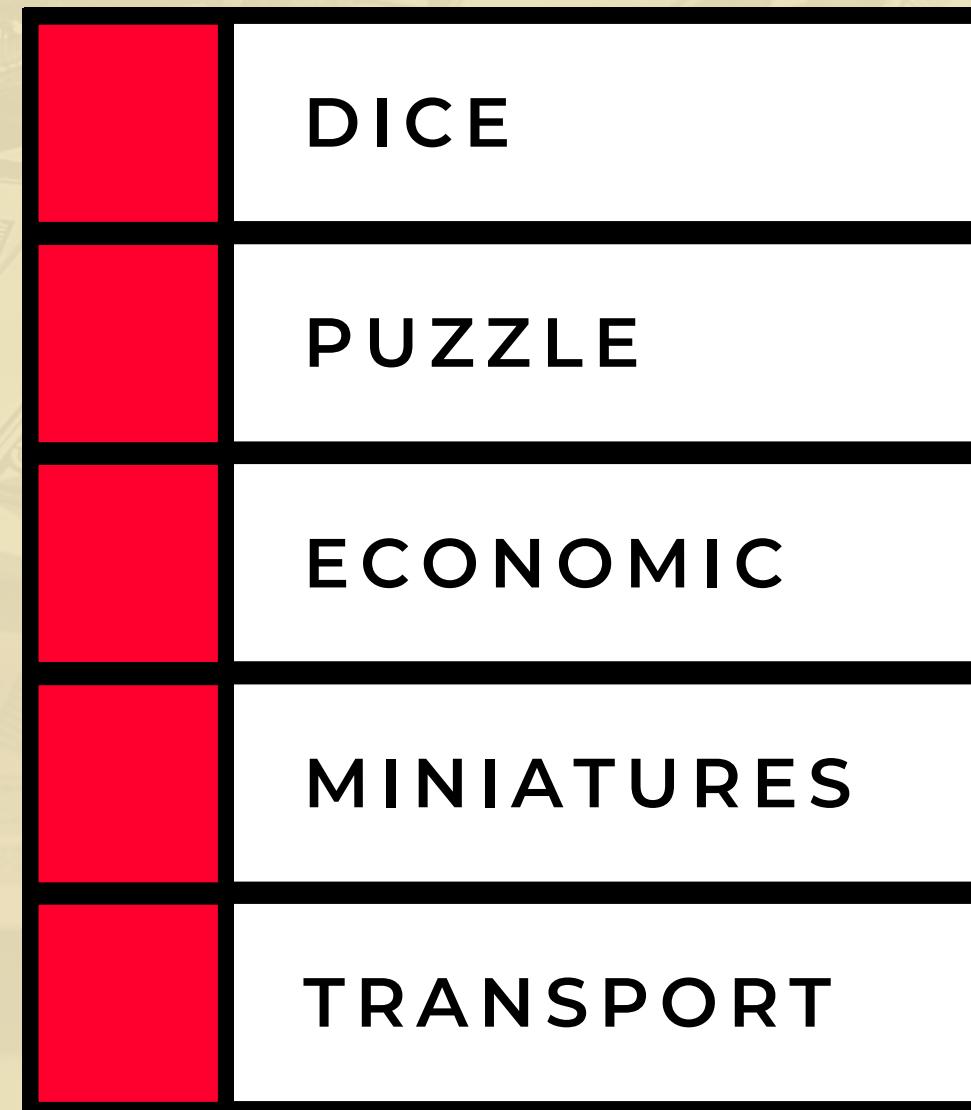
## FUTURE RESEARCH

**THANK YOU!**

# COMPARING SERENDIPITY



# COMPARING SERENDIPITY



Comparing

# NDCG VALUES

Content-Based Only

5

10

15

20

**0.8561**

**0.7780**

**0.7381**

**N/A**

Meta-Hybrid Recommender

5

10

15

20

**0.8046**

**0.8046**

**0.7963**

**0.7899**