

# ON BOARD GAMES AND HOW TO BUILD THEM

A study on the next best board game



POLITECNICO  
MILANO 1863



Colombo  
D'Amicantonio  
Lancellotti

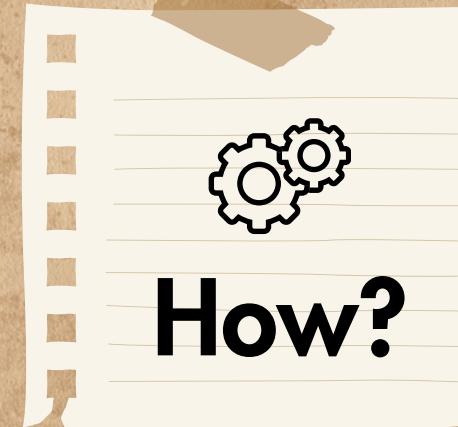
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Nonparametric Statistics

A.Y. 2023-2024

12th December 2023

# Presentation Overview



# Why?

Motive for the ~~crime~~ study

*"The board game industry revenue will be approximately \$3.39 billion worldwide in 2023."*

*"The market size will grow up to \$29.7 billion in 2028, meaning a compound annual growth rate of 11.2% in these years."*

**playtoday.co**



*"Despite today's technology-dominated culture, board games have experienced a renaissance, with sales growing steadily in the past decade."*

**unidice.world**

KICKSTARTER

Arts Comics and illustrations Design and technology Film Food and creations Games Music Editorial

Bring a creative project to life.

ARE KICKSTARTER:

250,685 projects funded	\$7,738,596,430 for creative activities	92,239,250 contributions
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FEATURED PROJECT

PLASTIC FREE • MADE FROM PLANTS • HYPO-ALLERGENIC  
ONLY DO GOOD. ALBWAYS 100% OF PROFITS TO CHARITY

100% OF PROFITS TO CHARITY

OUR MISSION DOESN'T STOP AT LAUNDRY

LAUNDRY DETERGENT SHEETS (PLASTIC FREE • LIQUID FREE • ULTRA CONCENTRATED)

FRESH LINEN SCENT

Only Do Good :: Plastic-Free, Liquid-Free Laundry Detergent

We're more than just laundry detergent. 100% of profits to charity. Let's fix capitalism together.

By Michael Alahverdian

RECOMMENDED FOR YOU

- Adventure Time Card Wars 10th Anniversary 1.035% financed By Cryptozoic Entertainment
- Pursuit of Shadows: Signed Deluxe Edition... 70% funded By JA Andrews
- Keychron Q1 HE -Wireless QMK Custom... 39.4% funded At Keychron

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**Kickstarter** is a funding platform for creative projects

In 2019 the best-selling board game on Kickstarter, called Etherfields, received over \$5 million from around 33000 backers.

# Final Goal

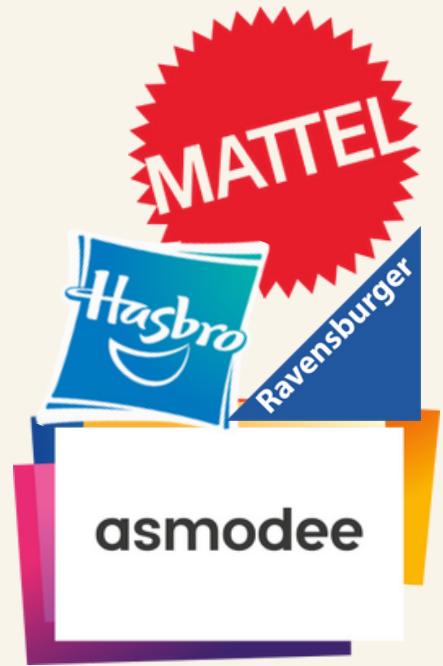
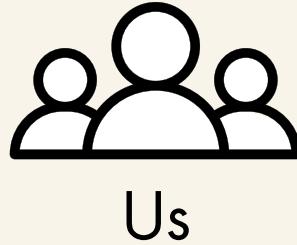
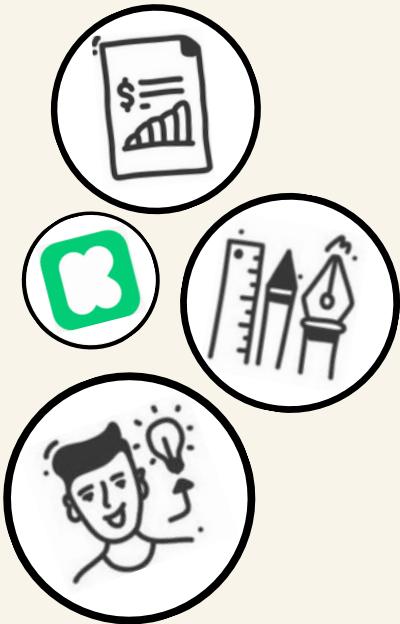
*Find the **best board game** and offer **targeted recommendations** to new developers to maximize the potential **success** and optimize **investments**.*



# Who?

~~Suspects~~ Stakeholders

# Stakeholders



Emerging designers  
and startups

Established  
Publishers

# What?

Murder ~~weapon~~ Data

# Dataset description

For approximately **21600 games**, we have **different features** such as: *complexity, playtime, category, number of players, rank, average rating* and other indicators.



Datasets come  
from the  
**BoardGameGeek**  
database.



Data are collected  
for games released  
**between 1950 and  
2023.**



**Daily snapshots** of  
the dataset are  
available **since late  
2016.**

# First task: Categories and Publishers

The column containing the categories and the publishers reports  
***strings of characters.***

How do we deal with them?

Game ID	Category	Publisher
1	[Economic, Fantasy, War]	[Portal Games, Valley Games, ...]
2	[Card, Fantasy]	[Wizards of the Coast, 999 Games, Hasbro, ...]
3	[War]	[999 Games, Hans im Glück, Rio Grande Games]

# First task: Categories and Publishers

We decomposed the strings ***distributing categories across columns*** and assigning ***binary values***, while for ***publishers*** we considered the ***number of published games***.

But are all **84** categories ***informative?***

Game ID	Card	Economic	Fantasy	War	...	Publisher
1	0	1	1	1	...	970
2	1	0	1	0	...	6144
3	0	0	0	1	...	37

# How?

~~Modus operandi~~  
Analysis methods

# Second task: Popularity

In order to **make inference** on the popularity of games, first we must define **what's popular**: how do we **measure** popularity?

Some alternatives:

- **Number of ratings**: how many users rated the game
- **Rank**: game rank in the charts on BGG website
- **Rating**: average game rating on BGG website

Board Game Rank		Title	Geek Rating	Avg Rating	Num Voters
1		<a href="#">Brass: Birmingham</a> (2018) Build networks, grow industries, and navigate the world of the Industrial Revolution.	8.421	8.61	41991
2		<a href="#">Pandemic Legacy: Season 1</a> (2015) Mutating diseases are spreading around the world - can your team save humanity?	8.386	8.53	51950
3		<a href="#">Gloomhaven</a> (2017) Vanquish monsters with strategic cardplay. Fulfill your quest to leave your legacy!	8.374	8.61	60276
4		<a href="#">Ark Nova</a> (2021) Plan and build a modern, scientifically managed zoo to support conservation projects.	8.321	8.53	37020

# Number of ratings as response

- **Semiparametric model:**

$$\begin{aligned} \log(usersRated + 1) \sim & maxplayers + complexity + pltme + year \\ & + publisher + [categories] + I(year, complexity) \\ & + I(minplayers, pltme) + I(complexity, pltme) \end{aligned}$$

- **Permutational t-test** for the significance of the covariates
- All the numerical covariates and the interactions are **significant**
- *Economic, Fantasy, Card* seem to have a **positive effect**
- *War, Trivia, Children's games* seem to have a **negative effect**
- *Adventure, Deduction, Puzzle* **don't seem to have any effect**

$$R_{adj}^2 = 0.54$$

# Rank as response

- **Semiparametric model:**

$$Rank \sim usersRated + complexity + pltme + year + minAge + [categories]$$

- **Permutation importance method** to assess variables importance
- All the numerical covariates are **significant**
- *Collectible Components, Negotiation, Mature-Adult* seem to have a **positive effect**
- *Miniatures, Trains, Puzzle* seem to have a **negative effect**
- *Nautical, Exploration, Manufacturing* **don't seem to have any effect**

$$R_{adj}^2 = 0.528$$

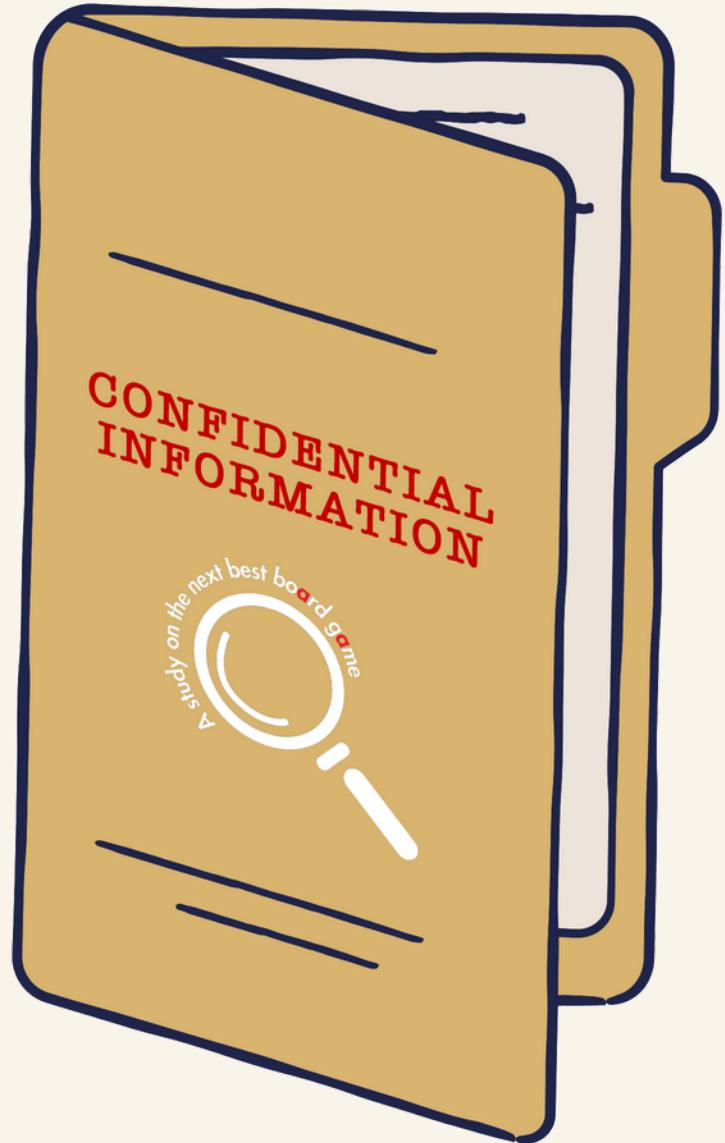
# Rating as response

- Semiparametric model:

$Rating \sim s(pltime, meanplayers, complexity) + [categories]$

- All the numerical covariates are **significant**
- *Book, Miniatures, Print&Play* seem to have a **positive effect**
- *Electronic, Movies/TV/Radio theme, Trivia* seem to have a **negative effect**
- *Environmental, Nautical, Number* **don't seem to have any effect**

$$R_{adj}^2 = 0.37$$



**What's next?**

- Using historical data can we spot **past trends** in popularity of board games and **predict** what will be **next year popular games?**
- Can we describe the **commercial life** of a board game with a **survival model?**



- Based on our analysis, are we able to select a few promising **projects** from **Kickstarter** to be proposed to shareholders of a publisher?

**Thank you for the  
attention!**