

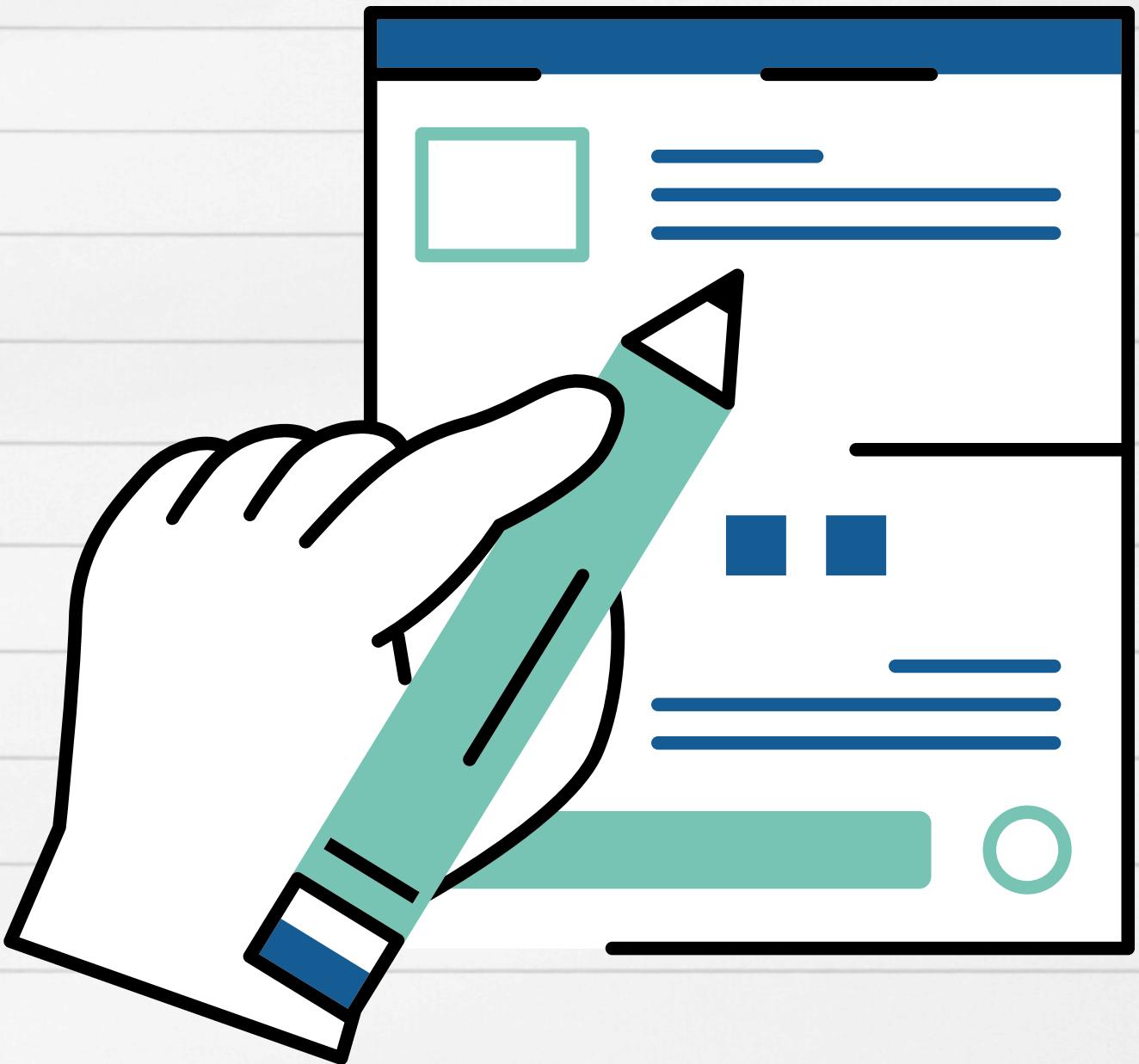
# GAME RECOMMENDATION

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# INTRODUCTION

The growth of platforms like Steam has made a wide variety of games easily accessible, but it also presents the challenge of helping users find games that match their preferences, leading to unnecessary purchases made without enough information.

To address this, we designed a personalized game recommendation model that analyzes user game histories and preferences, utilizing game metadata to deliver tailored recommendations.



# DATA SOURCES - STEAM API



STEAM Friends  
Network

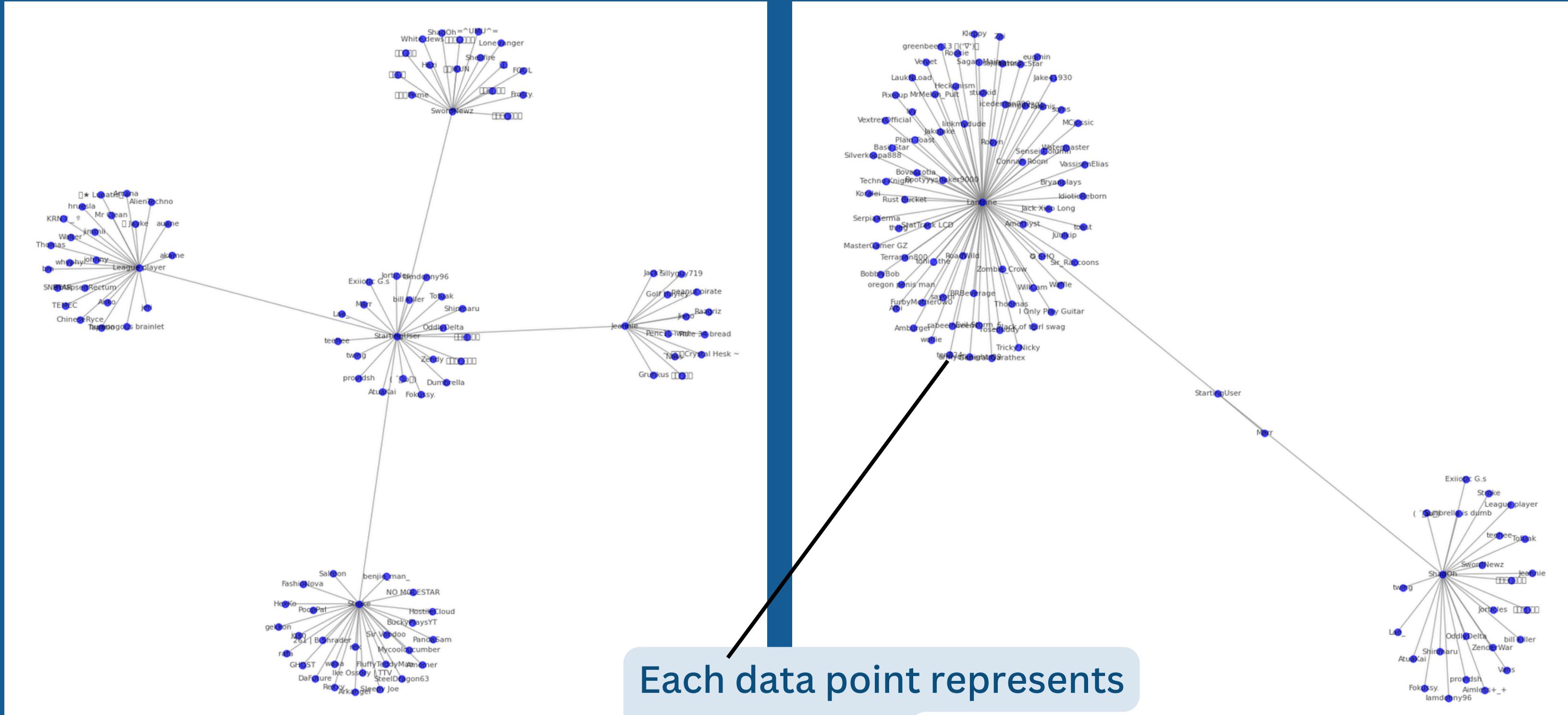
Steam Users'  
ID, Username

Users' Most  
Played Games

Game and  
Genres

## DATA GATHERING

# STEAM FRIENDS NETWORK



# USERS' MOST PLAYED GAMES

User	game1	game2	game3	game4	game5
76561198147141306	Team Fortress 2	Apex Legends	Garry`s Mod	Risk of Rain 2	Persona 5 Royal
76561199010931665	Dread Hunger	Counter-Strike 2	Apex Legends	Overwatch® 2	Satisfactory
76561197963625807	Counter-Strike 2	Counter-Strike	Team Fortress Classic	Day of Defeat	Deathmatch Classic
76561199147298734	Apex Legends	Counter-Strike 2	ARK: Survival Evolved	Palworld	Terraria
76561198798740899	Apex Legends	Counter-Strike 2	THE FINALS	Terraria	Wallpaper Engine
76561198214942720	Hearts of Iron IV	Sid Meier`s Civilization V	Cities: Skylines	Project Zomboid	Muse Dash
76561198220384872	VRChat	OVR Advanced Settings	fpsVR	STALCRAFT: X	XSOVERLAY
...	...	...	...	...	...

# USERS' MOST PLAYED GAMES

game1	game2	game3	game4	game5
76561199407925912	Counter-Strike 2	Deadlock	THE FINALS	HELLDIVERS™ 2
76561199402189100	Garry's Mod	OVR Advanced Settings	Apex Legends	Wallpaper Engine
76561198220384874	Counter-Strike 2	Rocket League	fpsVR	Paladins
76561198220384872	VRChat	OVR Advanced Settings	Hogwarts Legacy	XSOVERLAY
765611994246648080	Sea of Thieves	God of War	God of War Ragnarök	PlateUp!
765611994246648079	Hearts of Iron IV	Sid Meier's Civilization V	Cities: Skylines	Muse Dash
765611994246648078	Call of Duty®	PAYDAY 2	HELLDIVERS™ 2	Baldur's Gate 3
765611994246648077	Team Fortress 2	Counter-Strike 2	Mod Loader	Apex Legends
76561198220384873	Terraria	Counter-Strike 2	THE FINALS	Call of Duty®
76561198220384872	Arma 3	Counter-Strike 2	Palworld	Wallpaper Engine
76561198220384871	Apex Legends	Garry's Mod	People Playground	Terraria
76561198220384870	Arma 3	Ready or Not	Hearts of Iron IV	ARK: Survival Evolved
76561198220384869	Grand Theft Auto V	ARK: Survival Evolved	Battlefield 1™	Risk of Rain 2
76561198220384868	team Fortress 2	Counter-Strike 2	Garry's Mod	Persona 5 Royal
76561198220384867	Euro Truck Simulator 2	Apex Legends	PC Building Simulator	Assetto Corsa Competizione
76561198220384866	Sid Meier's Civilization V	HELLDIVERS™ 2	Project Zomboid	DOOM Eternal
76561198220384865	Call of Duty®	Counter-Strike 2	Team Fortress 2	Assetto Corsa
76561198220384864	Call of Duty®	Counter-Strike 2	Apex Legends	PC Building Simulator
76561198220384863	Dread Hunger	Counter-Strike 2	Team Fortress Classic	Game Dev Tycoon
76561198220384862	War Thunder	Rust	Team Fortress Classic	Mini Metro
76561198220384861	Garry's Mod	Left 4 Dead 2	Apex Legends	Counter-Strike
76561198220384860	Brawlhalla	Aesprite	Team Fortress 2	Team Fortress 2
76561198220384859	Apex Legends	Brawlhalla	ELDEN RING	Apex Legends
76561198220384858	Arma 3	Garry's Mod	NBA 2K22	Day of Defeat
76561198220384857	Call of Duty®	Counter-Strike 2	PC Building Simulator	Overwatch® 2
76561198220384856	NARAKA: BLADEPOINT	Yardarm	Project Zomboid	Marauders
76561198220384855	Counter-Strike 2	Black Myth: Wukong	Team Fortress 2	Deathmatch Classic
76561198220384854	Counter-Strike 2	Black Myth: Wukong	Apex Legends	Satisfactory
76561198220384853	Monster Hunter: World	Counter-Strike 2	Team Fortress Classic	Destiny 2
76561198220384852	Controller Companion	Slay the Spire	Hearts of Iron IV	Arma 3
76561198220384851	Battlefield™ V	Gran Theft Auto V	Rust	MultiVersus
76561198220384850	Hearts of Iron IV	Mount & Blade II: Bannerlord	MONSTER HUNTER: WORLD	Phasmophobia
76561198220384849	Battlefield 2042	HELLDIVERS™ 2	Monsters at the Gate	Marauders
76561198220384848	Call of Duty®	Counter-Strike 2	WALLPAPER ENGINE	Baldur's Gate 3
76561198220384847	Call of Duty®	Counter-Strike 2	WALLPAPER ENGINE	Dying Light
76561198220384846	Call of Duty®	Counter-Strike 2	The Witcher 3: Wild Hunt	Assassin's Creed II
76561198220384845	Call of Duty®	Counter-Strike 2	Skull: The Horror Slayer	Melvor Idle
76561198220384844	Call of Duty®	Counter-Strike 2	Hearts of Iron IV: Complete	Stardew Valley
76561198220384843	Call of Duty®	Counter-Strike 2	VICTORIA 3	Mount & Blade: Warband
76561198220384842	Call of Duty®	Counter-Strike 2	ACE COMBAT™ UNKNOWN	Wallpaper Engine
76561198220384841	Call of Duty®	Counter-Strike 2	Call of Duty®: Black Ops III	Phoenix Wright: Ace Attorney Trilogy
76561198220384840	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Forza Horizon 4
76561198220384839	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Ravenfield
76561198220384838	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Red Dead Redemption 2
76561198220384837	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Losless Scaling
76561198220384836	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Red Room
76561198220384835	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Dead Recking
76561198220384834	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384833	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384832	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384831	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384830	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384829	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384828	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384827	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384826	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384825	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
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76561198220384821	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384820	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384819	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384818	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384817	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384816	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384815	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384814	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384813	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384812	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384811	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384810	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384809	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384808	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384807	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384806	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384805	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384804	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384803	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384802	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384801	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384800	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384799	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384798	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384797	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384796	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384795	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384794	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384793	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384792	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384791	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384790	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384789	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
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76561198220384787	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384786	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384785	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384784	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384783	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384782	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384781	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384780	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384779	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384778	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384777	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384776	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384775	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384774	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384773	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384772	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384771	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384770	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384769	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384768	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384767	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384766	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous
76561198220384765	Call of Duty®	Counter-Strike 2	Call of Duty®: Warzone	Elite Dangerous

# GAME AND GENRES

Game Name	Tags
<b>Apex Legends</b>	Action. Adventure. Free To Play
<b>Counter-Strike 2</b>	Action. Free To Play
<b>Terraria</b>	Action. Adventure. Indie. RPG
<b>Wallpaper Engine</b>	Casual. Indie. Animation & Modeling. Design & Illustration. Photo Editing. Utilities
<b>Brawlhalla</b>	Action. Indie. Free To Play
<b>ELDEN RING</b>	Action. RPG
<b>Phasmophobia</b>	Action. Indie. Early Access
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# DATA PROCESS - ANALYSIS / MINING

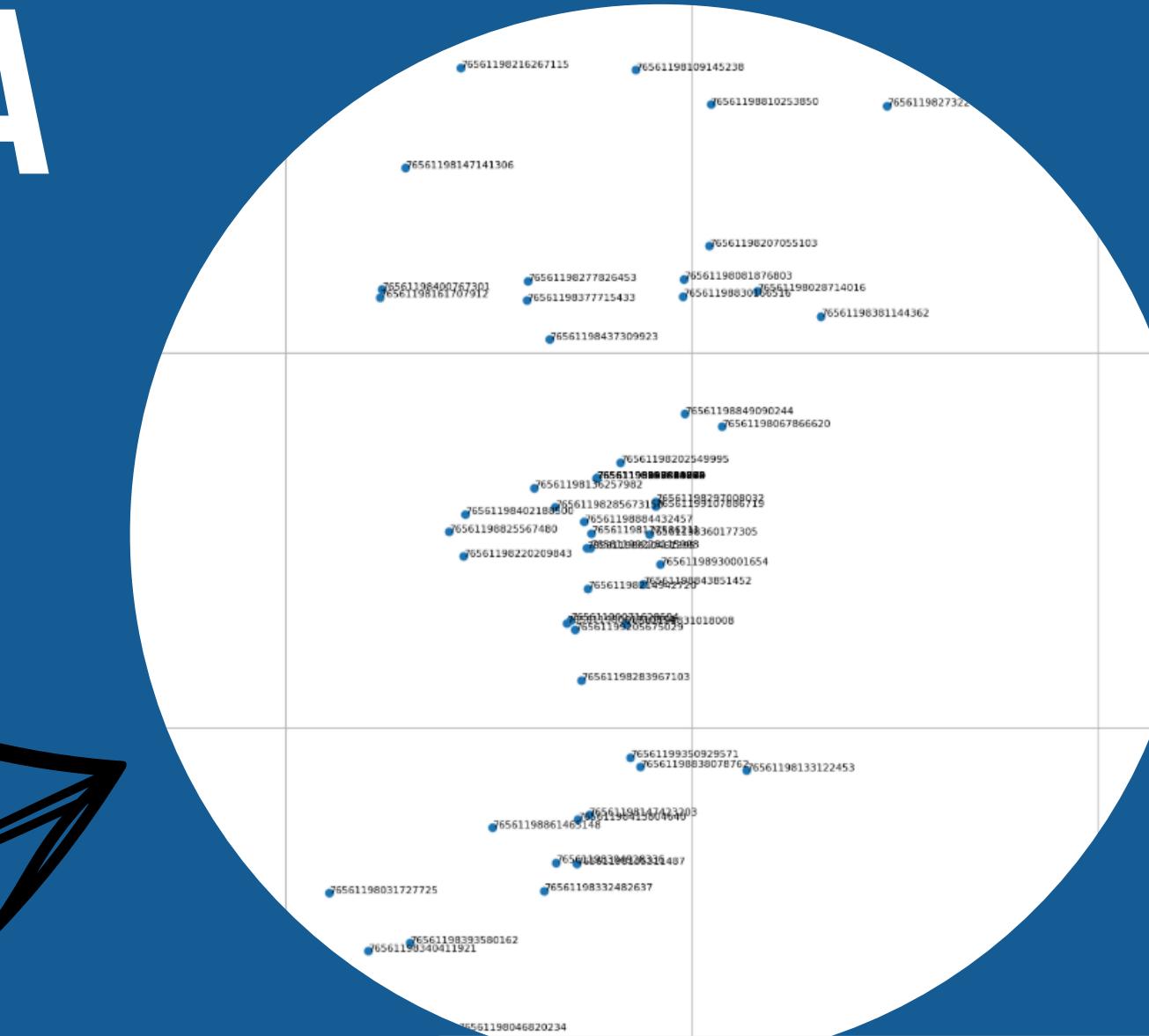
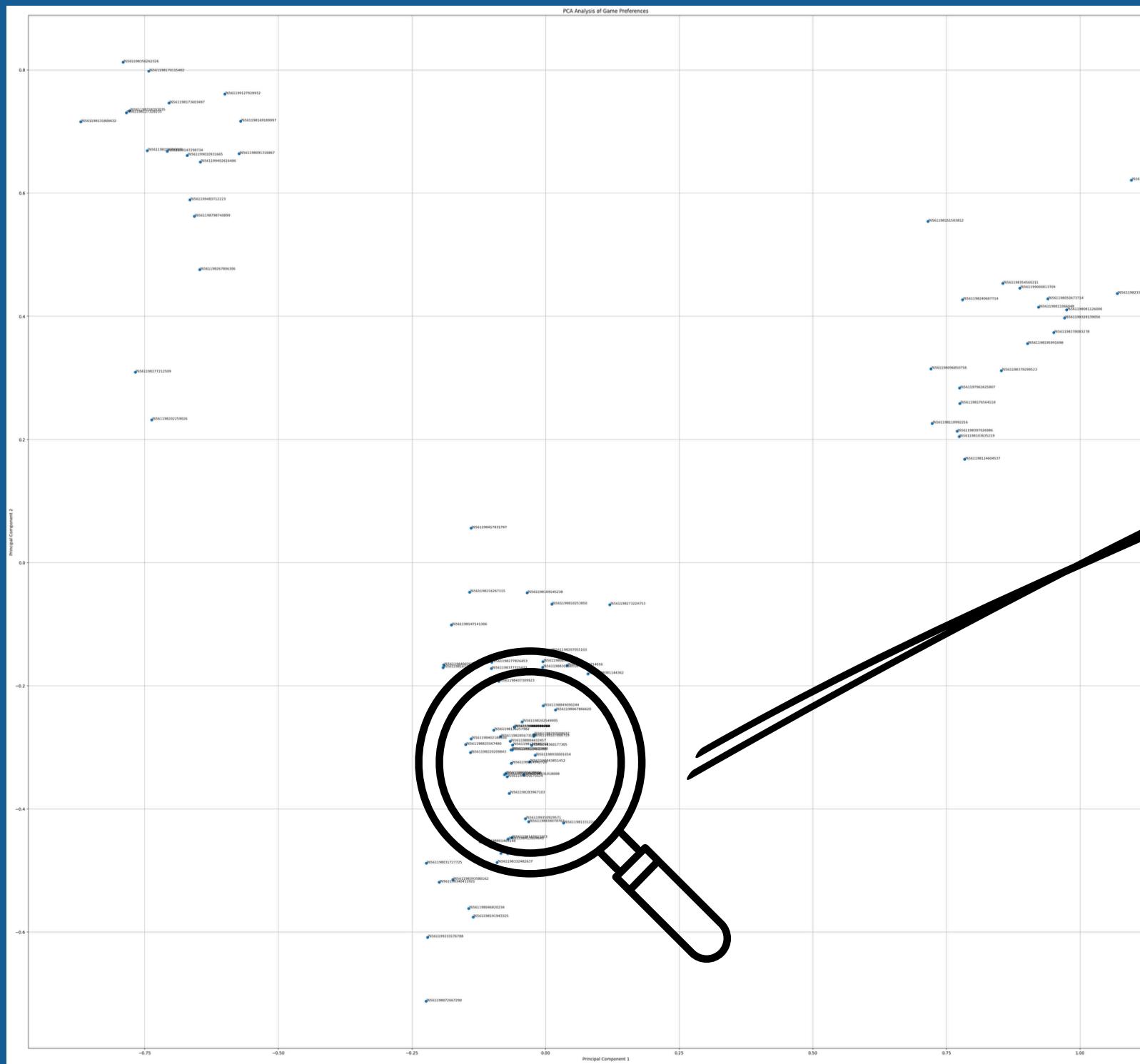
## PCA

- Purpose: Reduce dimensionality of game preference data.
- Outcome: A plot representing key features influencing game preferences.
- Preprocess the data to handle missing values, outliers, and normalization.
- Each point represents a user.

## K-MEANS CLUSTERING

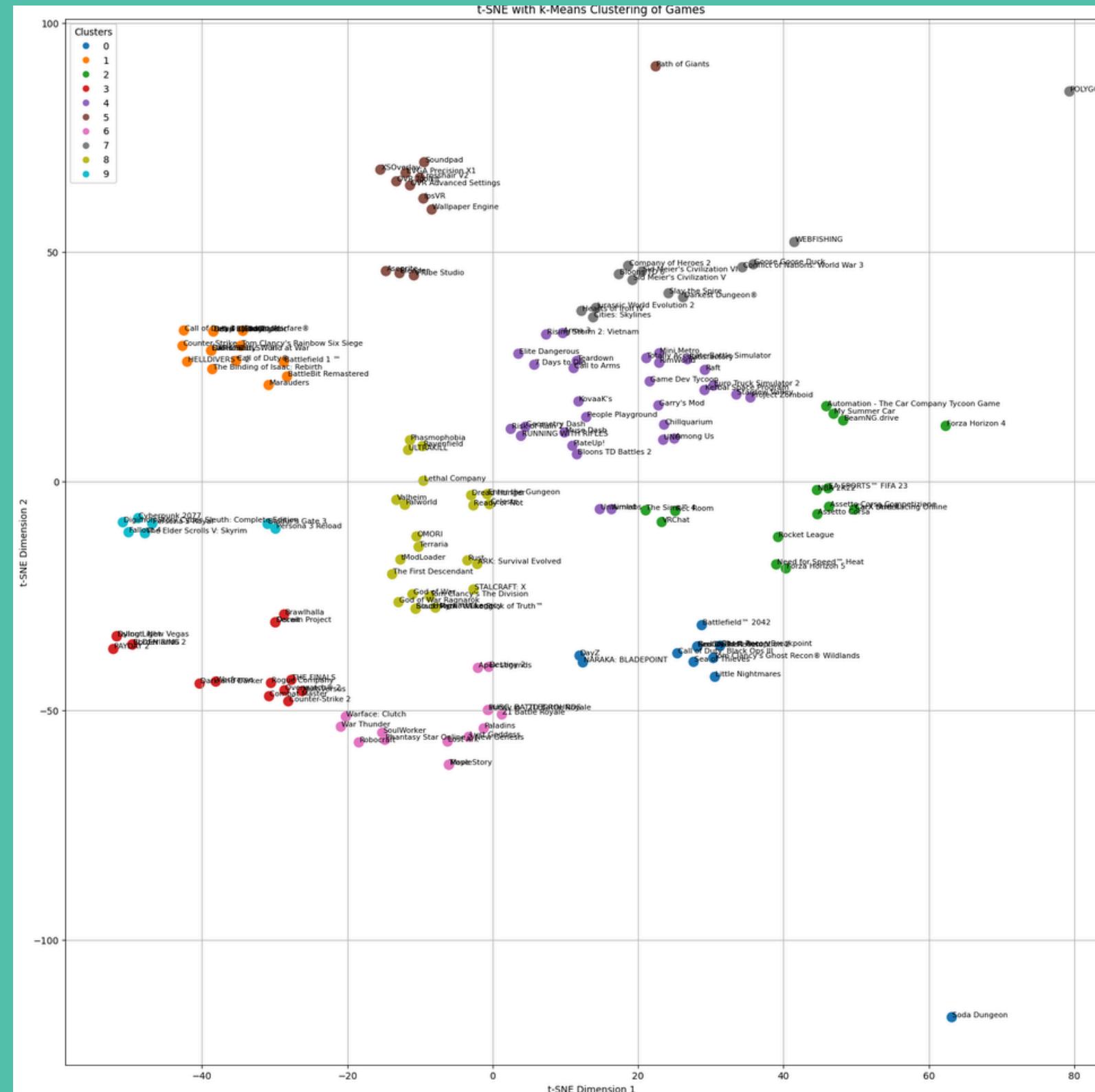
- Purpose: Identify distinct game groups based on users' preferences.
- Outcome: Clusters of games with similar characteristics.
- Each point represents a game

# PCA



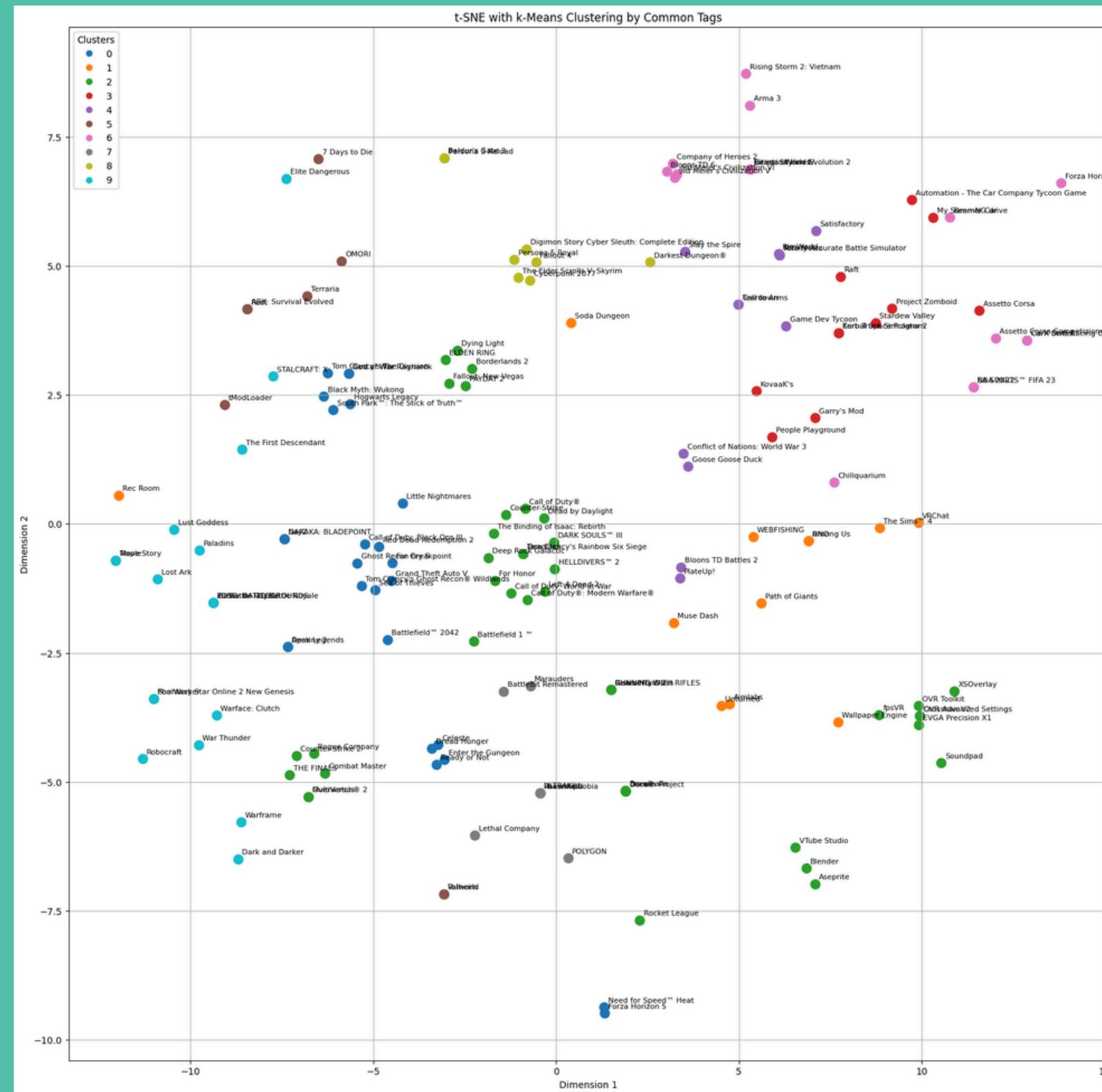
Applied PCA to reduce the data of the top 5 games to two dimensions for visualization. The results are annotated with user IDs and plotted to analyze game preferences visually.

# K-MEANS CLUSTERING



Used t-SNE to reduce the game tag data to 2D and applied K-Means clustering to group games into 9 clusters. A binary matrix is created to show which tags each game has. t-SNE reduces the data for visualization, and K-Means groups the games, with each cluster shown in a different color.

# K-MEANS CLUSTERING



- Also used t-SNE and K-Means clustering, but with some differences.
  - Applied t-SNE with a higher perplexity value (30) for better point distribution. K-Means was performed on the original tag matrix instead of the reduced t-SNE data.

# RESULT

User ID	Top Games	Recommended Games
76561198195991698	Counter-Strike 2. Rainbow Six Siege. Destiny 2. GTA V. Rust	tModLoader. ARK: Survival Evolved. Terraria. Palworld
76561198377715433	Apex Legends. Brawlhalla. ELDEN RING. Terraria. Phasmophobia	tModLoader. Valheim. Palworld. Lethal Company. Terraria
76561198253696914	Assetto Corsa. Euro Truck Sim 2. BattleBit Remastered. Warframe. PAYDAY 2	Robocraft. POLYGON. Phantasy Star Online 2. Rocket League. SoulWorker
76561199062254362	PUBG. Apex Legends. Counter-Strike 2. Wallpaper Engine. NARAKA	Unturned. Aimlabs. MapleStory. Trove
76561199058667968	War Thunder. Arma 3. Hearts of Iron IV. DayZ. Warface	Paladins. Lust Goddess. Elite Dangerous. surviv.io
76561198214942720	Hearts of Iron IV	Sid Meier's Civilization V
76561198220384872	VRChat	OVR Advanced Settings
...	...	...

# SUMMARY

- We designed a personalized game recommendation system to address the challenge of matching users with games that suit their preferences.
- We analyzed patterns by leveraging user **game histories** and **game metadata**.
- **PCA Analysis:** Identified key features influencing game preferences, reducing data complexity.
- **K-Means Clustering:** Grouped games into distinct clusters based on shared characteristics.
- **Cosine Similarity:** Compared user preferences (based on t-sne graphs) with candidate games



# CONCLUSION



- **Impact:** Our system helps users discover games that align with their tastes, **reducing unnecessary purchases** and **enhancing user satisfaction**.
- **Future Improvements**
  - Incorporate more user data (e.g., playtime trends, reviews).
  - Add real-time feedback to refine recommendations over time

**THANK  
YOU VERY  
MUCH!**