



Indie Game Recommender

(for Steam)

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github.com/Brionnic/Indie-Game-Recommender

Guacamelee

Credit: Neomonki@DeviantArt

Why Indie Games?

Relative to mainstream game titles, indie games generally have the freedom to be:

Experimental



Limbo (2010)

Artistically Creative



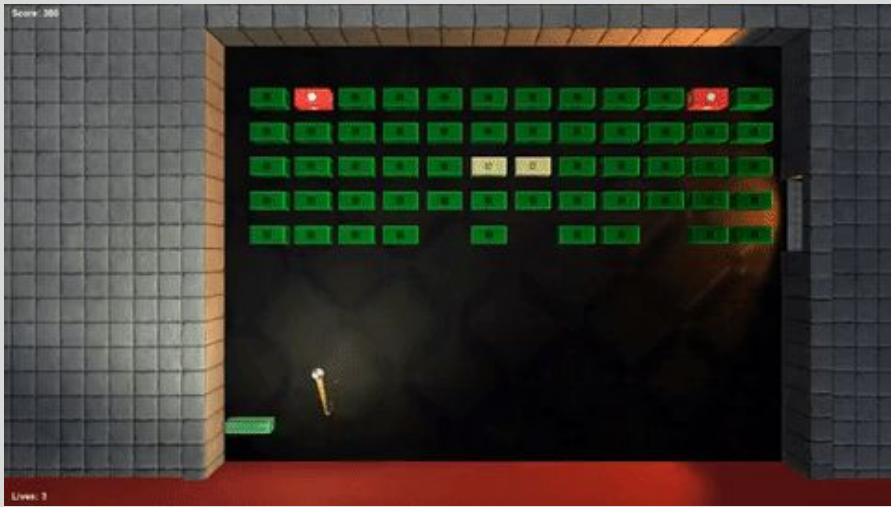
The Witness (2016)

Target Narrower Audiences



Papers Please (2013)

and...



Prototype, Brian Hardenstein 2015



Prototype, Brian Hardenstein 2016

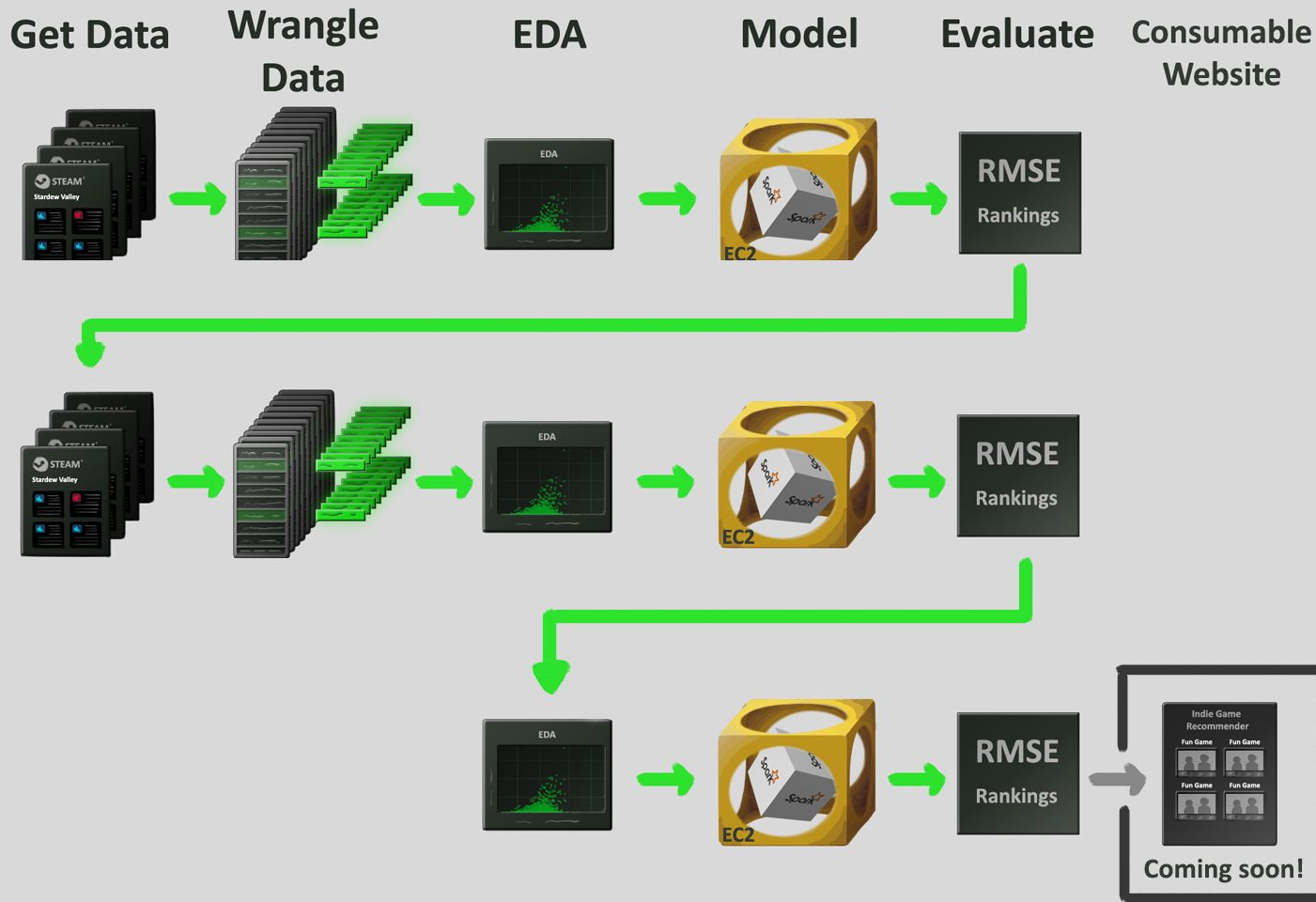
Indie games can also be developed by small teams or even individuals!

Why an Indie Game Recommender?

Surviving the “Indiepocalypse”

- Almost 9,000 games on Steam tagged as “Indie”
- As a developer, making a high-quality game doesn’t mean that the game will sell; it’s hard to get noticed
- As a player, it can be difficult to find new games that one would enjoy

Business Understanding



Exploring the Data

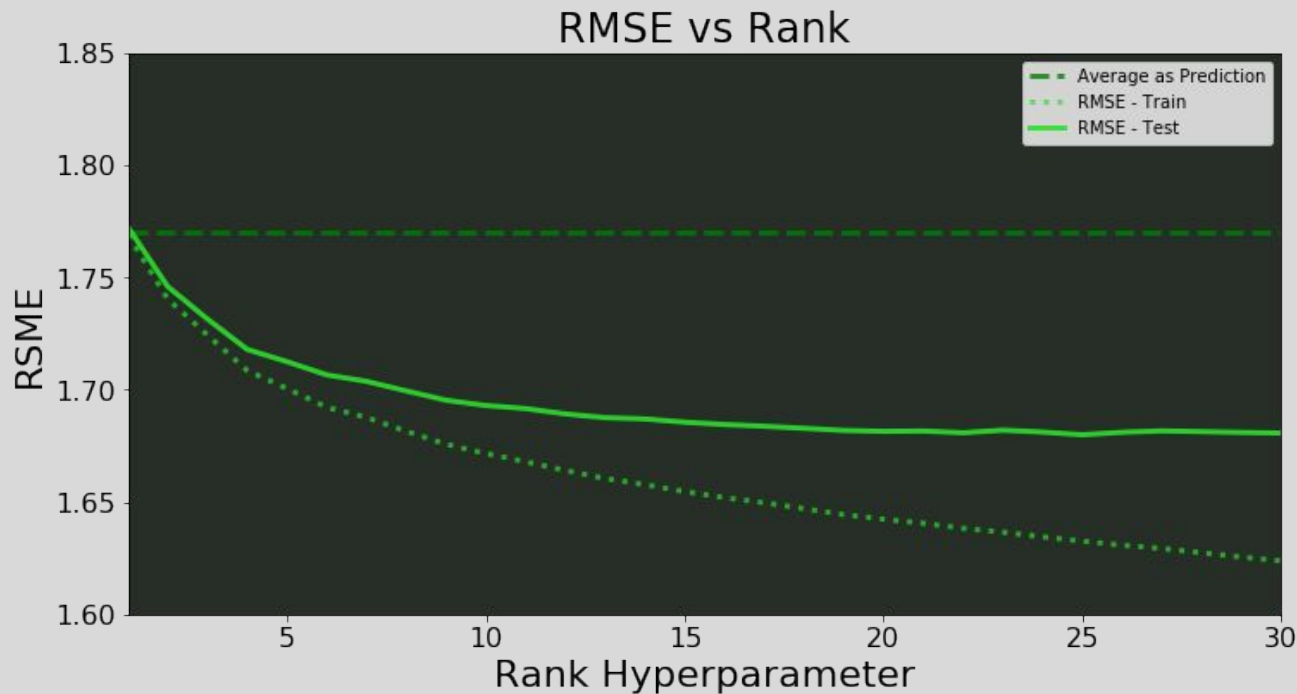
- Important to my process in conjunction with evaluation
- Used EDA to validate hypotheses to explain some of the weird recommendations seen in different model iterations
- Discovered that User Minutes Played had a very wide distribution. Ended up using a Log10 transformation to improve results

Building a model for the recommender

- Used Spark because of the size of the data (9M+ rows)
- Spark ALS model for the recommender
- Final hardware platform was an AWS EC2 64 CPU cluster w/ 256GB of RAM
- Final model uses implicit ratings of Log10 minutes played, with weighting

Evaluation

- Used RMSE with a limited grid search in conjunction with cross validation to find optimal hyperparameters
- Sanity checked recommendations of random users

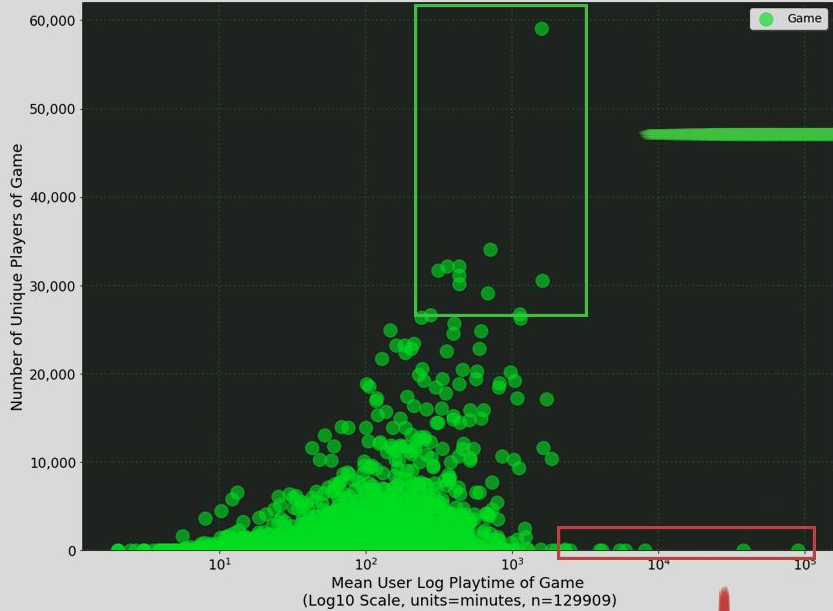


Evaluation: Triggered Two Major Model Changes

- Explicit ratings performed very poorly in the initial model
- Switched to implicit model using playtime as the rating
- Second revision the model was recommending games that I had never heard of
- One example was a game called “Superku” which upon further investigation was a game with 1 player and has not yet been released
- Triggered further EDA

Discovered Some Problematic Data

Scatter Plot of Per Game
Mean Log Playtime vs Number of Unique Players



Most Unique Players

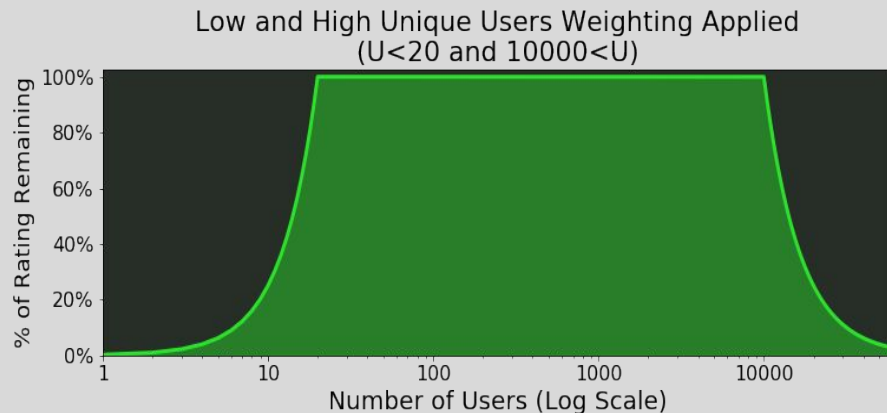
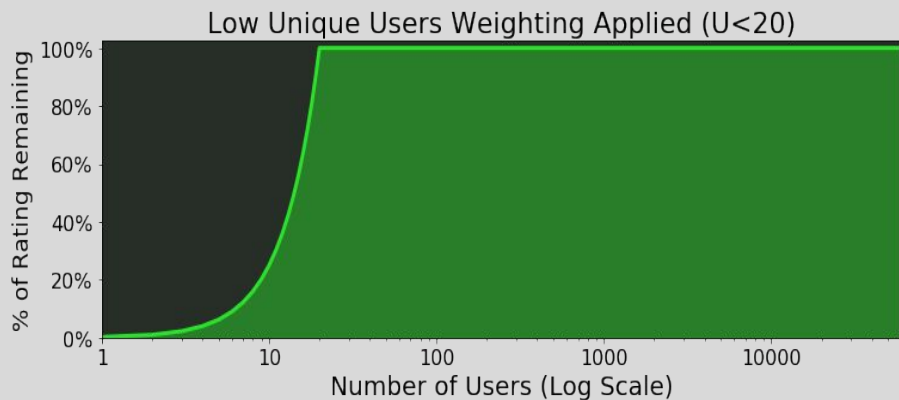
Unique Players	Title
59079	Terraria
34064	FTL Faster Than Light
32214	Dont Starve
32176	Chivalry Medieval Warfare
31686	Robocraft
31122	Dont Starve Together
30544	Starbound
30215	Path of Exile
29175	Torchlight II
26742	Stardew Valley

Highest Average Playtime

Avg Log10 Min	Unique Players	Title
4.951922	3	Star Sonata 2
4.578710	1	Superku
3.904578	1	Light Fall
3.775517	1	Darkfall Unholy Wars
3.733394	1	InnerSpace
3.613263	2	Nimbatus The Space Drone...
3.599243	1	Unreal Heroes
3.393963	2	ClockwiZZZe
3.361314	139	Don Bradman Cricket 14
3.351669	3	APE OUT
3.295907	1	Sky Noon
3.269812	1	RUN

Resolving Extreme Data with Weighting

- Exponentially penalizes games with low unique players ($U < 20$)
- Optionally penalizes popular games as well ($U > 10,000$)
- Implicit rating is multiplied by weight value before entering ALS model



Train Set	
Title	Playtime (Log10)
Primal Carnage	4.0
Primal Carnage Extinction	3.8
The Isle	3.3
Prison Architect	3.3
Wildlife Park 2 Dino World	3.1
Transport Fever	2.9
Five Nights at Freddys 2	2.4
Five Nights at Freddys 4	2.4
Bendy and the Ink Machine	2.4
Five Nights at Freddys Sis...	2.3
Youtubers Life	2.2
Universe Sandbox	2.2
Whos Your Daddy	2.1
911 Operator	1.9
Test Set	
The Escapists	3.6
Ace of Spades Battle Builder	3.3
Turbo Dismount	2.9
Five Nights at Freddys	2.8
Five Nights at Freddys 3	2.2

Rank	Base Weighting
1	Five Nights at Freddys
2	Kerbal Space Program
3	Euro Truck Simulator 2
4	The Escapists
5	Terraria

Rank	Optional Weighting
1	Five Nights at Freddys
2	The Escapists
3	Five Nights at Freddys 3
4	Besiege
5	Geometry Dash

- An example of some recommendations
- Green tabs indicate a successful recommendation
- Terraria is not on the Optional Weighting recommendation (So the weighting is working)

Next Steps

- Develop consumable website so people can get predictions
- Explore ways to improve recommendations



Thank you!

Brian Hardenstein

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Much more detailed information at:

github.com/Brionnic/Indie-Game-Recommender/README.md

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