

# Predicting Difficulty of Stepmania Charts

With Machine Learning

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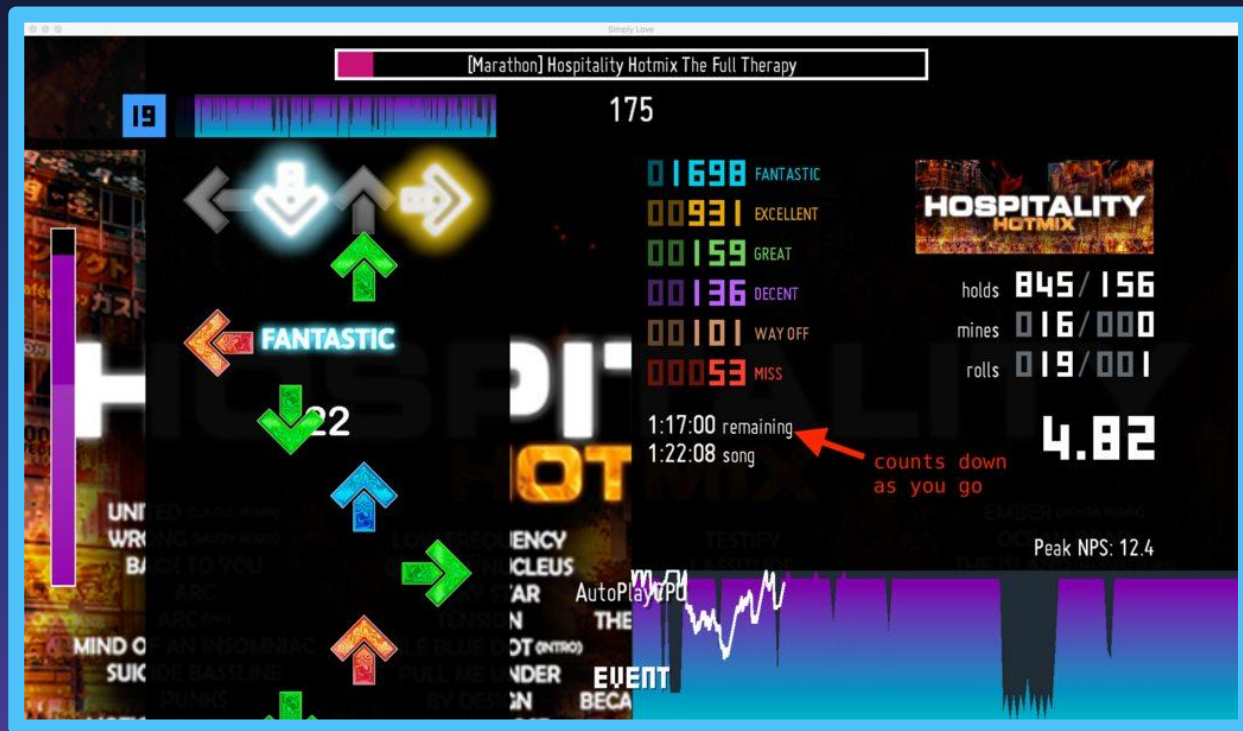
Next Steps

01

# What is Stepmania?

- Open-source software for music games, created in 2005
- Endlessly customizable
- Most popular for “4-panel” dance games (think Dance Dance Revolution)





Credit:  
[SimplyLove](#) by  
quietly-turning  
and hurtpiggypig

02

# Data Collection

[ITGPACKS.COM](https://ITGPACKS.COM) - community-driven spreadsheet

Chart parser built by [Tim Murphy](#), fellow dance-gamer and software engineer

3200 Technical songs

2250 Stamina songs

# Technical vs. Stamina Data

## Technical

- Pattern complexity - more technical features
- Shorter songs

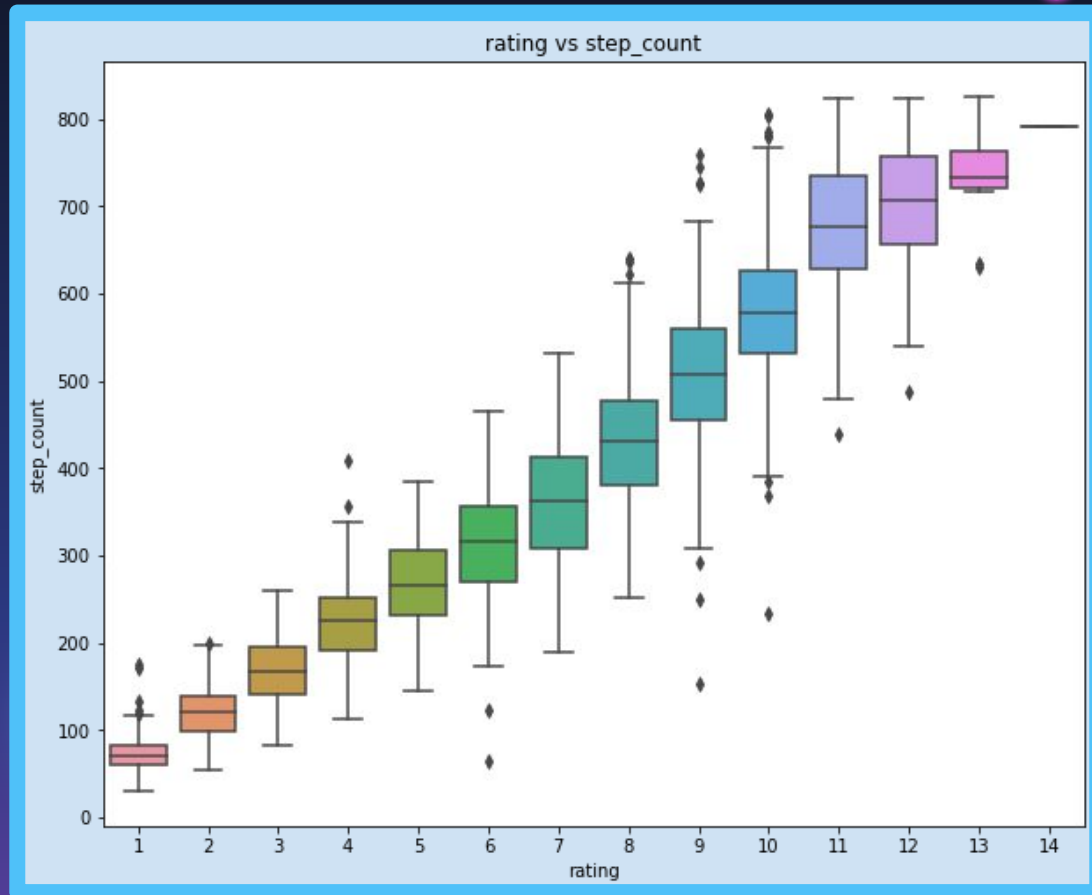
Target: Rating -  
numerical  
difficulty

Key features: step  
count, song NPS,  
stream total

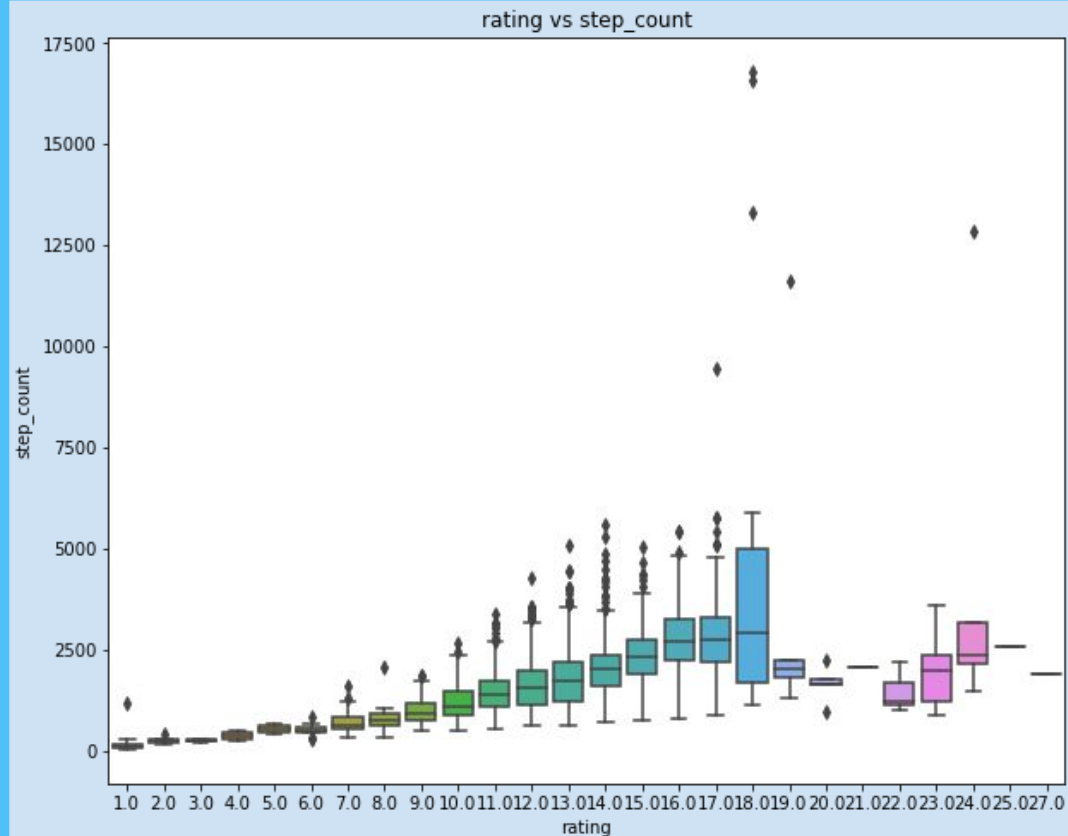
## Stamina

- Larger distribution - song lengths & difficulties
- Less pattern complexity

# Technical



# Stamina





**Tech**

Linear Regression

R-squared: .951

MSE: .642

**Stamina**

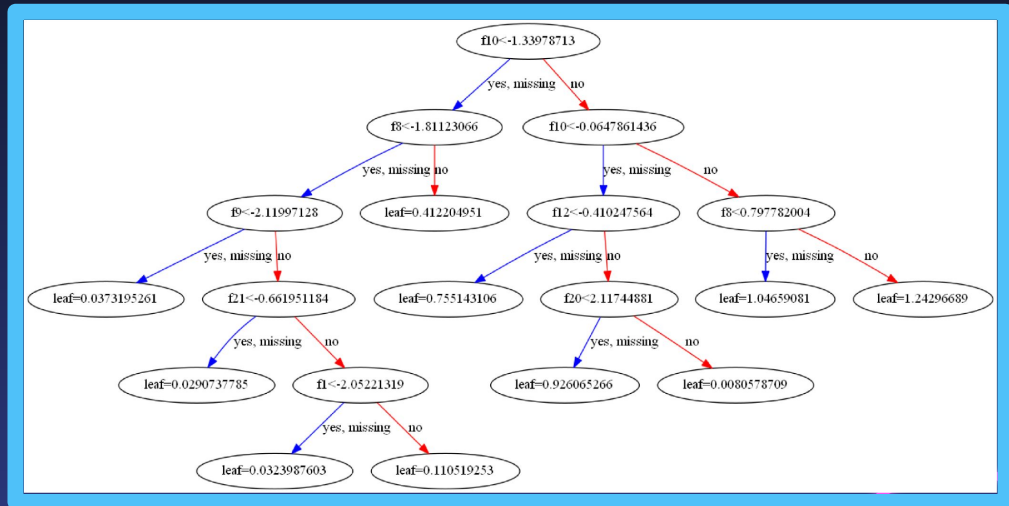
Linear Regression

R-squared: .958

MSE: .502

# XGBoost Regressor

- Tree-based Regression Model
- Boosts high-performing trees
- Decisions based upon residuals



# Final Model - Technical

## XGBoost Regressor

R-squared = .968

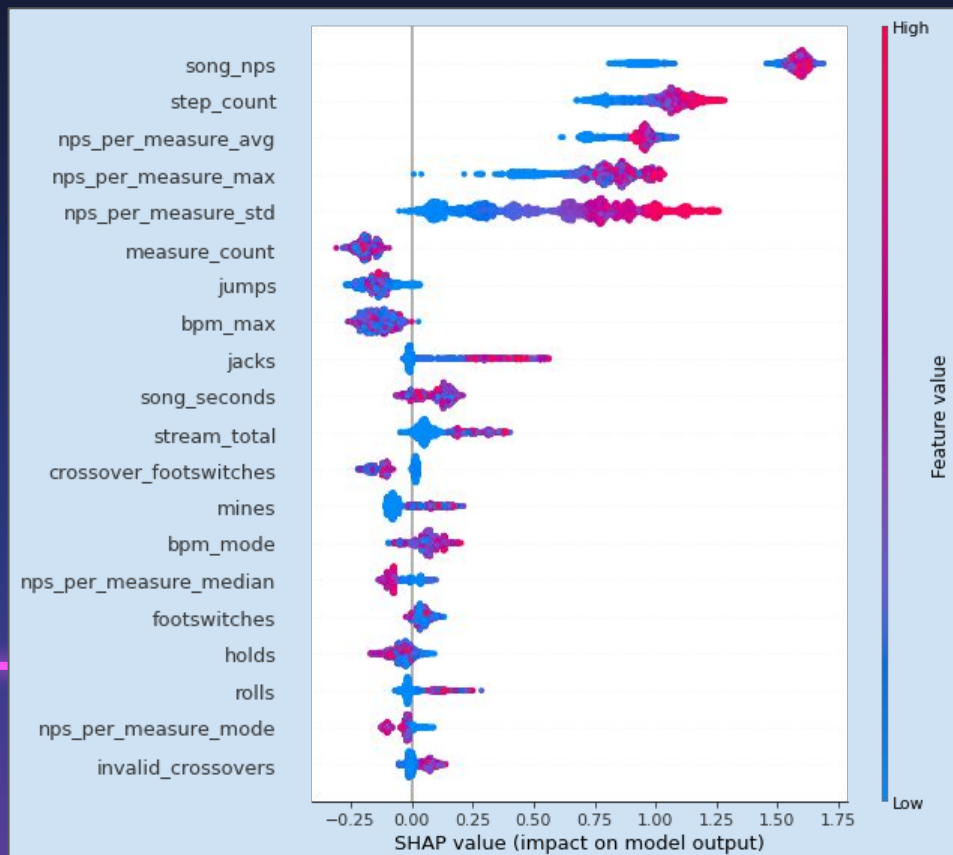
MSE = .404

learning rate = .1

depth = 5

gamma = 0

lambda = .1



# Final Model - Stamina

## XGBoost Regressor

R-squared = .979

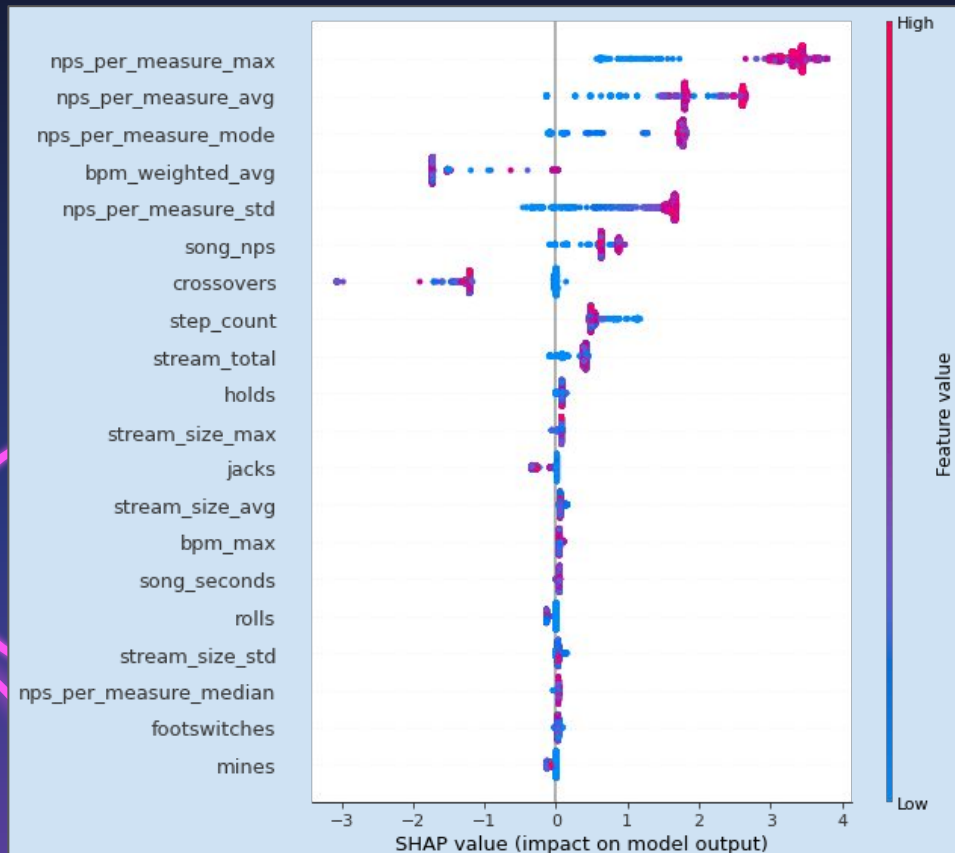
MSE = .282

learning rate = .1

depth = 5

gamma = .5

lambda = 5



04

## Next Steps

- Enable the user to upload pure song files to Flask app
- Tuning a classification model for Stamina vs. Tech
- Further data acquisition



# THANK YOU!

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