Predicting Rank and Boosting in StarCraft2

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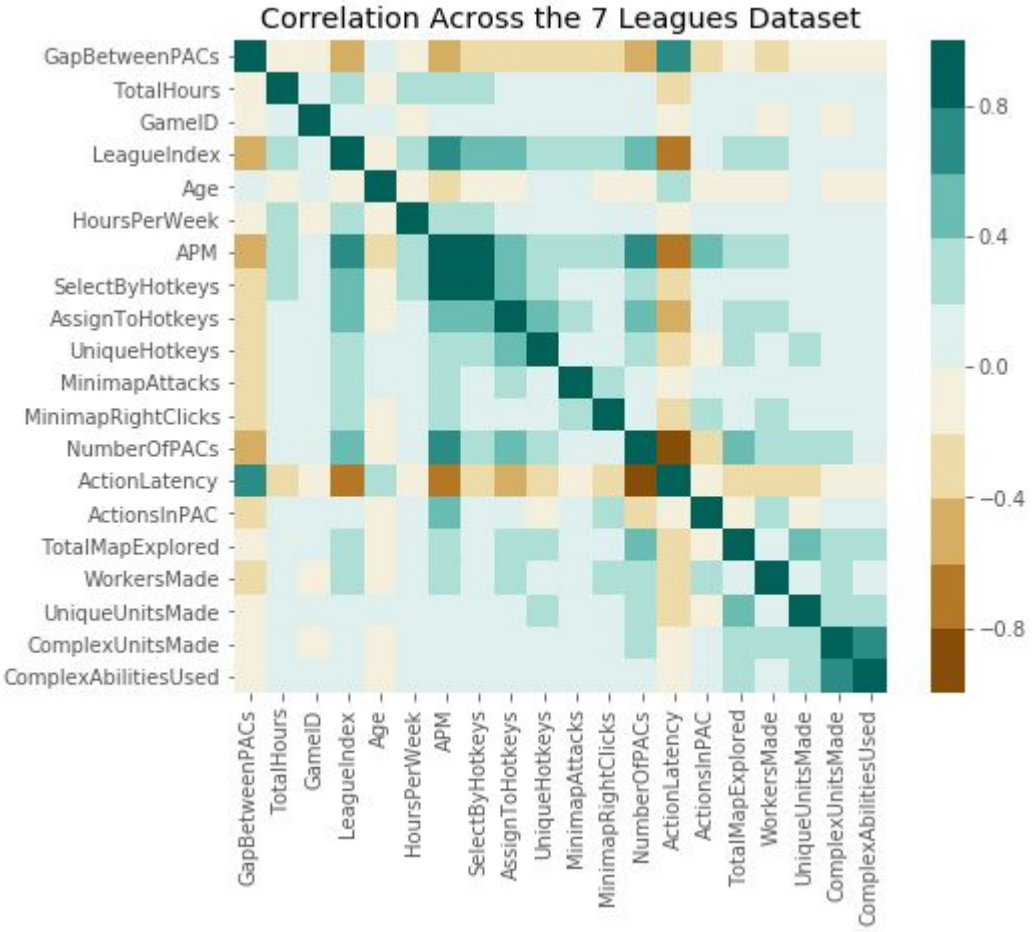
Introduction

- 5th largest E-Sport of all time
- Runs on a competitive league system with 7 ranked levels and a professional tier above that
- Dataset from Mark Blair, Joe Thompson, Andrew Henrey and Bill Chen from Simon Fraser University via UCI Machine Learning Repository
- Represents over 3300 single games, provided by volunteers as well as pulled from public record in the case of professional games

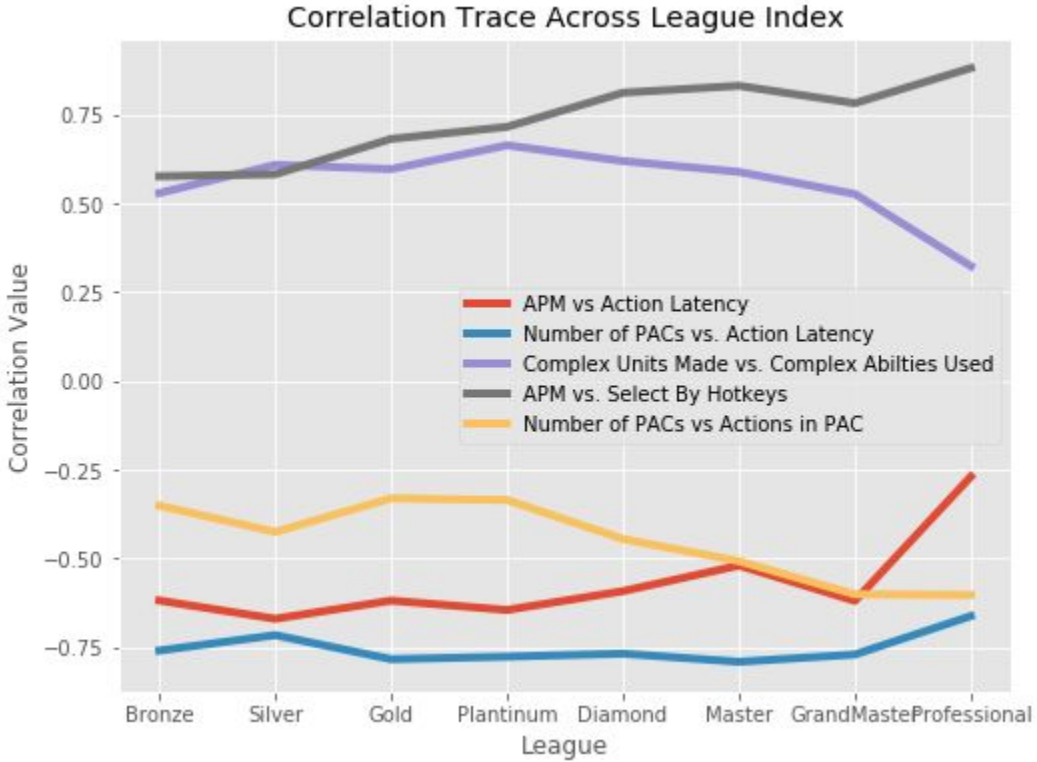
General Trends

- APM vs. Select By Hotkeys
  - Speed of movement
- Number of PACs vs Action Latency
  - Speed of gameplay

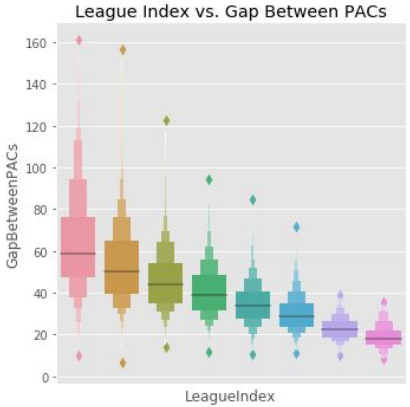


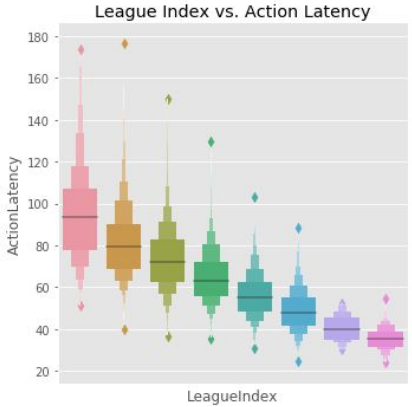
Trends Across Leagues

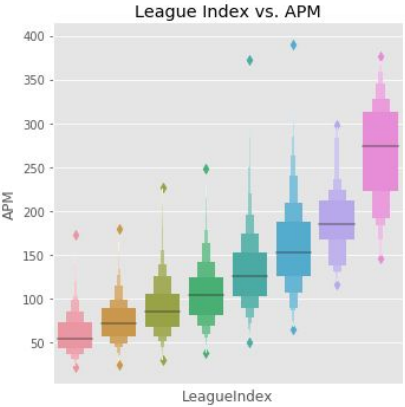
- Gray, Gold: high level players move quickly
- Purple: complex moves trend away
- Red: efficiency in professionals
- Blue: speed is always important

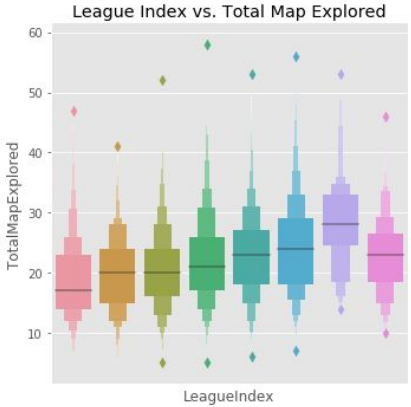


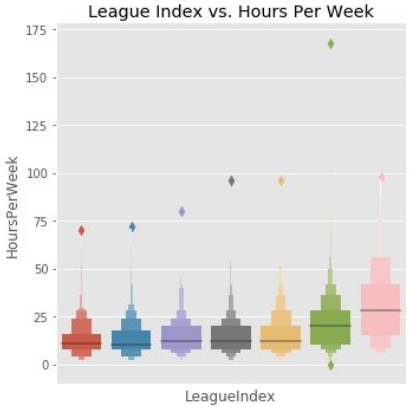
Trends within League Index











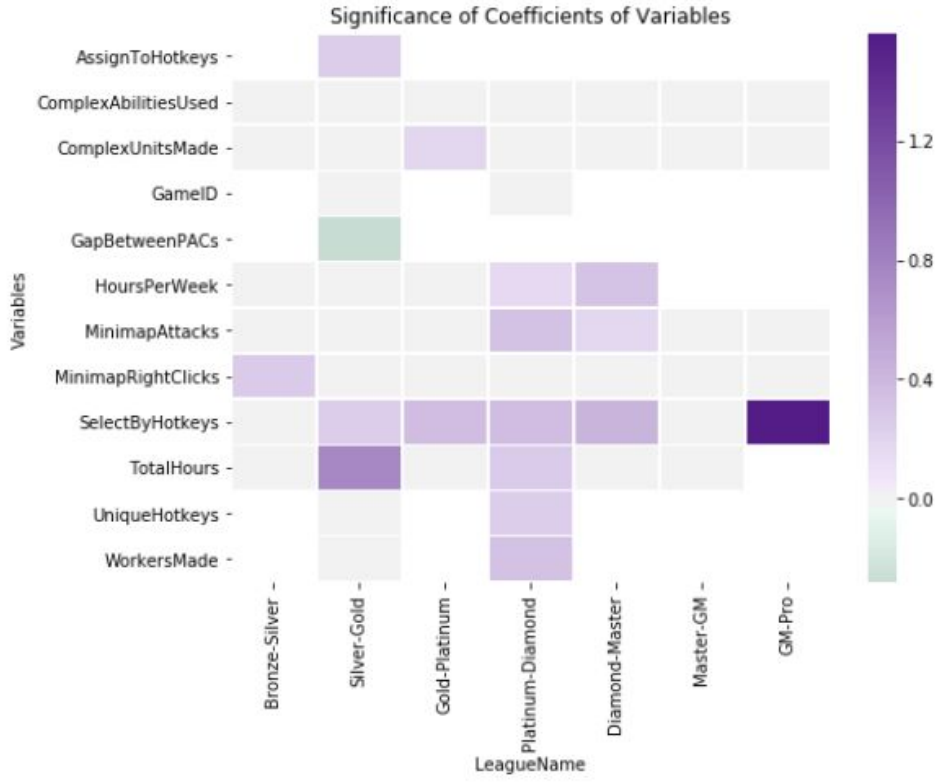
Statistical Analysis

- Significant: helps differentiate all levels
- Regional: helps differentiate a region (high level players, low level players etc.)
- Poor: cannot differentiate more than one or two groups from each other

Significant	Regional	Poor
APM	Workers Made	Unique Hotkeys
Action Latency	Select By Hotkeys	Minimap Right Clicks
Assign To Hotkeys	Minimap Attacks	Actions in PAC
Number of PACs	Total Hours	Total Map Explore
Gap Between PACs	Hours Per Week	Unique Units Made
		Complex Units Made
		Complex Abilities Used
		Age

In Depth: League to League

- Only one negative coefficient
- Some variables significant in multiple leagues, some not
- Some league transitions have many significant variables, others do not

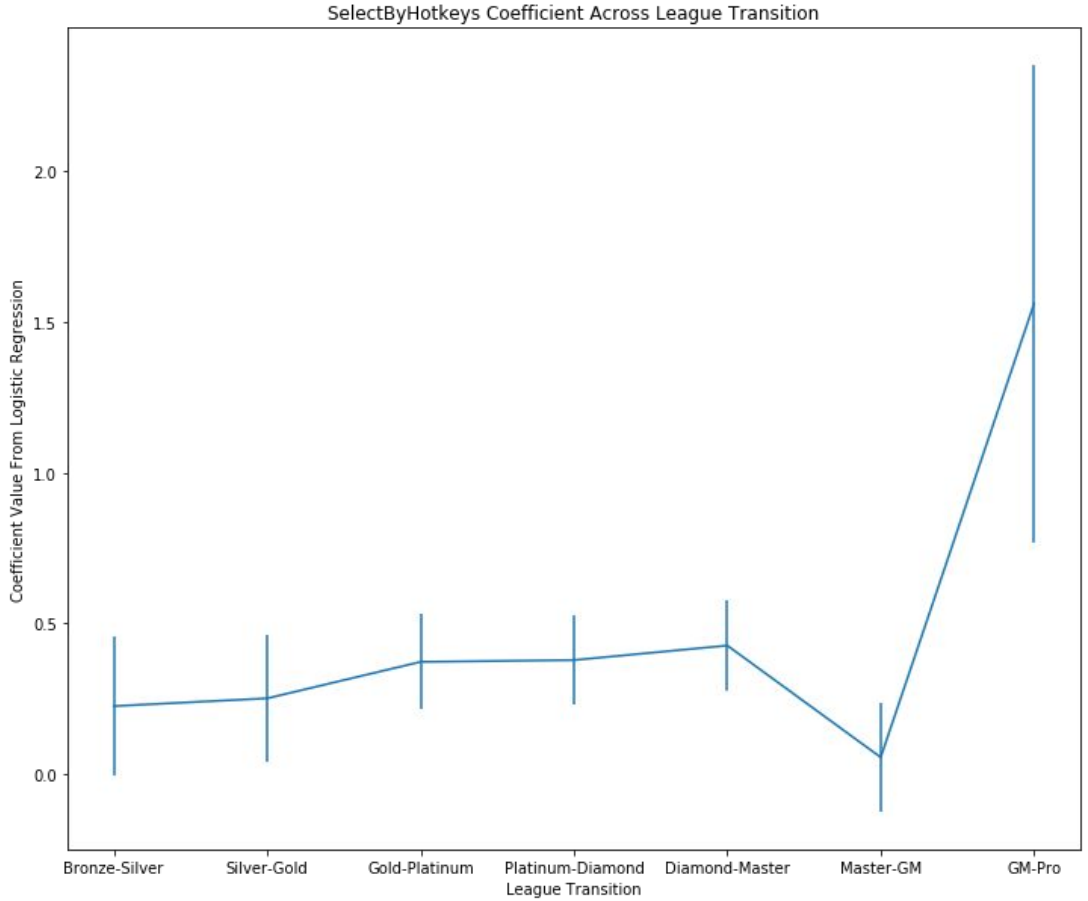


Story of Platinum-Diamond

- 6 variables with significant coefficients
- Hours per week and total hours follow expected trends
- 3 variables show significance of macro gameplay strategy

Micro strategy and select by hotkeys

- Selecting specific units for specific tasks -> micro
- Ideology shift between the ranked leagues and the professionals

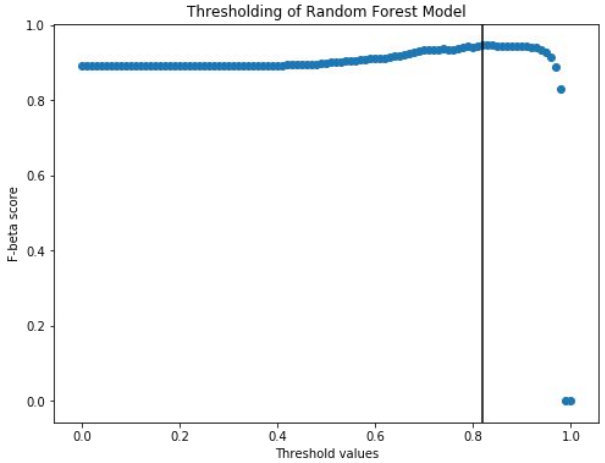


Boosting: Background

- Process of cheating via paying a better player to play on your account
- Thus it ‘boosts’ your account to a higher league
- Rampant across video games
- CBA to decide to crack down on boosting

Boosting: Application

- Model Choice
- Model Thresholding
- Model Performance via confusion matrix



Method	F-Beta Score (Beta=3)
Random Forest	0.9465
Logistic Regression	0.9385
KNN Means	0.7510

		Prediction	
		Silver	Non-Silver
Actual	Silver	79	16
	Non-Silver	165	547

Conclusion

StarCraft 2 is a complex game with many interlocking factors. Players of varying levels have various approaches to the game that allow them to be successful. By analyzing these approaches and their quantifiable differences, developers can find possible cheaters and increase the fairness of play of their game.