Team Evolution and Dynamics in Online Multiplayer Games

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Motivation

Esports is a booming multi-billion-dollars industry where millions of players and viewers actively play and watch games everyday.

Gaming community, especially games with teamwork, is a fruitful environment to explore and analyze some of the real-world collaborative phenomena.

Insight to whether a team performance changes when a player(s) switch teams elucidates about the human collaboration and competition and aid in decision making for owners and coaches.

Counter Strike: Global Offense is a first-person shooter game with two teams (Counter-terrorists vs Terrorists) consist of 5 players each to compete in a best-of-30 match.

The professional CS:GO scene hosts tournaments year-round with prize pool for teams from around the world to compete for.

CS:GO Major Championships have prize pools > $1,000,000

Problem

This project aims to study the changes in team dynamics when a player transfer teams in Counter Strike: Global Offense (CS:GO).

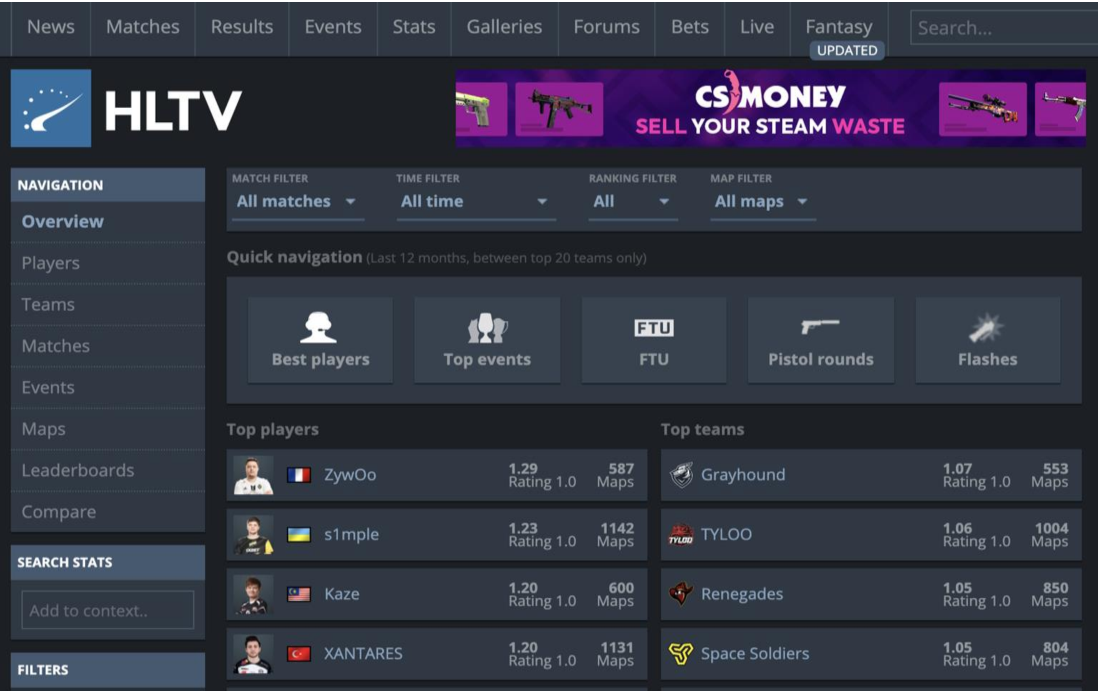
First, we will need a complete data collection on CS:GO statistics.

Our goal is to build models to explain the following questions:

- What is the effect on a **player** after changing the team?
- How does player transfer affects the **team** performance?

Data Source

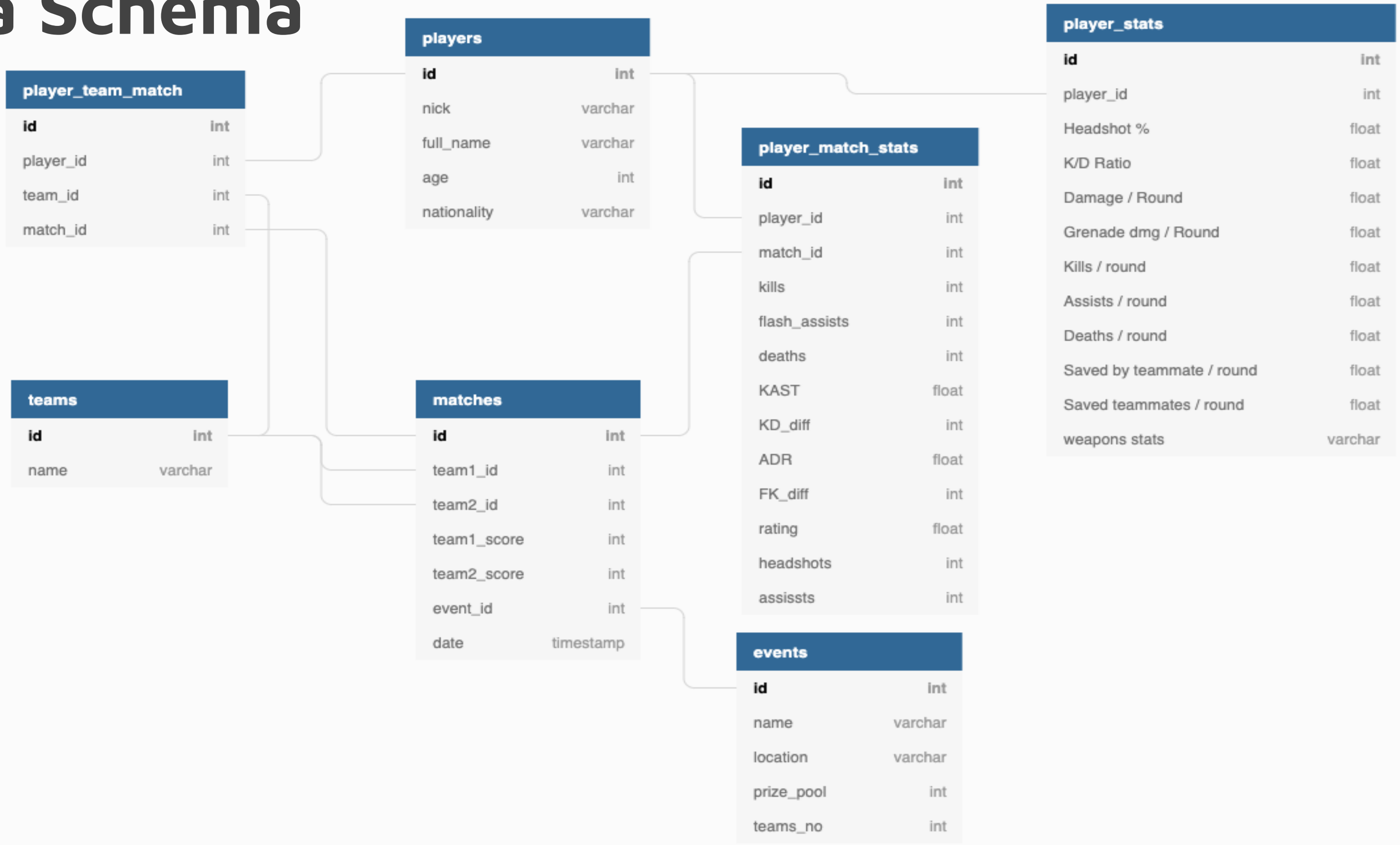
HLTV.org is the most prominent website that keeps track of all major professional events in CS:GO.



Tabular data available:

- Players
- Teams
- Matches
- Events
- Maps

Our Data Schema



dbdiagram.io

Challenges in data collection

- ❖ Understanding of how the website is organized by the administrators of HLTV.org
  - ➢ E.g. Map ID vs Match ID (Each Match has several Maps and the Match results is the sum of all of the maps combined)
- ❖ Some of our first times in web scraping data and learning how to organize our data to avoid redundancy.
- ❖ Data cleaning and imputation on missing value for data
  - ➢ E.g. Calculate player tenure in various teams, or over the entire career

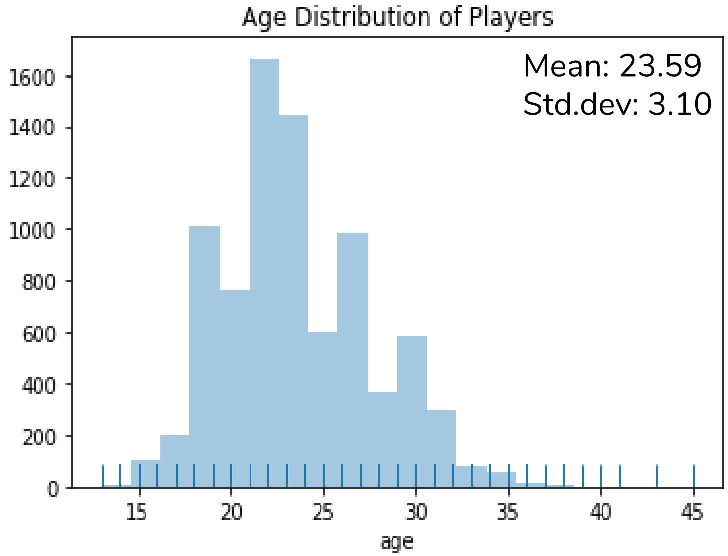
Approach

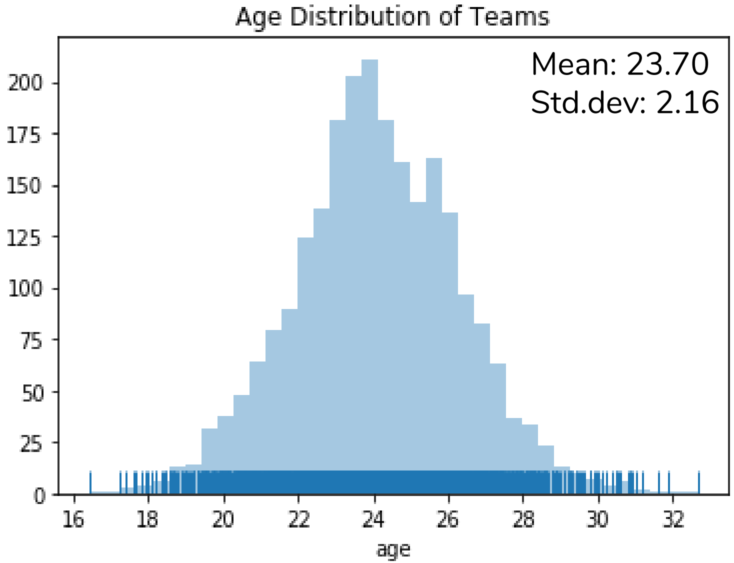
1. The data has been collected by web scraping using Python BeautifulSoup library 4.4.0 and Selenium.
2. A structured data schema has been created to organize the data sets and demonstrate relationships amongst data values.
3. We organized the data into dataframes and exported as csv files.
4. **We analyze the following:**

- **Relation between player characteristics and player performance**
- **Relation between team characteristics and team performance**
- **What happens with player performance when switching the team**

Data statistics

Data Type	Count
Players	13706
Teams	4832
Matches	76450
Events	4051





Best Teams and Players of CS:GO

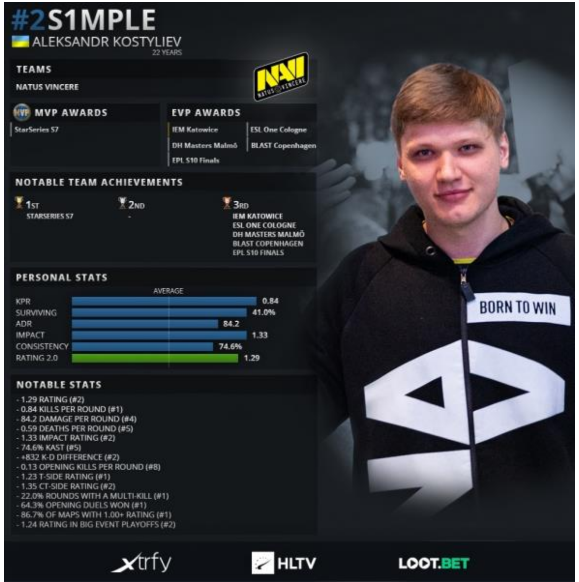
Natus Vincere

Astralis

fnatic

mousesports

G2



Younger players play better

Linear Regression: Player Age vs Player Performance

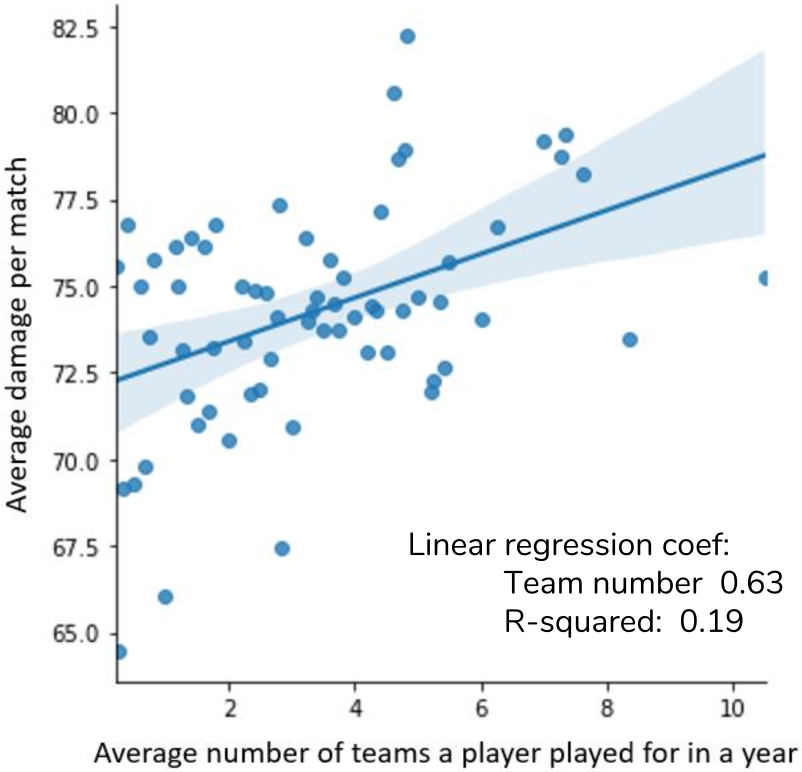
- Older players have less kills per match (-0.0768)
- Older players have lower Kill-to-Death ratio (-0.0024)
- Older players have lower damage per round (-0.2067)
- Older players have fewer kills per round (-0.0025)
- $p<0.0001$

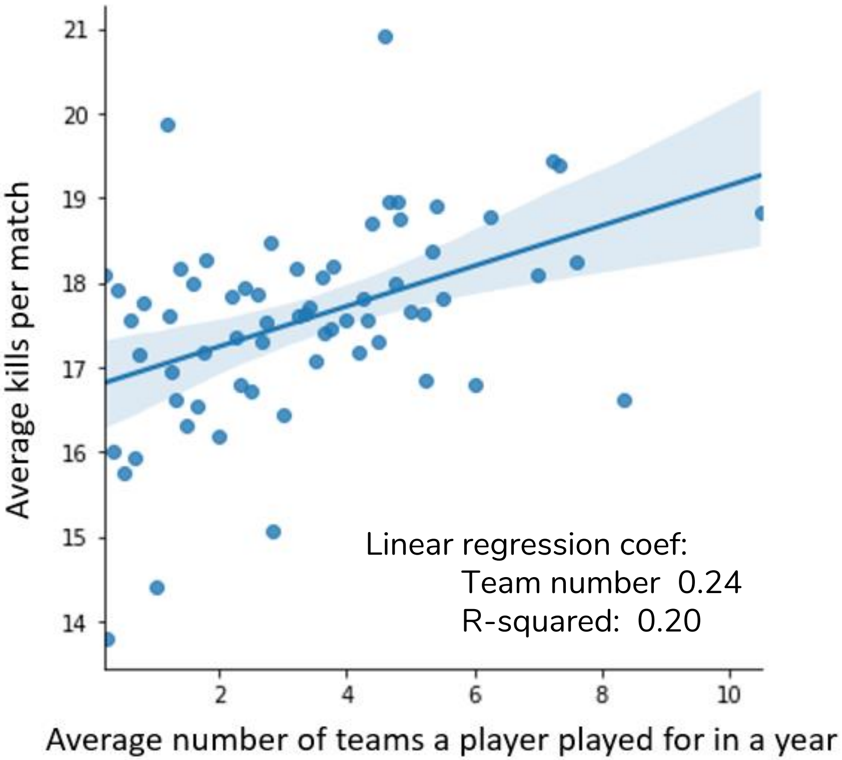
Players improve with the experience

Linear regression: Player Tenure vs Player Performance

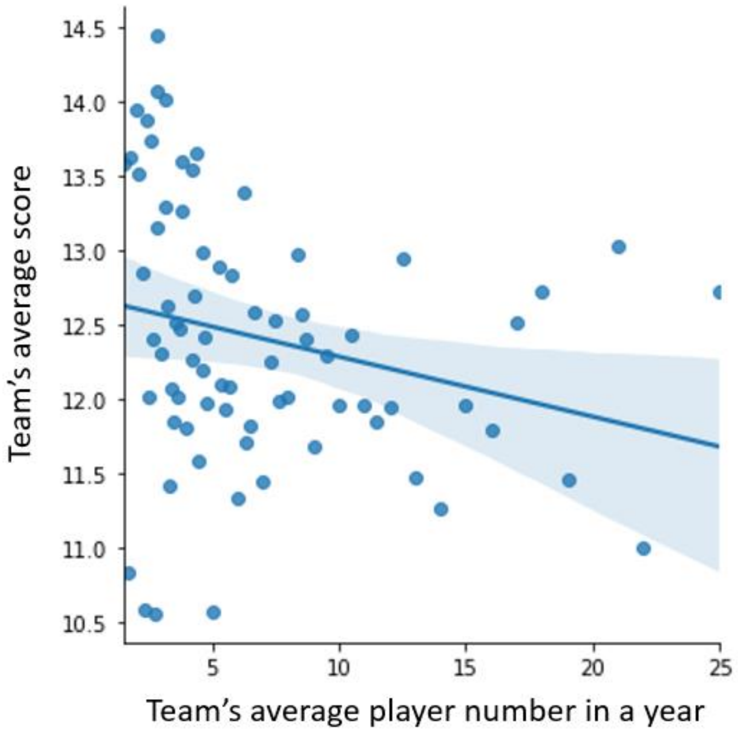
- More kills per day (0.0014)
- More damage per round (0.0016)
- More kills per round (2.28e-05)
- Similar kill/death ratio (5.992e-05)
- Similar headshot ratio (-0.0005)

Good players change teams often





Good teams are more stable - do not change players often



Linear regression coef:
Player number -0.04
Constant 12.6

R-squared: 0.059

Change team does not affect player performance

For each player that played in at least 2 teams, we calculate the performance before and after the change, and compare it:

The average kills before change a team: 16.38

The average kills after change a team: 16.34


Questions?
CS GO