What makes a good (fantasy) football manager?
webscraping and data analysis in R

Joseph O'Brien

4-Feb-2021 | Why R? Webinar

UNIVERSITY of LIMERICK
OLLSCOIL LUIMNIGH

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@obrienj

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Fondúireacht Eolaíochta Éireann
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Science Foundation Ireland
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About Me

- PhD student at the University of Limerick
- Generally interested in understanding complex systems via mathematical modelling + data science
- Avid R user with sides of Python, Julia, and MATLAB
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Outline of Today's Talk

- What is webscraping and why should we learn it?
- Key packages in R
- Demo of how it can be done
- Example project – Fantasy Premier League

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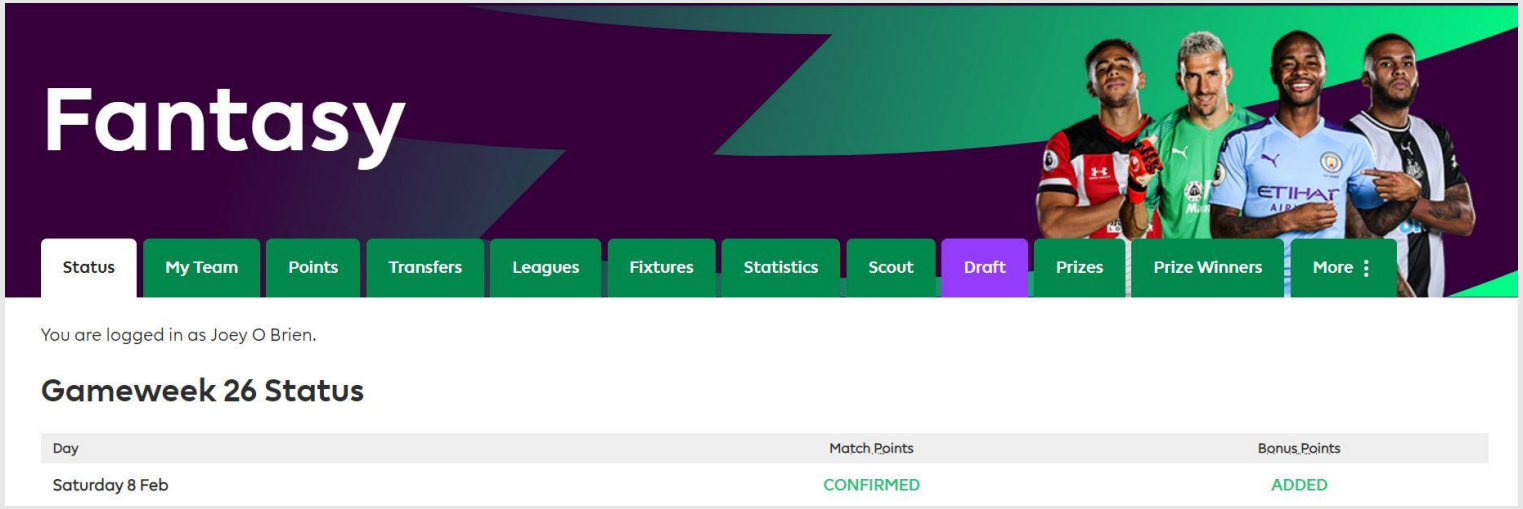
What is Webscraping All About?

- The web is essentially a repository for data.

- In order to store and display that data the websites have to be coded - generally in **HTML** or **Javascript**.



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```

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- The web is essentially a repository for data.

- In order to store and display that data the websites have to be coded - generally in **HTML** or **Javascript**.

- Once we become comfortable with the syntax of these languages any data on the web is obtainable!

Why Webscrape?

- Many important publications use novel datasets to determine previously unconsidered phenomena
  - Think Stanley Milgram's research into the *six degrees of separation*
  - One of the many studies into citation dynamics

- Some fields suffer from 'Zachary Karate Club Syndrome'

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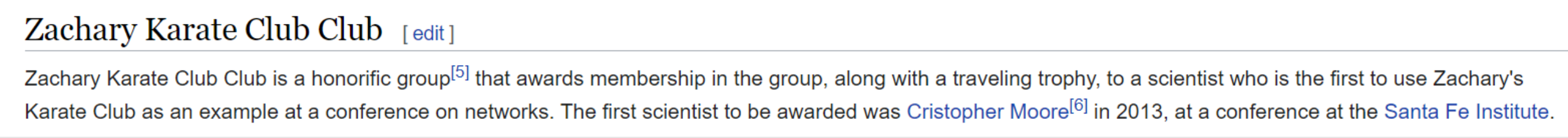

Zachary Karate Club Club [edit]

Zachary Karate Club Club is a honorific group[5] that awards membership in the group, along with a traveling trophy, to a scientist who is the first to use Zachary's Karate Club as an example at a conference on networks. The first scientist to be awarded was Cristopher Moore[6] in 2013, at a conference at the Santa Fe Institute.

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  - One of the many studies into citation dynamics
- Some fields suffer from 'Zachary Karate Club Syndrome'
- A chance to do *research* on something that really interests you

Key Packages

- In R there are two main packages used scrape data - **XML2** and **rvest**.

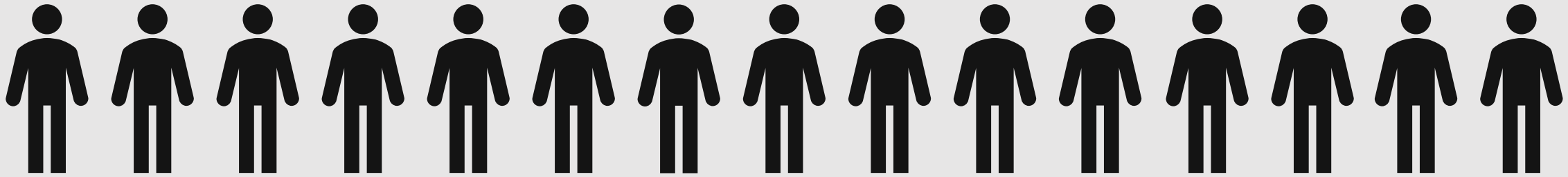
- Python equivalents – beautifulsoup4 + requests

Examples 

- Reddit data
- Wikipedia
- Fantasy Premier League

What is Fantasy Premier League?

- Online game where users are provided with a virtual £100 million budget to assemble a squad of 15 real-life Premier League footballers.
- Each week choosing 11 of them to ‘start’ for the user’s team, who then receive points based upon their statistical performance in the real game.
- Also choose one **captain** who receives double points. The challenge of the game is to **determine an optimal way of spending your budget as to maximize your points.**



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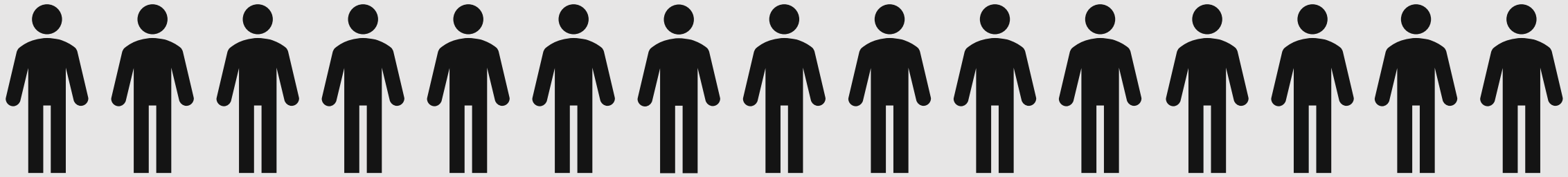

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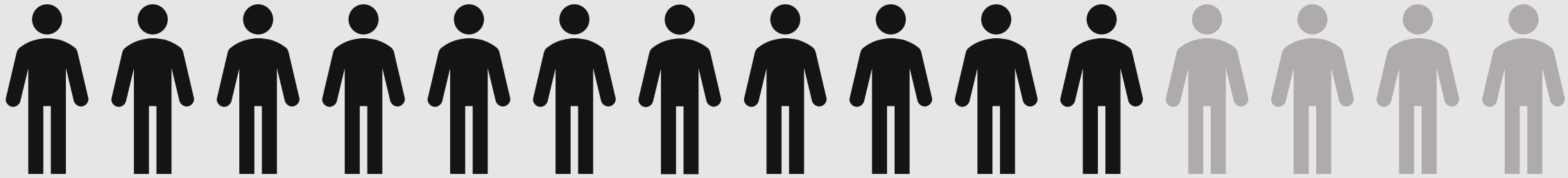

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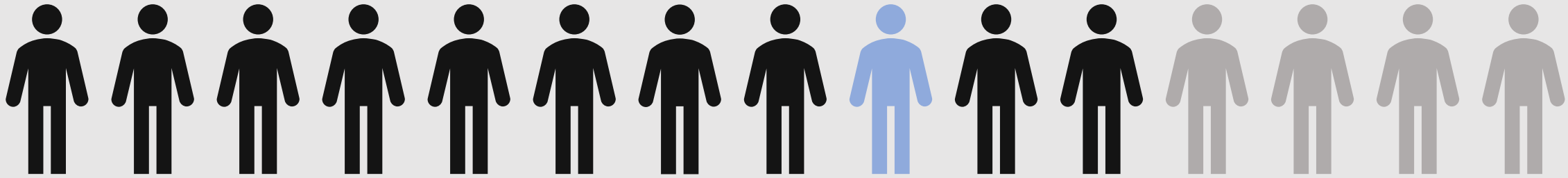

@obrienj_

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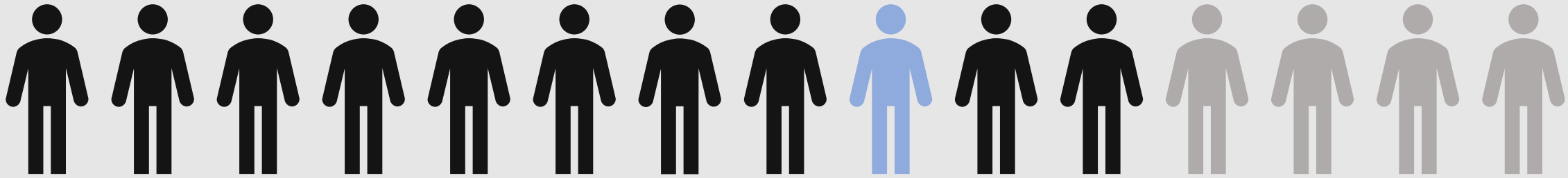

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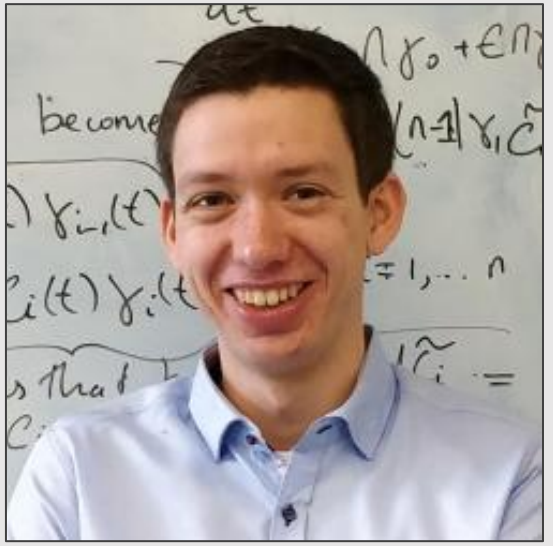
Example Study

James Gleeson

David O'Sullivan

University of Limerick



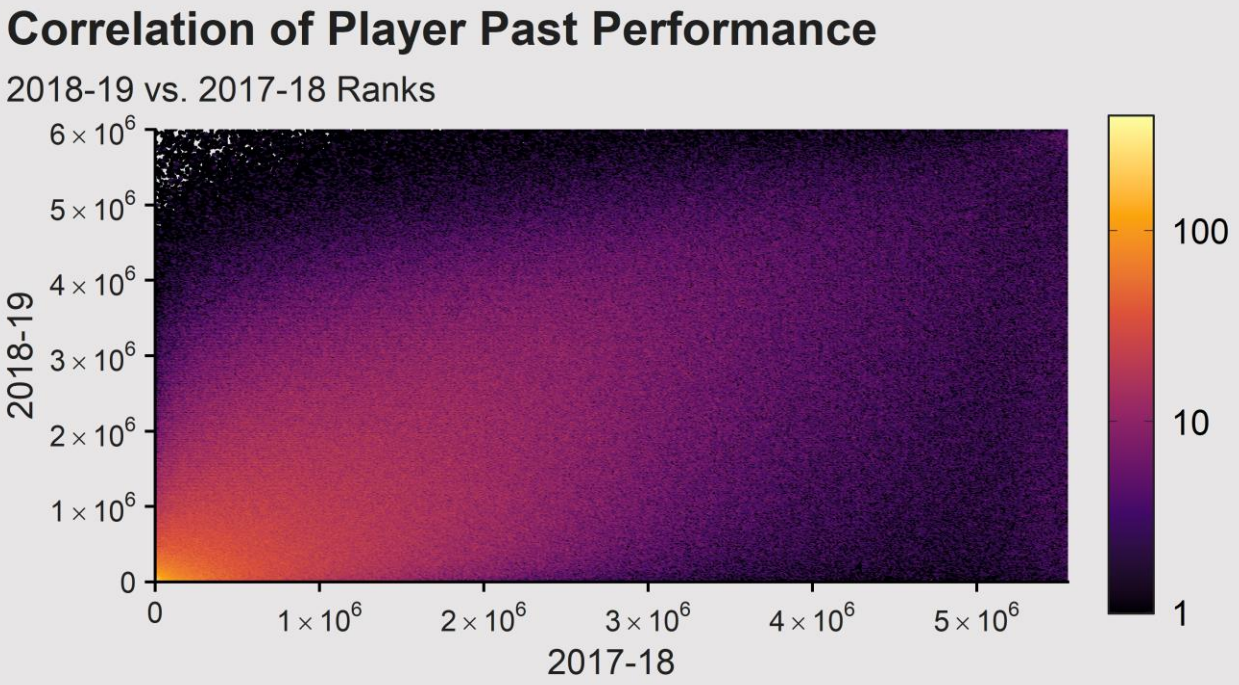
Identification of skill in an online game: The case of Fantasy Premier League

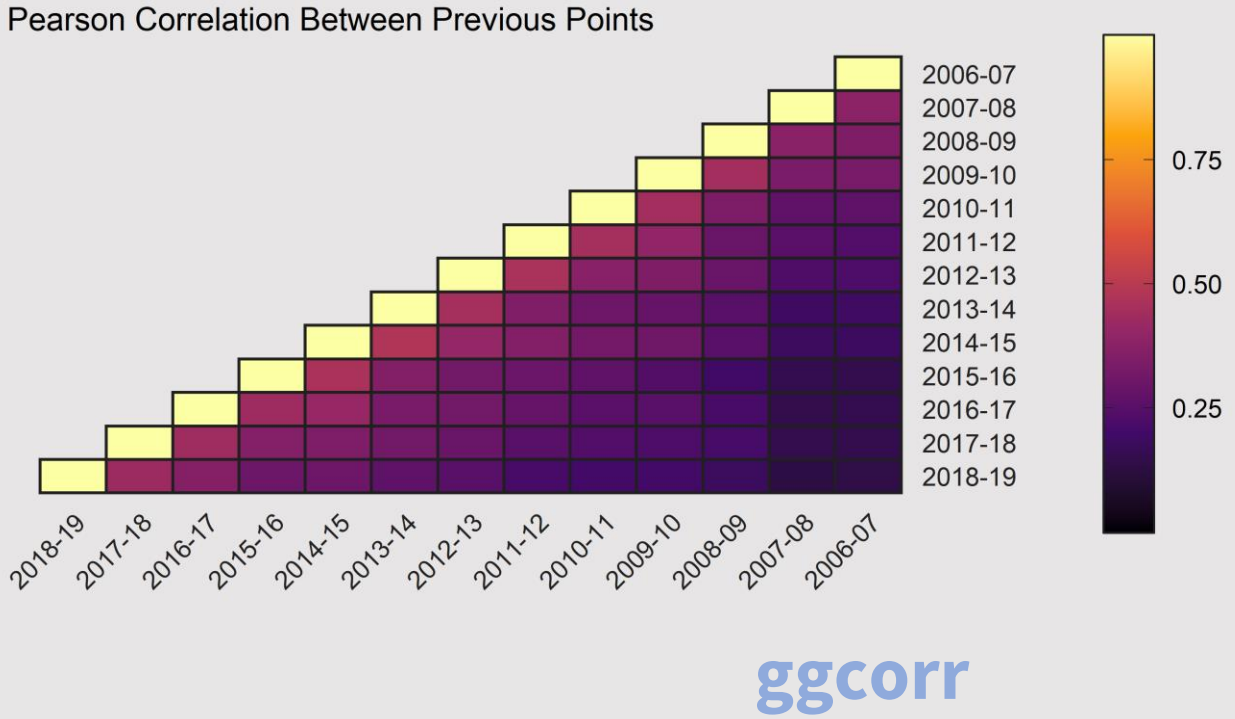
Joseph D. O'Brien, James P. Gleeson, and David J. P. O'Sullivan
MACSI, Department of Mathematics and Statistics,
University of Limerick, Limerick V94 T9PX, Ireland
(Dated: September 3, 2020)

In all competitions where results are based upon an individual's performance the question of whether the outcome is a consequence of skill or luck arises. We explore this question through an analysis of a large dataset of approximately one million contestants playing *Fantasy Premier League*, an online fantasy sport where managers choose players from the English football (soccer) league. We show that managers' ranks over multiple seasons are correlated and we analyse the actions taken

PLOS ONE (in press) 2021
arXiv: 2009.01206

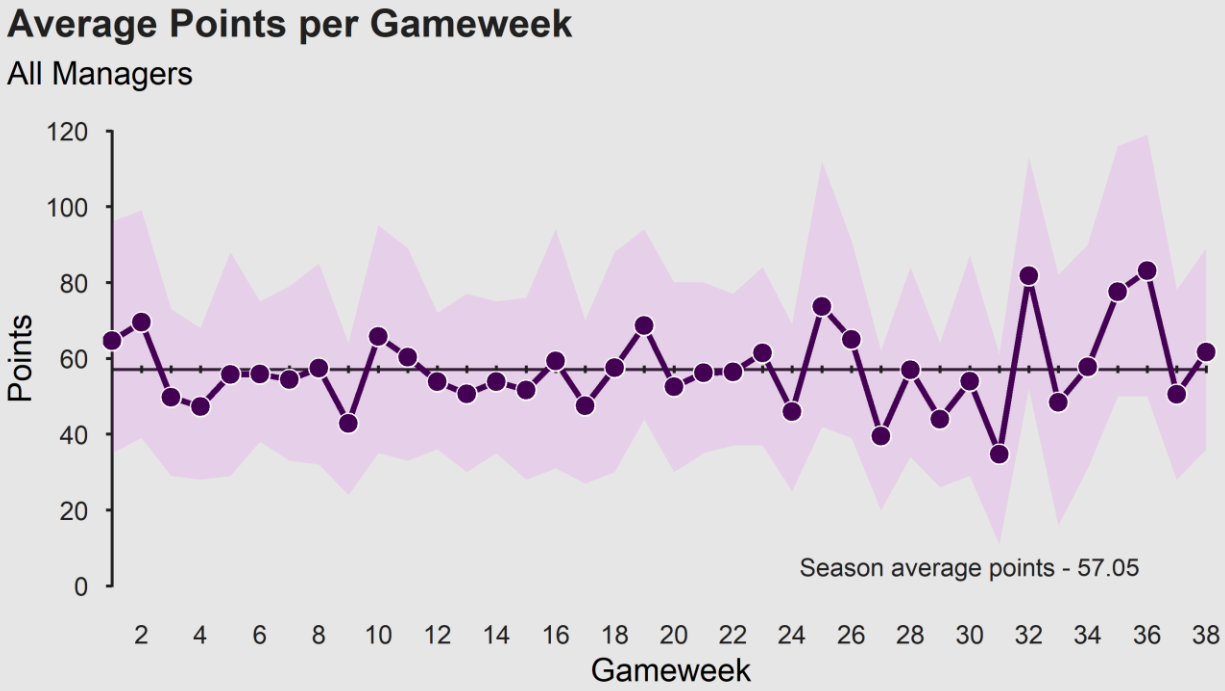
Consistency Between Performances?

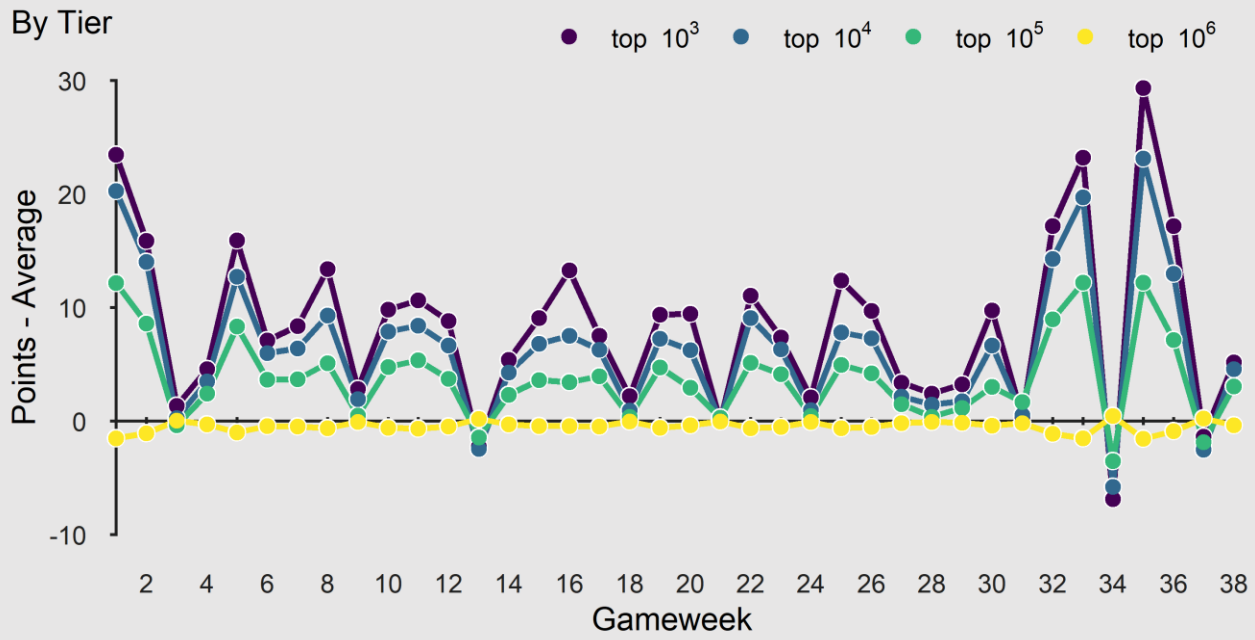




ggcorr

Tiers among managers





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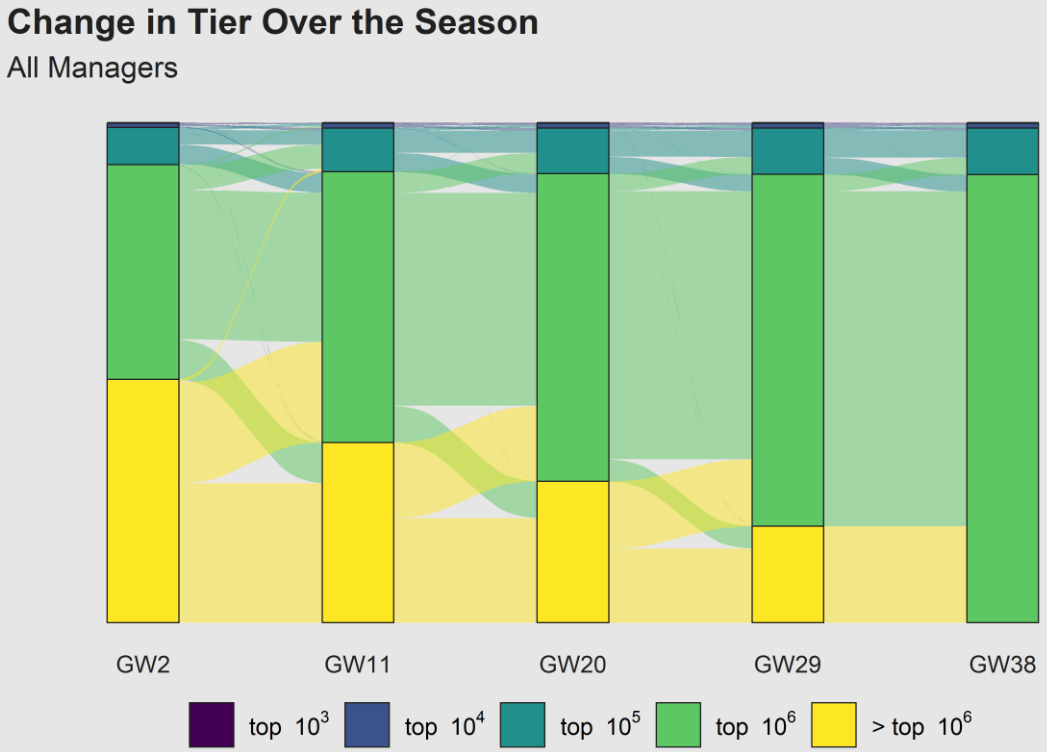
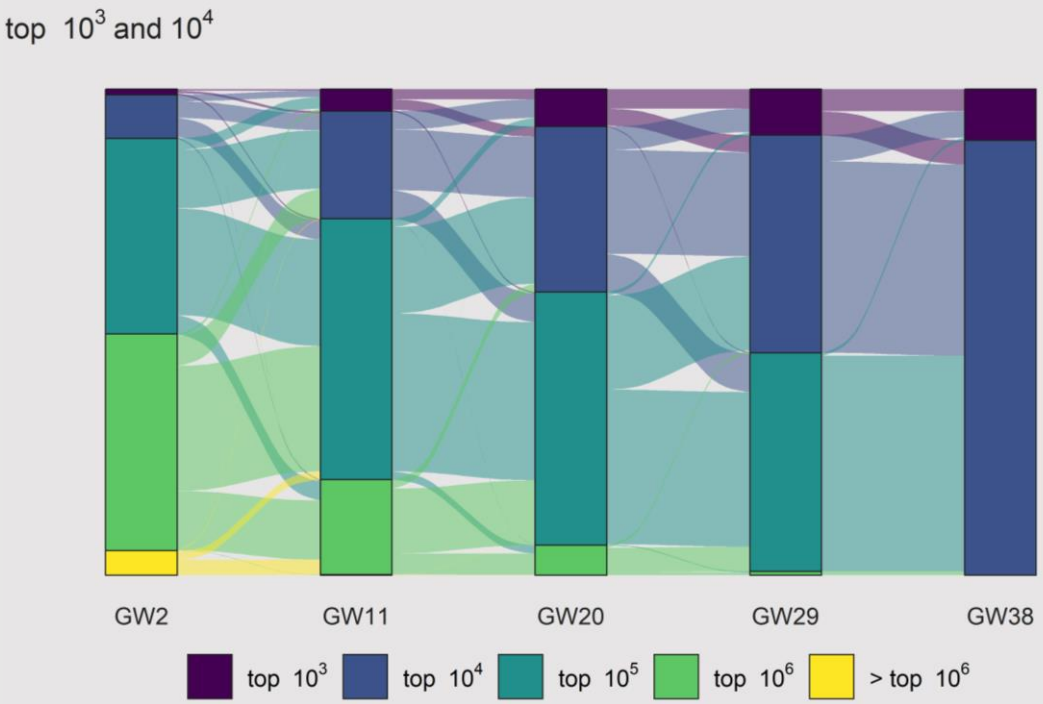
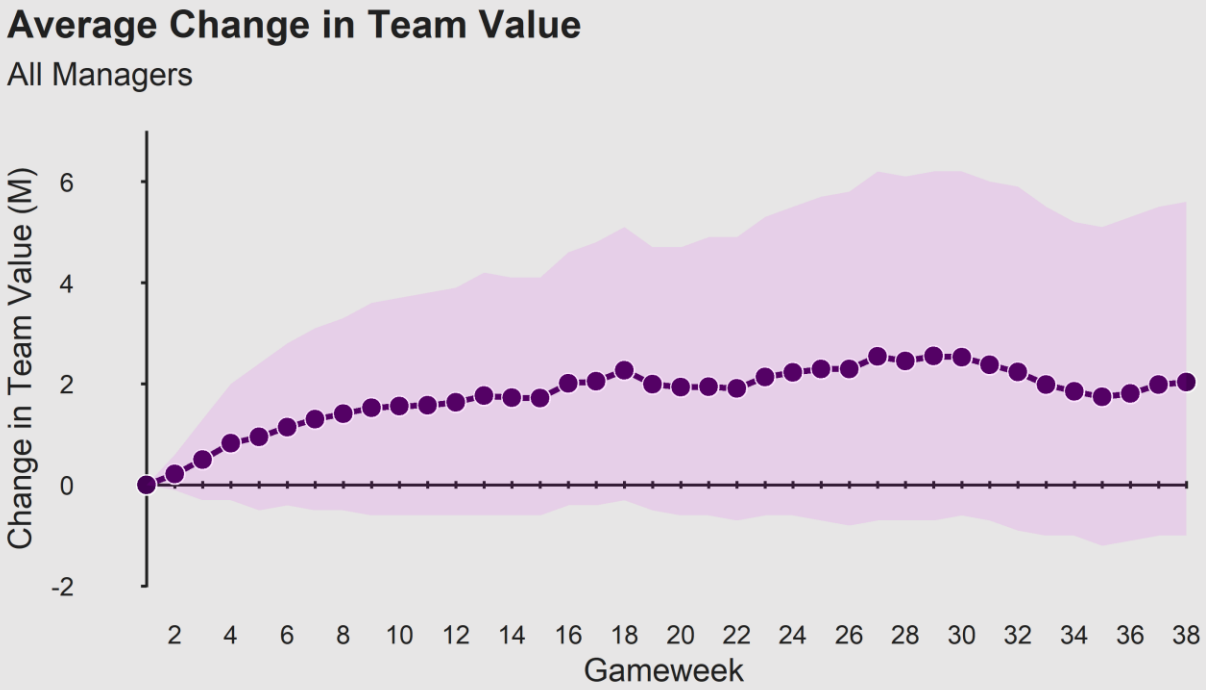
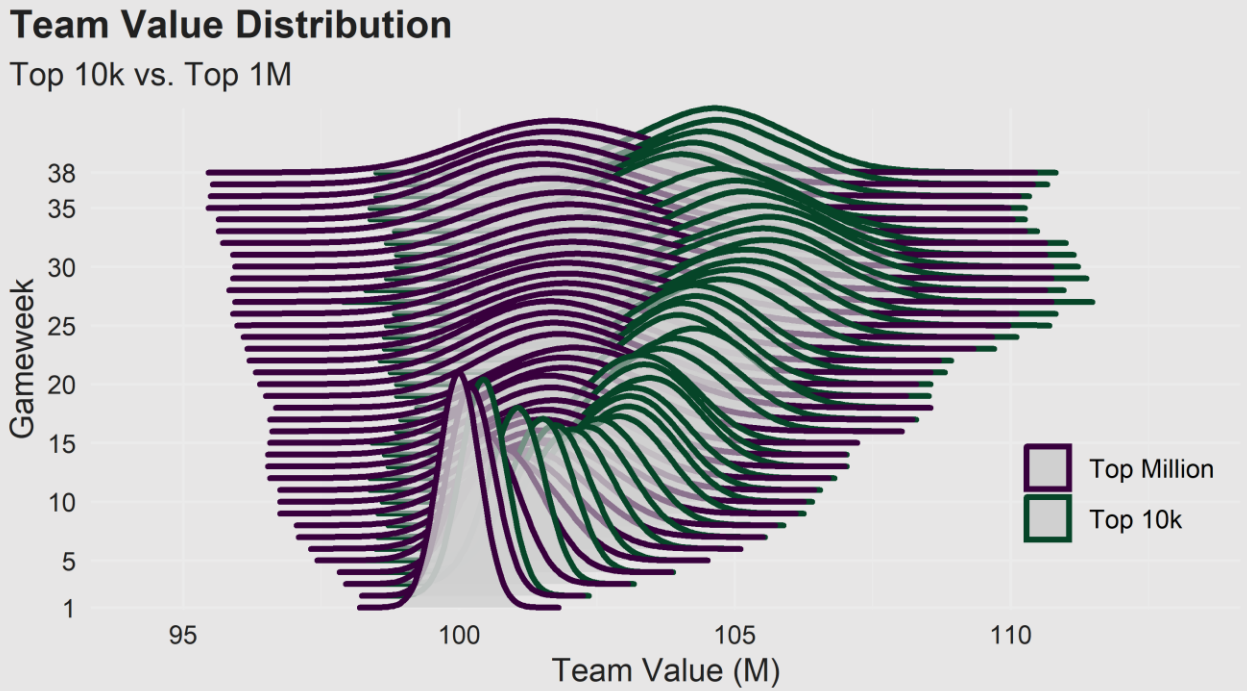




+geom_stratum

Difference in skill - money





ggridges

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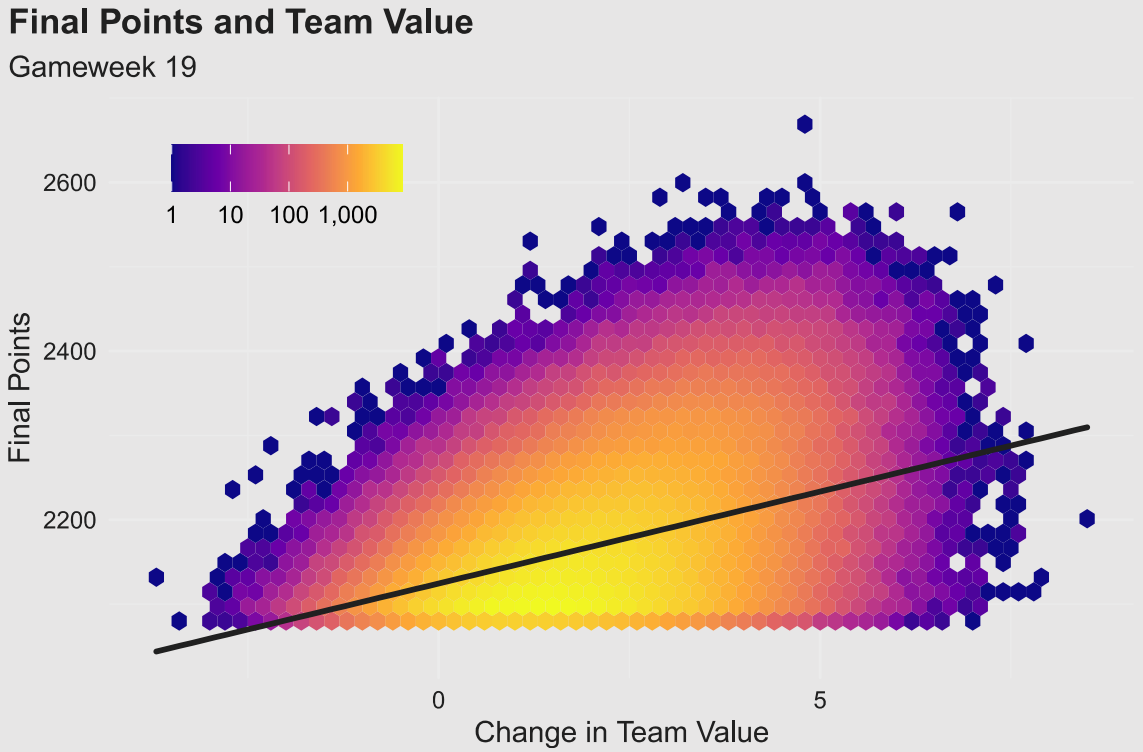
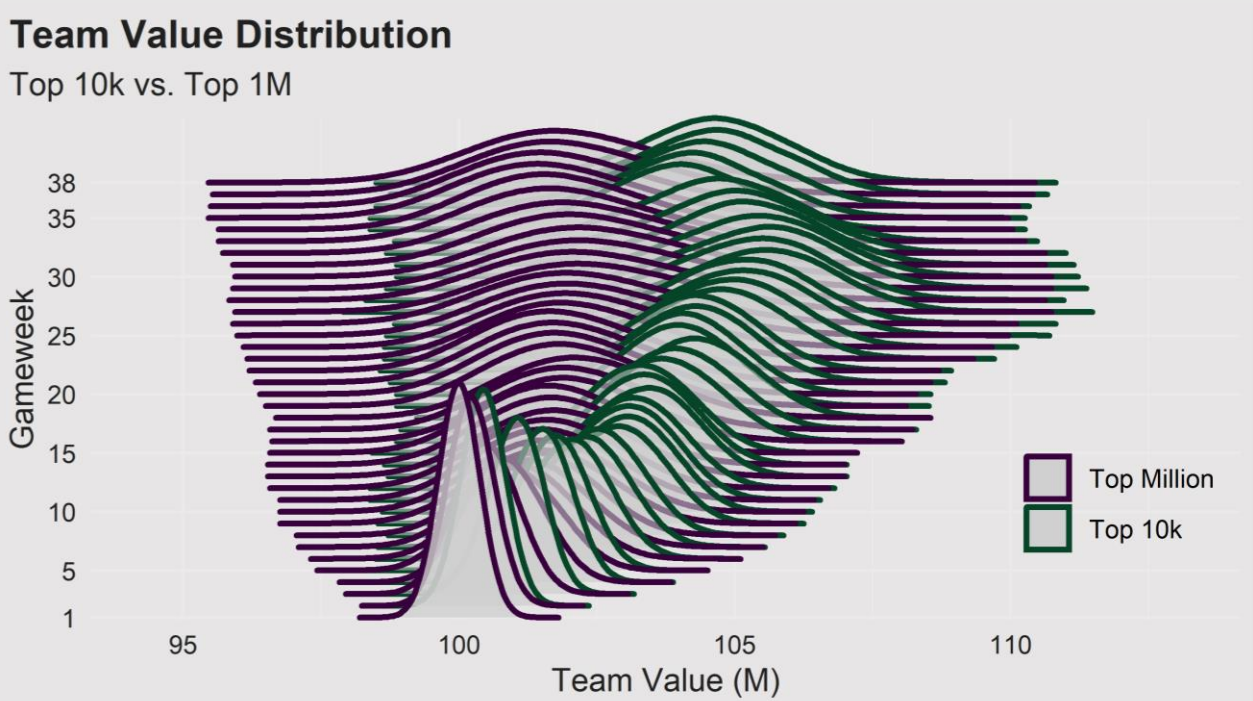
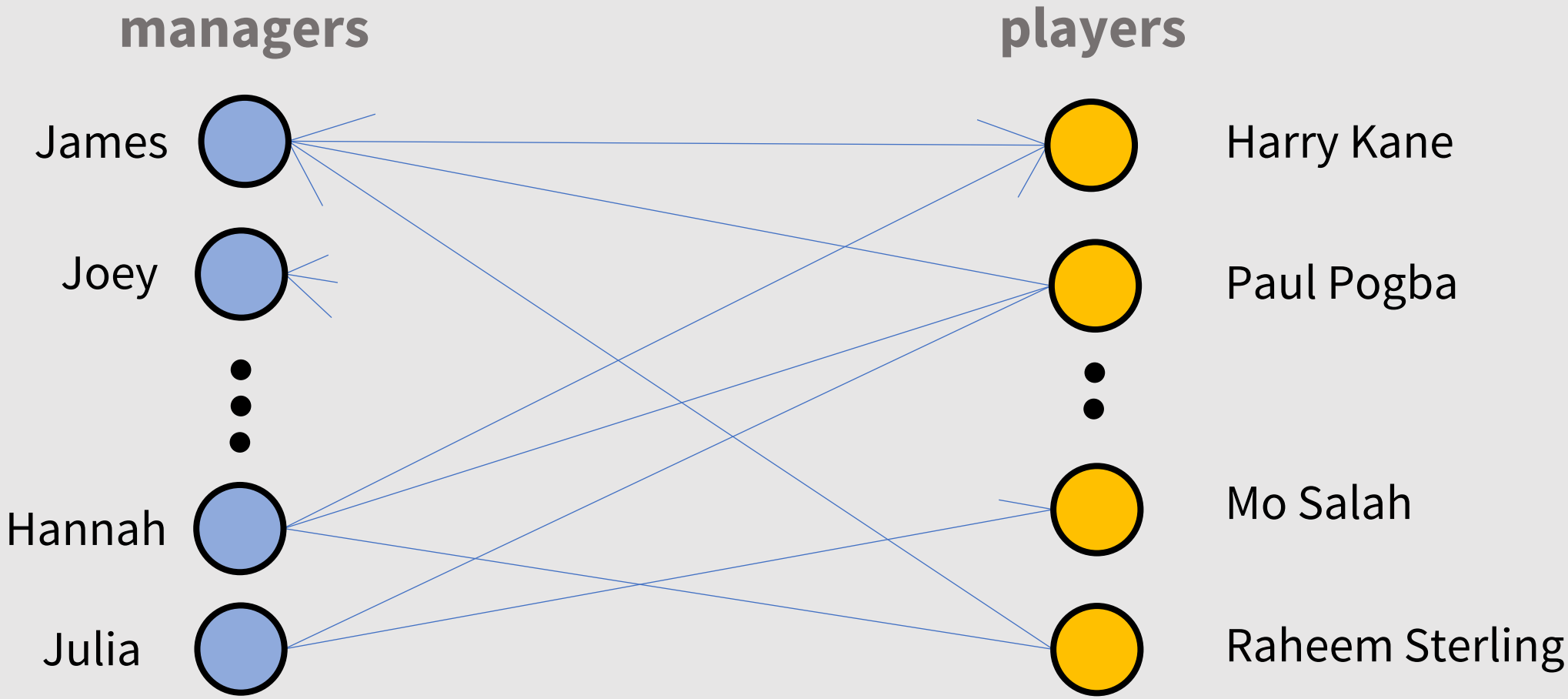




Network analysis



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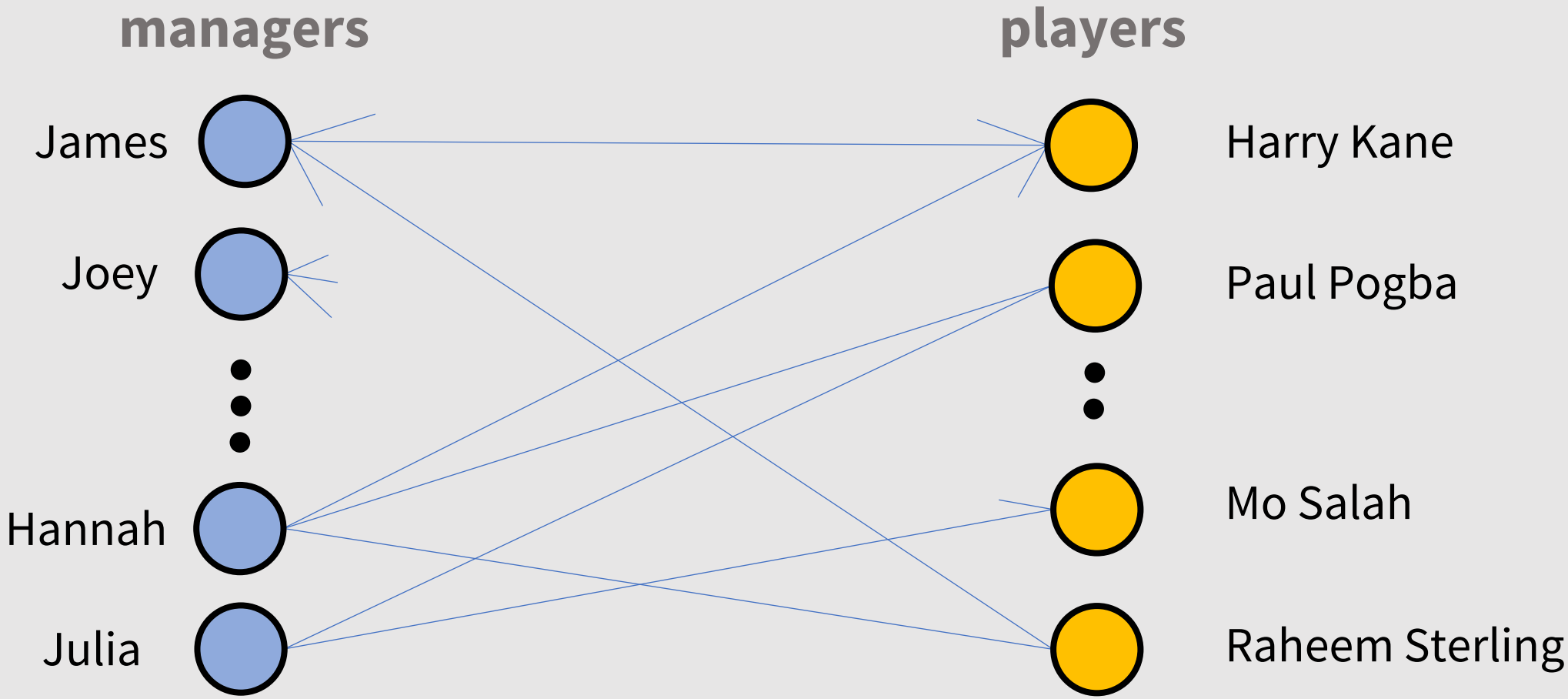

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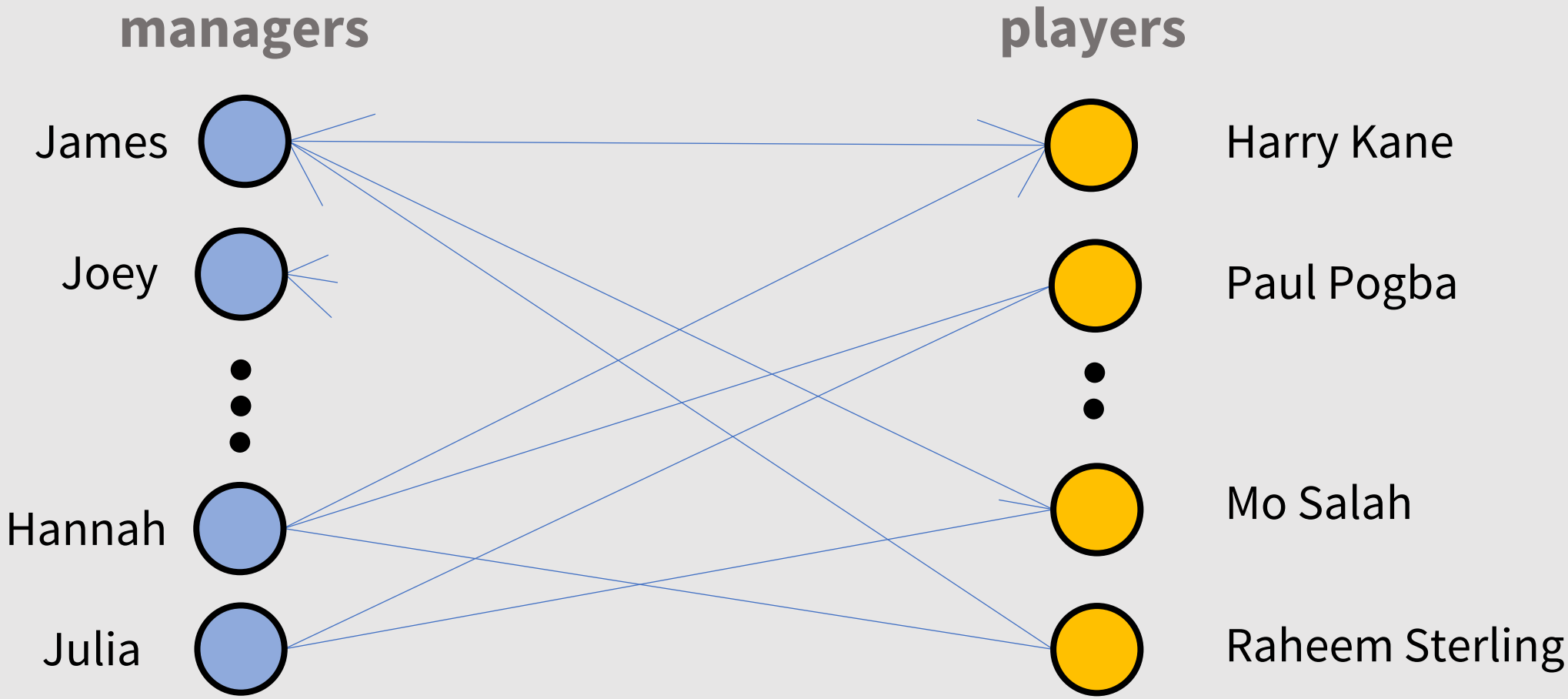

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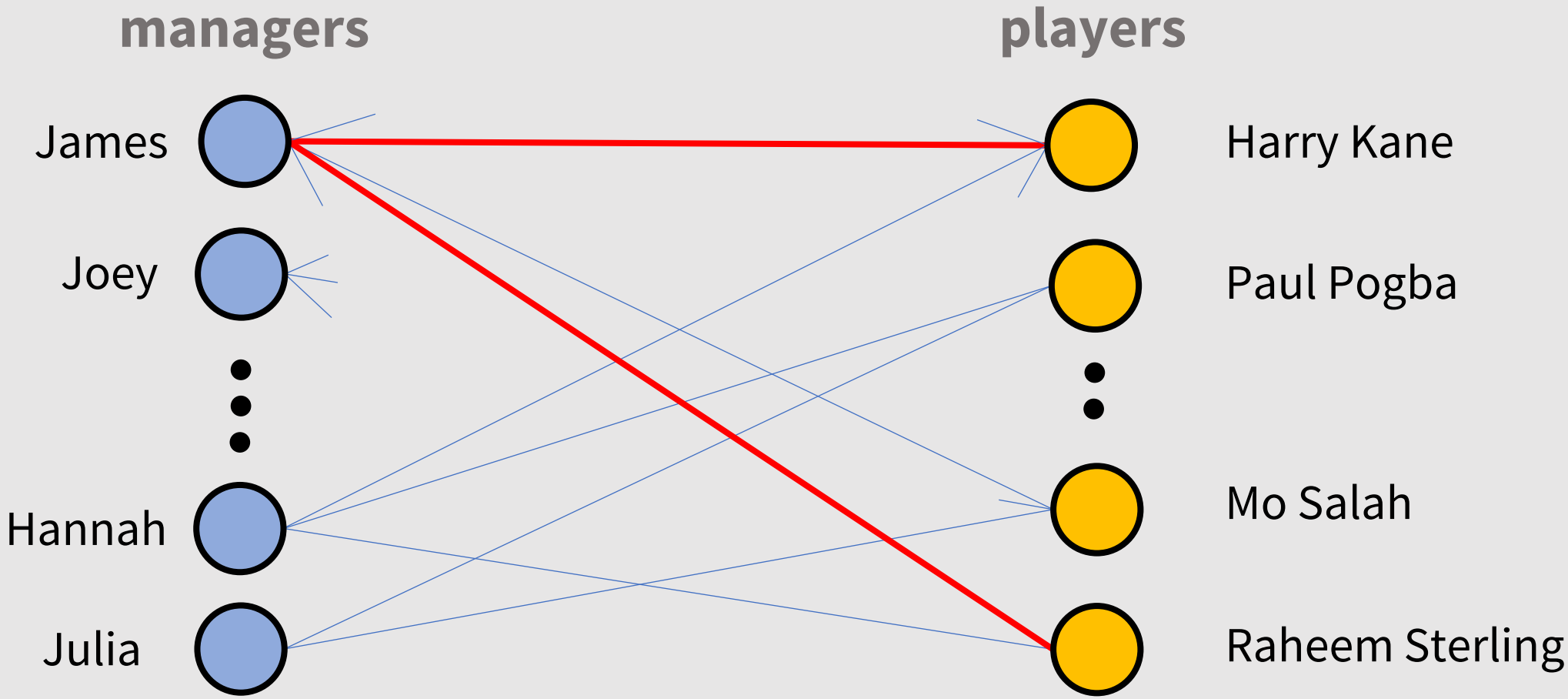

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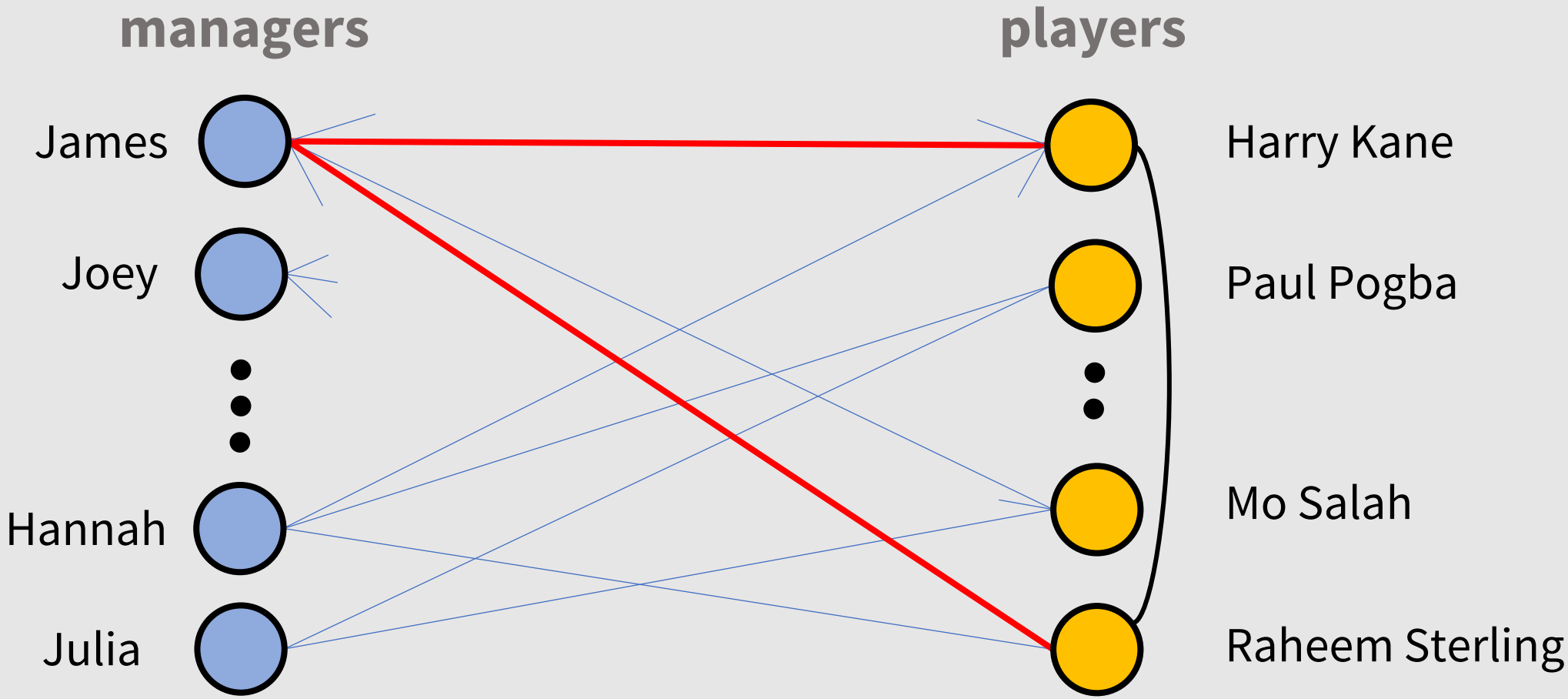

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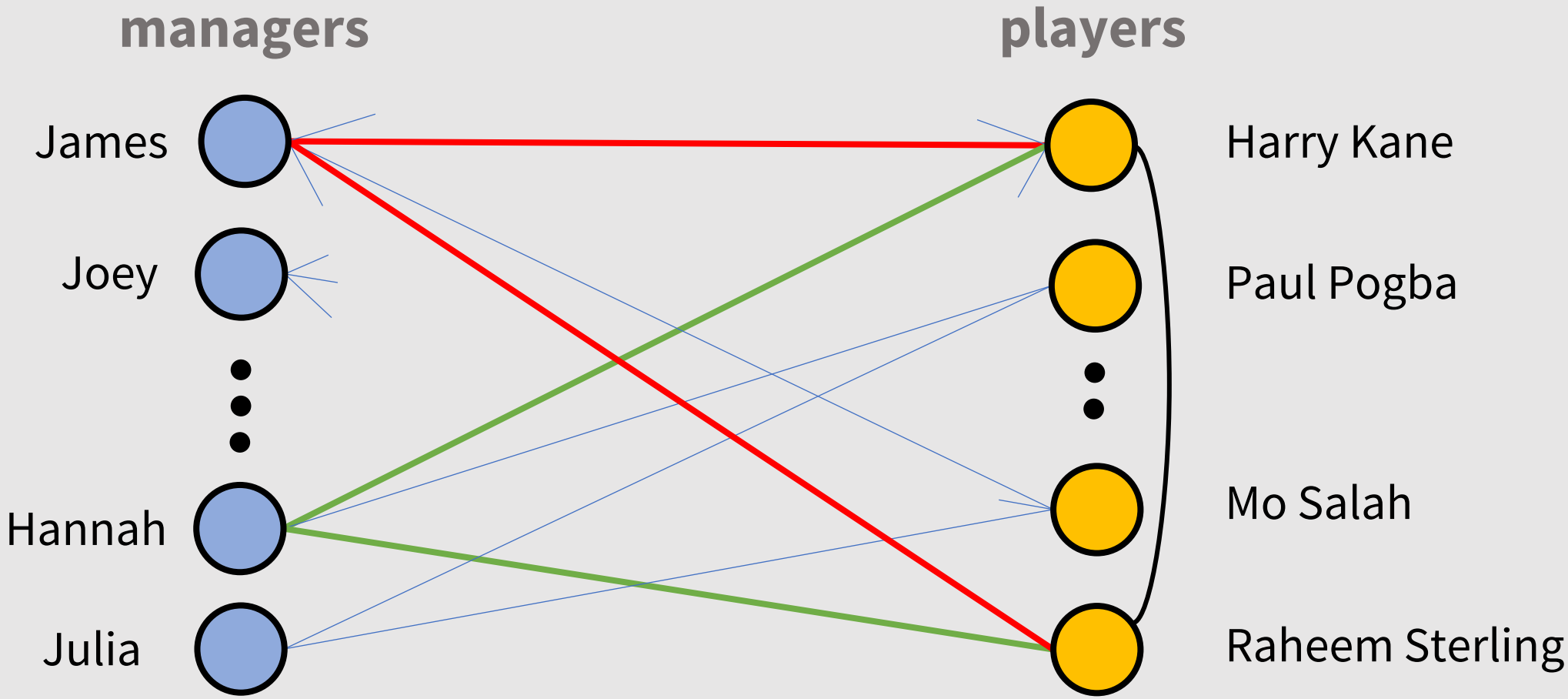

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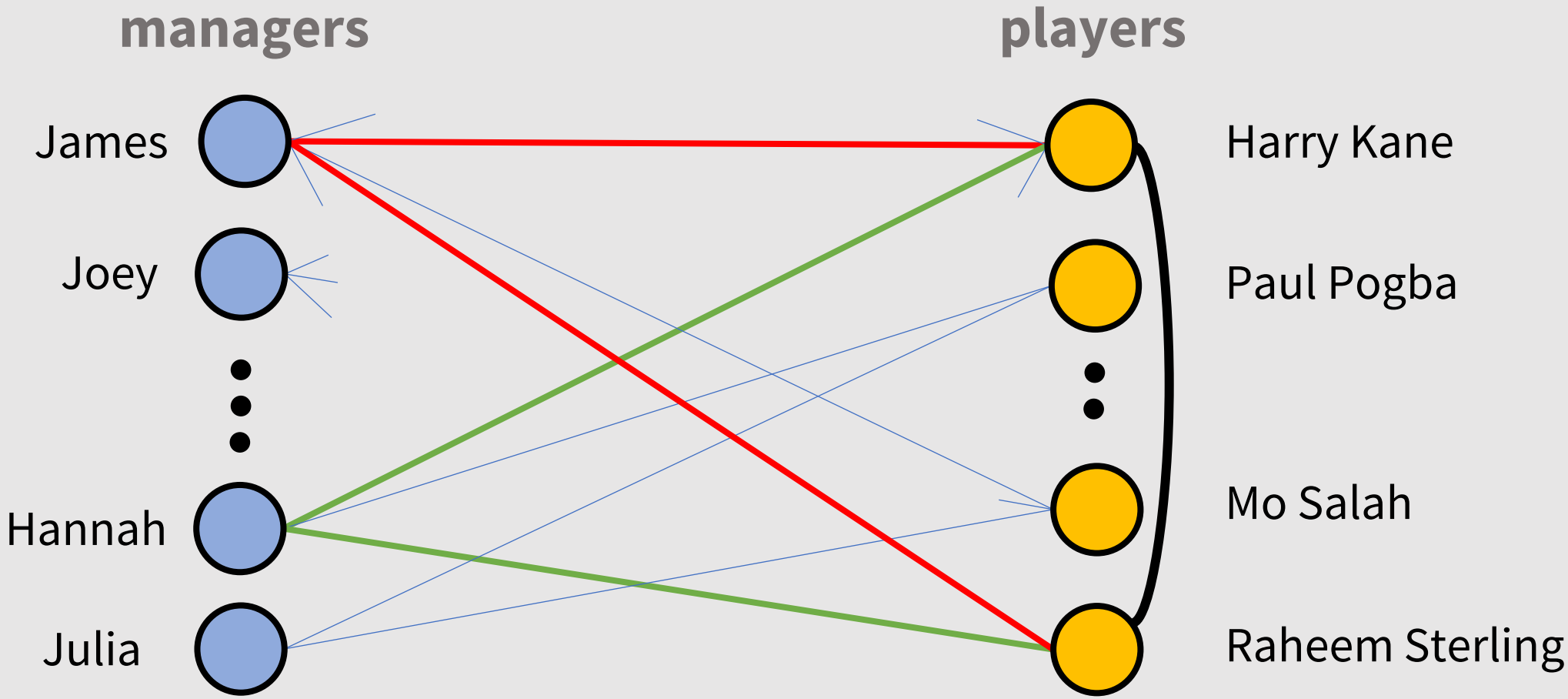

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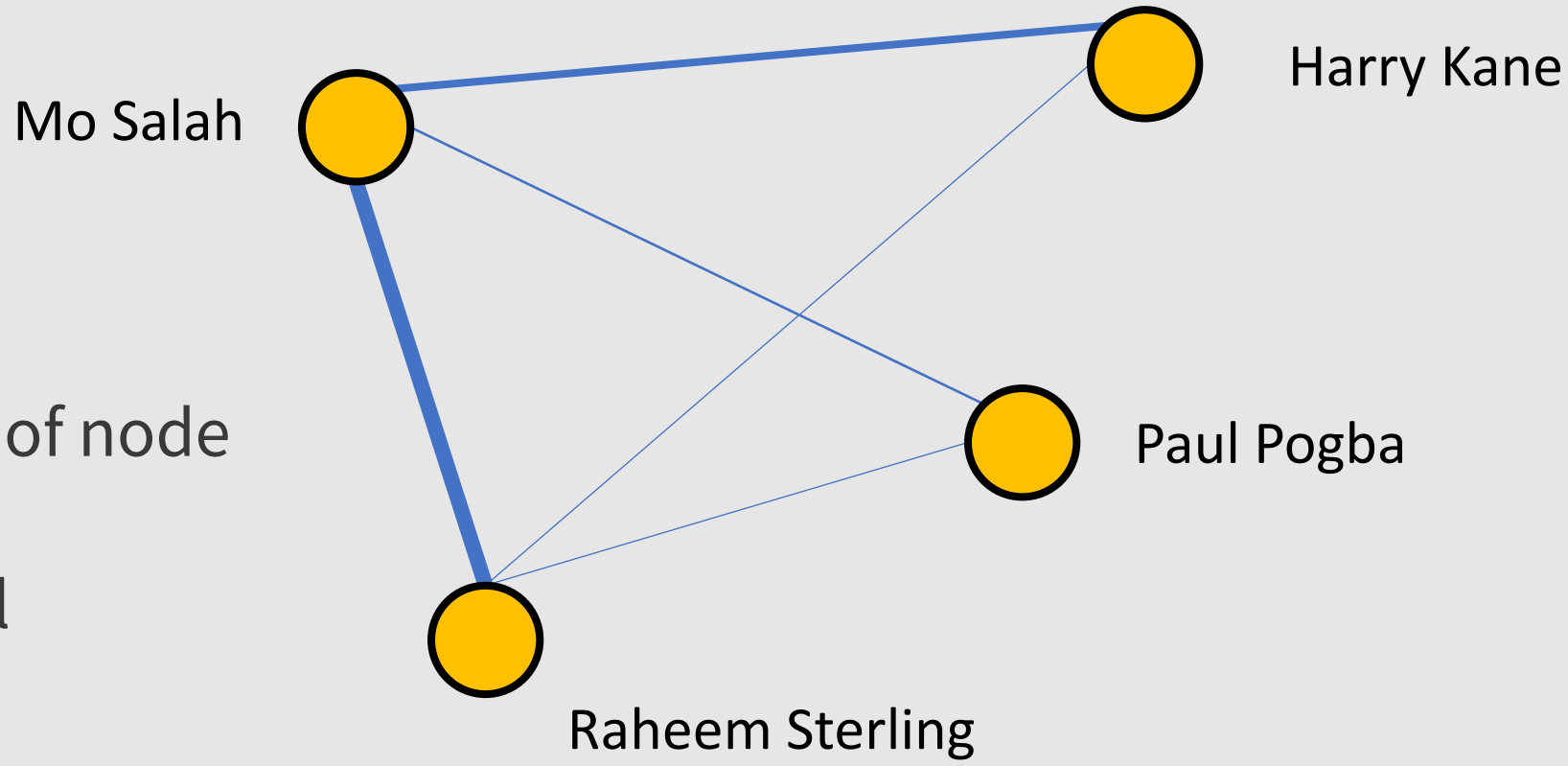
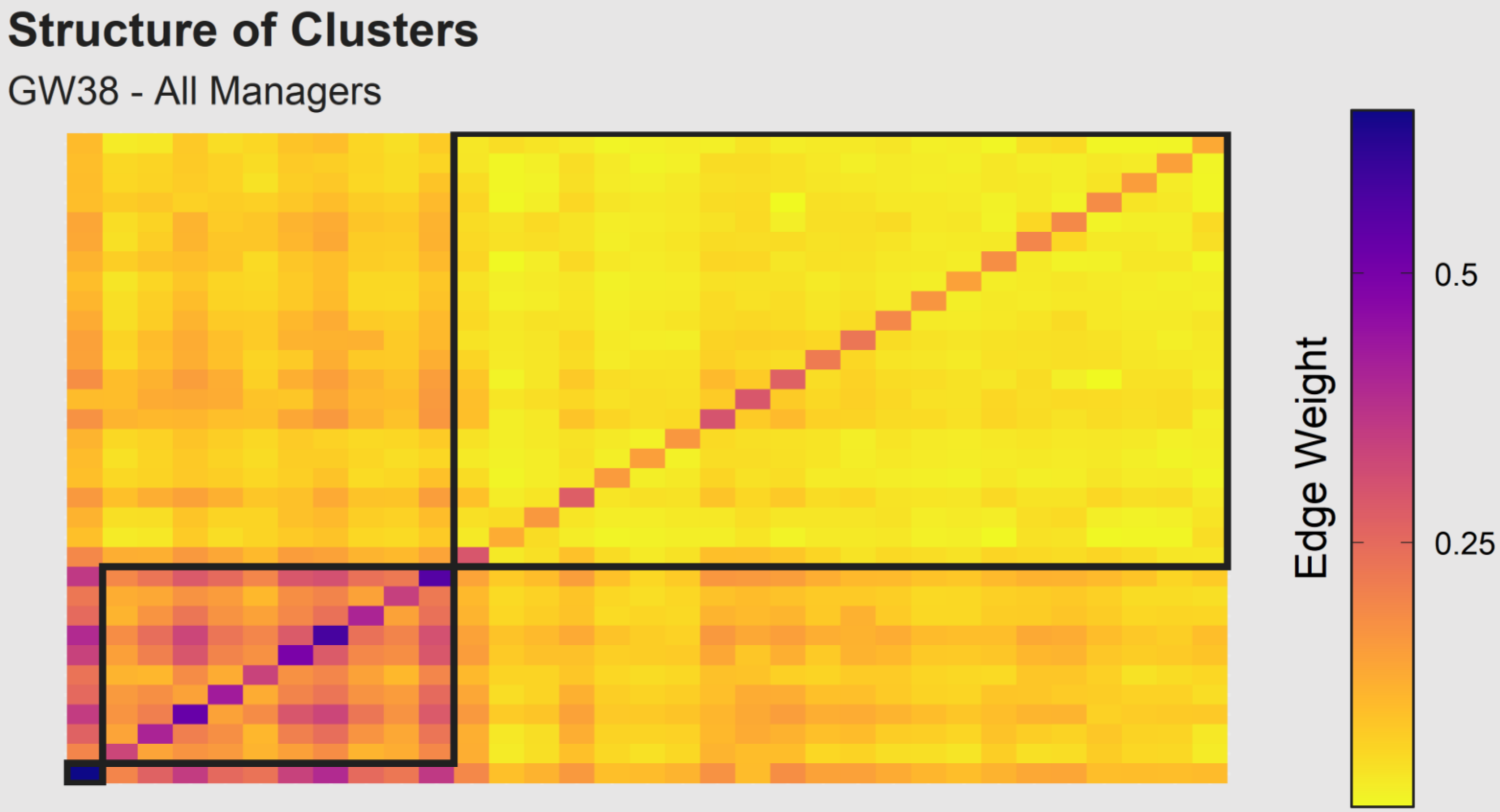


- One type of node
- Weighted
- Temporal
- **igraph**

Template team

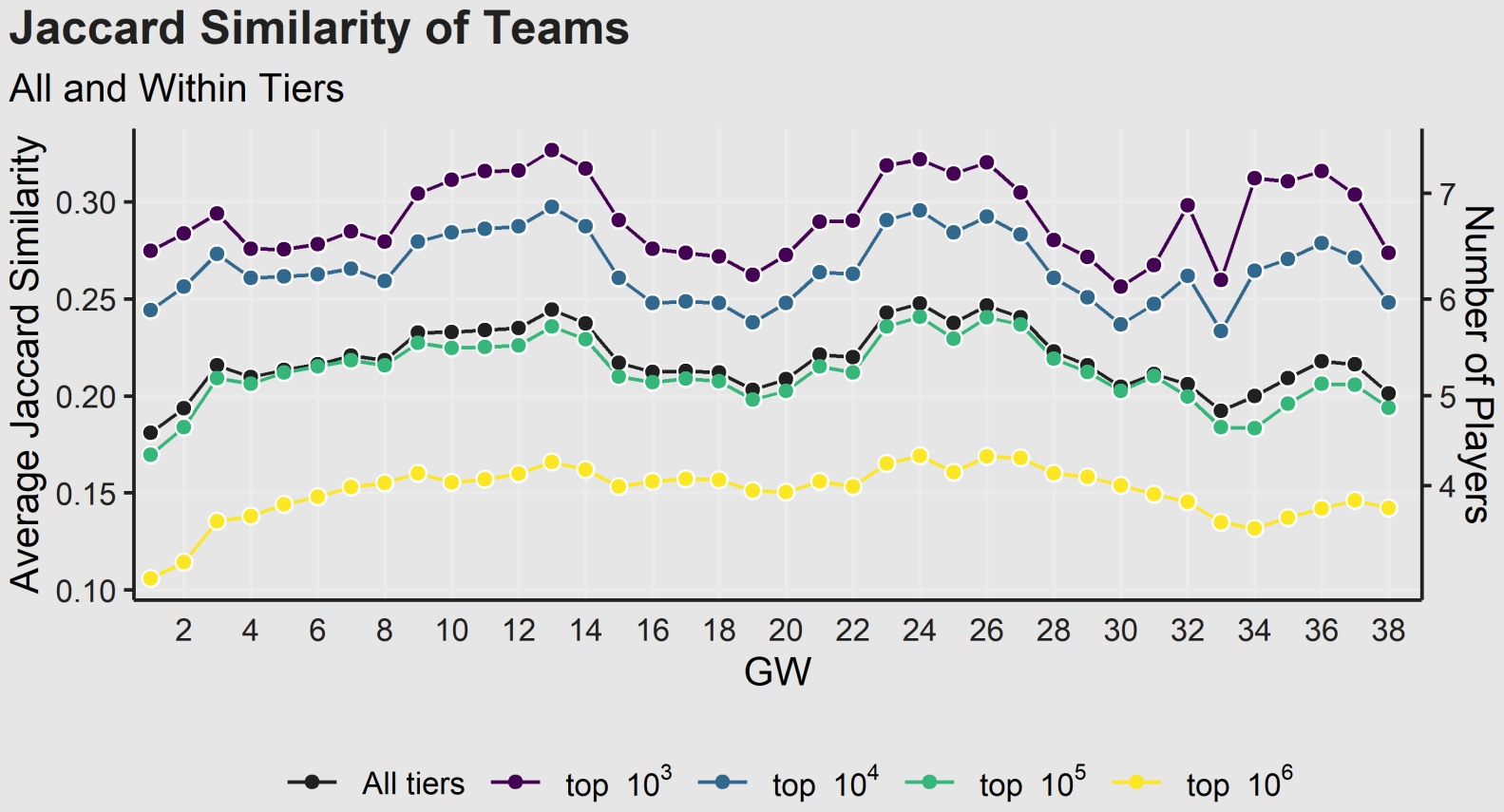
- From the network we can identify **clusters of players** based upon their section frequency.
- Find that four clusters can describe the different groups with **three of them** containing only **~30 players** (out of >600).



Template team

- We determine the similarity between two teams A and B through the **Jaccard Similarity** measure.

$$J(A,B) = \frac{|A \cap B|}{|A \cup B|}$$



In Conclusion

- It isn't one-size-fits-all

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‘Take these three items right here. You can have this. WD-40, vise grips, and some duct tape. Any man worth his salt can do half the household chores with just those three things.’

Walt Kowalski

Thank you for listening!

@obrienj_