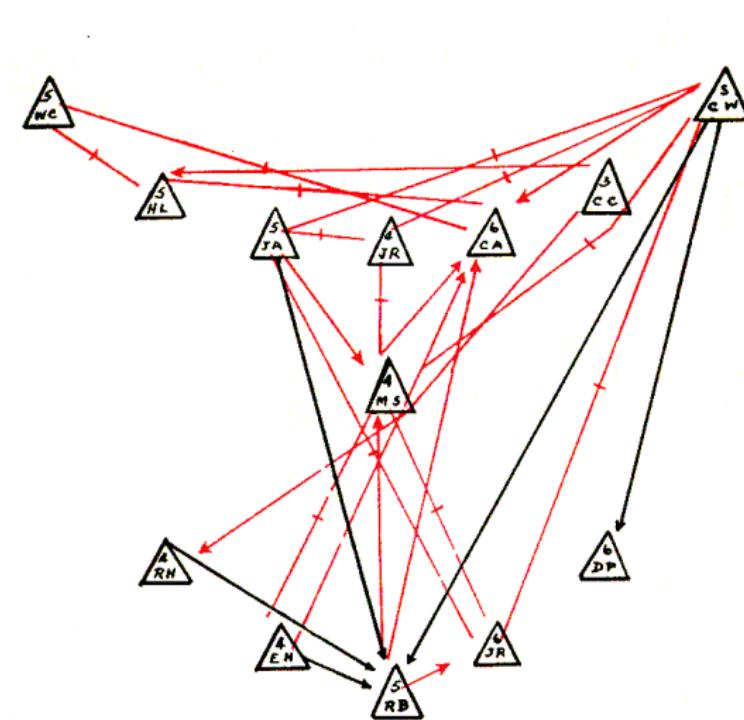




Sports Networks (FS18)

Ulrik Brandes & David Schoch

pre-game coverage



pre-game coverage

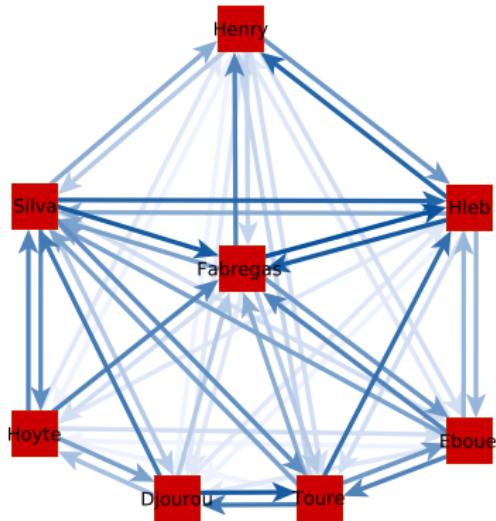
network type	examples
interaction networks	passing networks and ingame affiliations
competition networks	rankings of teams and athletes
intra-organizational networks	friendship networks of team members
inter-organizational networks	collaborations between organizations
affiliation networks	membership of athletes/managers in teams
social environments	embedding of individual sport actors in their social environment

Social Network Analysis in Sport Research: An Emerging Paradigm
[Wäsche et al., 2017]

interaction networks: passing as condition

Network structure and team performance:

The case of English Premier League soccer teams [Grund, 2012]



Summary

Studying team performance and network structure in teams by means of passing networks.

Data

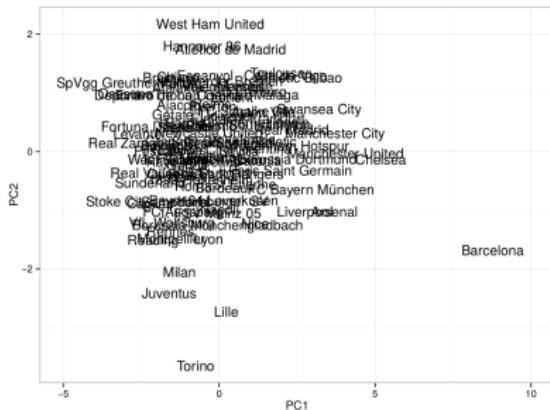
760 EPL matches of Saison 06/07 and 07/08

Prerequisites

Statistics (Poisson regression), Calculus

interaction networks: passing as outcome

Searching for a Unique Style in Soccer [Gyarmati et al., 2014]



Summary

Analysing passing sequences to differentiate the styles of soccer teams.

Data

Season 12/13 of La Liga, Serie A, EPL, Ligue 1 and Bundesliga

Prerequisites

Statistics (k-means, z-score, Ward clustering)

interaction networks: partnering in cricket

Complex network analysis in cricket: community structure, player's role and performance index [Mukherjee, 2013]



Summary

Analyzing the structure of batting partnership networks

Data

Test cricket statistics 1877-2012

Prerequisites

Basic Calculus and Linear Algebra

interaction networks: partnering in tennis

Revealing the best doubles teams and players in tennis history
[Breznik, 2015]



Summary

Using PageRank to determine the best ATP double teams and players.

Data

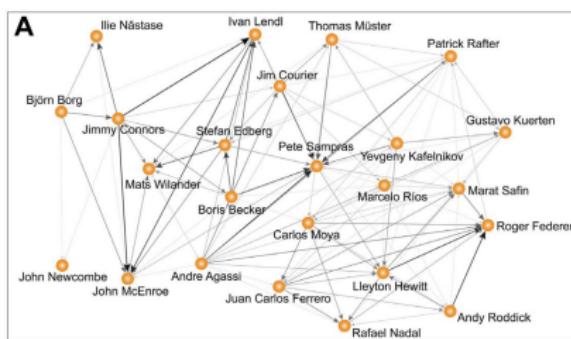
ATP double matches 1968-2014

Prerequisites

Basic Linear Algebra

competition networks: tennis

Who Is the Best Player Ever? A Complex Network Analysis of the History of Professional Tennis [Radicchi, 2011]



Summary

Applying a diffusion algorithm to the tennis contact network in order to rank professional players.

Data

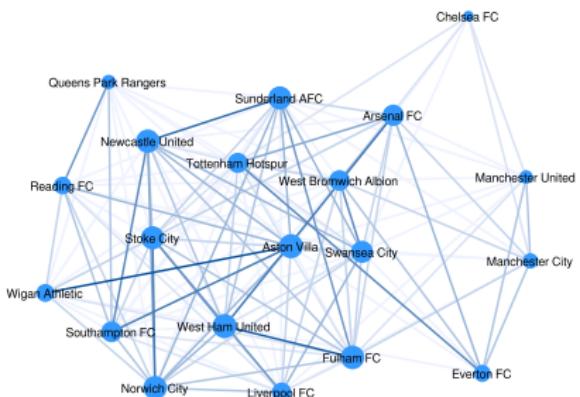
ATP matches 1968-2010

Prerequisites

Basic Linear Algebra and Calculus

competition networks: soccer one way

A new method for comparing rankings through complex networks: Model and analysis of competitiveness of major European soccer leagues
[Criado et al., 2013]



Summary

Constructing competitive networks based on rankings and comparing their structure with standard measures of competitive balance

Data

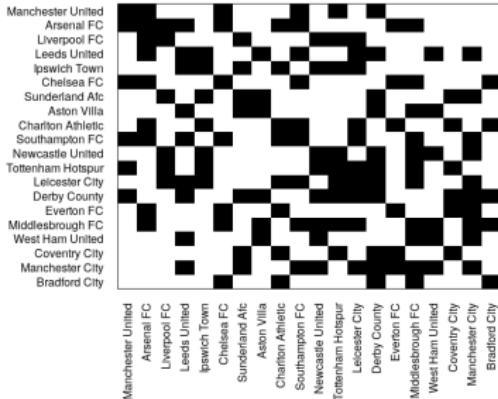
Season 11/12 and 12/13 of La Liga, Serie A, EPL and Bundesliga

Prerequisites

Statistics and Calculus

competition networks: soccer another way

A measure of competitiveness in leagues: a network approach
[Jessop, 2006]



Summary

Constructing a blockmodel based on match results to assess the competitiveness of leagues.

Data

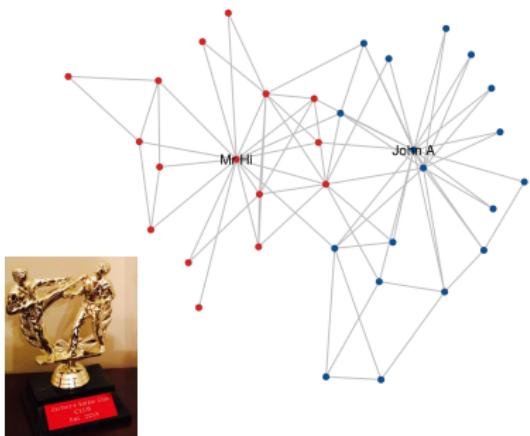
EPL seasons 1995-2003

Prerequisites

Basic Statistics and Calculus

intra-organizational: social structure

An Information Flow Model for Conflict and Fission in Small Groups
[Zachary, 1977]



Summary

Studying the fission of a Karate club
by means of network flow

Data

Interaction of 34 Karate club mem-
bers

Prerequisites

Some graph theory

intra-organizational: team sociology

The Application of Social Network Analysis to Team Sports
[Lusher et al., 2010]

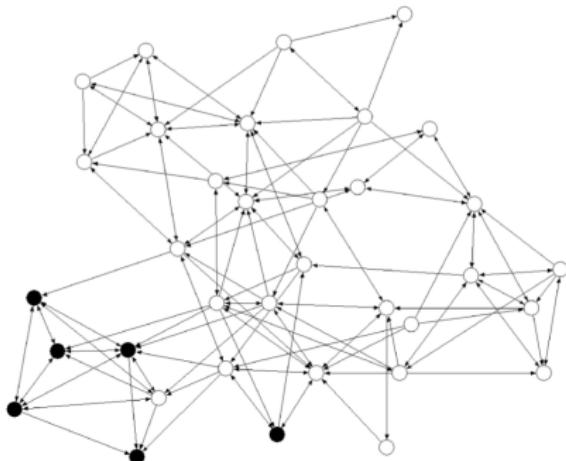


FIGURE 2 The team *friendship* network ($n = 35$). Black nodes represent best players; white nodes represent other players.

Summary

Introduces SNA for the study of teams in sports

Data

Friendship and influence relations of a team

Prerequisites

Statistics (regression)

inter-organizational networks

Exploring the Legacy of Sport Events on Sport Tourism Networks
[Sallent et al., 2011]

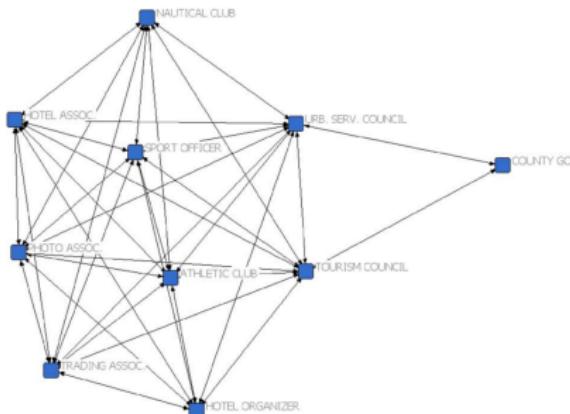


Figure 1. Network of all relationships before the event (without attributes).

Summary

Measuring impact of a sport event on relationships of local stakeholders

Data

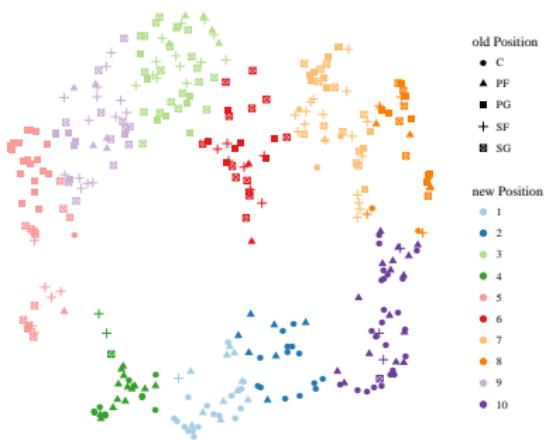
Relations before/after event of local organizations

Prerequisites

No specific requirements

inter-organizational: basketball player types

A cluster analysis of NBA players [Lutz, 2012]



Summary

Expanding the traditional 5 positions in basketball to 10 based on style of play.

Data

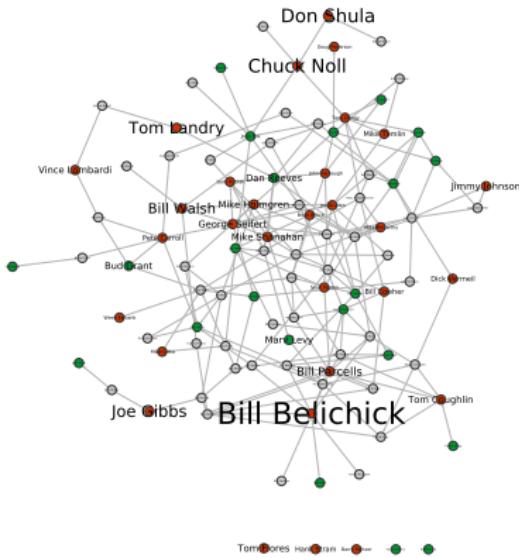
NBA player statistics 2000-2017

Prerequisites

Statistics (Clustering methods)

affiliation networks

The NFL coaching network: analysis of the social network among professional football coaches [Fast and Jensen, 2006]



Summary

Characterizing championship coaches by their coaching tree

Data

Coaching history of NFL franchises
1920-2005

Prerequisites

Statistics (relational probability trees)

References I

Hagen Wäsche, Geoff Dickson, Alexander Woll, and Ulrik Brandes. Social network analysis in sport research: An emerging paradigm. *European Journal for Sport and Society*, 14(2):138–165, 2017. URL <https://doi.org/10.1080/16138171.2017.1318198>.

Thomas U. Grund. Network structure and team performance: The case of English Premier League soccer teams. *Social Networks*, 34(4):682–690, 2012. URL <https://doi.org/10.1016/j.socnet.2012.08.004>.

Laszlo Gyarmati, Haewoon Kwak, and Pablo Rodriguez. Searching for a Unique Style in Soccer. In *Proceedings of ACM KDD Workshop on Large-Scale Sports Analytics*, 2014. URL <http://arxiv.org/abs/1409.0308>.

References II

- Satyam Mukherjee. Complex network analysis in cricket: Community structure, player's role and performance index. *Advances in Complex Systems*, 16(08):1350031, 2013. URL
<https://doi.org/10.1142/S0219525913500318>.
- Kristijan Breznik. Revealing the best doubles teams and players in tennis history. *International Journal of Performance Analysis in Sport*, 15(3):1213–1226, 2015. URL
<https://doi.org/10.1080/24748668.2015.11868863>.
- Dwight Lutz. A cluster analysis of NBA players. In *Proceedings of the MIT Sloan Sports Analytics Conference*, 2012. URL
http://www.sloansportsconference.com/wp-content/uploads/2012/02/44-Lutz_cluster_analysis_NBA.pdf.

References III

Andrew Fast and David Jensen. The NFL coaching network: Analysis of the social network among professional football coaches. *Growth*, 60:70, 2006. URL <https://kdl.cs.umass.edu/papers/fast-jensen-AAAI2006.pdf>.

Filippo Radicchi. Who Is the Best Player Ever? A Complex Network Analysis of the History of Professional Tennis. *PLOS ONE*, 6(2):e17249, 2011. URL <https://doi.org/10.1371/journal.pone.0017249>.

A. Jessop. A measure of competitiveness in leagues: A network approach. *Journal of the Operational Research Society*, 57(12), 2006. URL <https://doi.org/10.1057/palgrave.jors.2602122>.

References IV

- Regino Criado, Esther García, Francisco Pedroche, and Miguel Romance.
A new method for comparing rankings through complex networks:
Model and analysis of competitiveness of major European soccer
leagues. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 23
(4):043114, 2013. URL <https://doi.org/10.1063/1.4826446>.
- Wayne W. Zachary. An Information Flow Model for Conflict and Fission in
Small Groups. *Journal of Anthropological Research*, 33(4):452–473,
1977. URL <https://doi.org/10.1086/jar.33.4.3629752>.
- Dean Lusher, Garry Robins, and Peter Kremer. The Application of Social
Network Analysis to Team Sports. *Measurement in Physical Education
and Exercise Science*, 14(4):211–224, 2010. URL
<https://doi.org/10.1080/1091367X.2010.495559>.

References V

Oriol Sallent, Ramon Palau, and Jaume Guia. Exploring the legacy of sport events on sport tourism networks. *European Journal for Sport and Society*, 11(4):397–421, 2011. URL
<https://doi.org/10.1080/16184742.2011.599208>.