

A Study on Soccer Offence Patterns via Spatio-temporal Statistical Analysis

- Preliminary findings from Spanish
national team in 2013 Confederations
Cup games-

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Motivation of the research

“Before”

2013 Confederations Cup
Second-place



“After”

2014 World Cup
Lost in the qualifying round

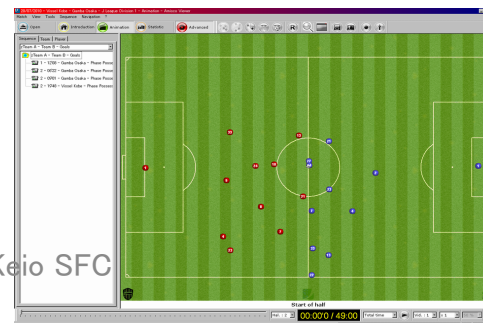


Spatio-temporal statistic methods used for soccer analysis

- Heat map (kernel density map)
- Quadrat analysis (point pattern analysis)
- Delaunay triangulation (nearest point)
- Distances between points

Data set

- 2013 Soccer Confederations Cup
 - Spanish national team
 - vs. Uruguay, vs. Nigeria and vs. Italy
- 4K video tracking system (developed by NHK)
- Player positions are traced by Amisco
 - 1/10 sec



(c) T. Furutani @ Keio SFC

Video tracking system



(c) T. Furutani @ Keio SFC

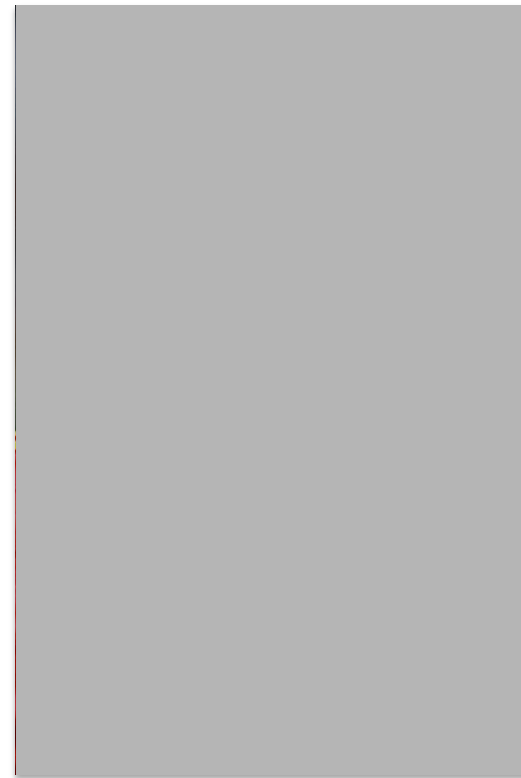
(provided by NHK)

Data structure

- Event information
 - time, position, uniform # of players, with what foot, how and results of events (passes, shots, etc.)
- Player information
 - names and uniform # of players
- Position information

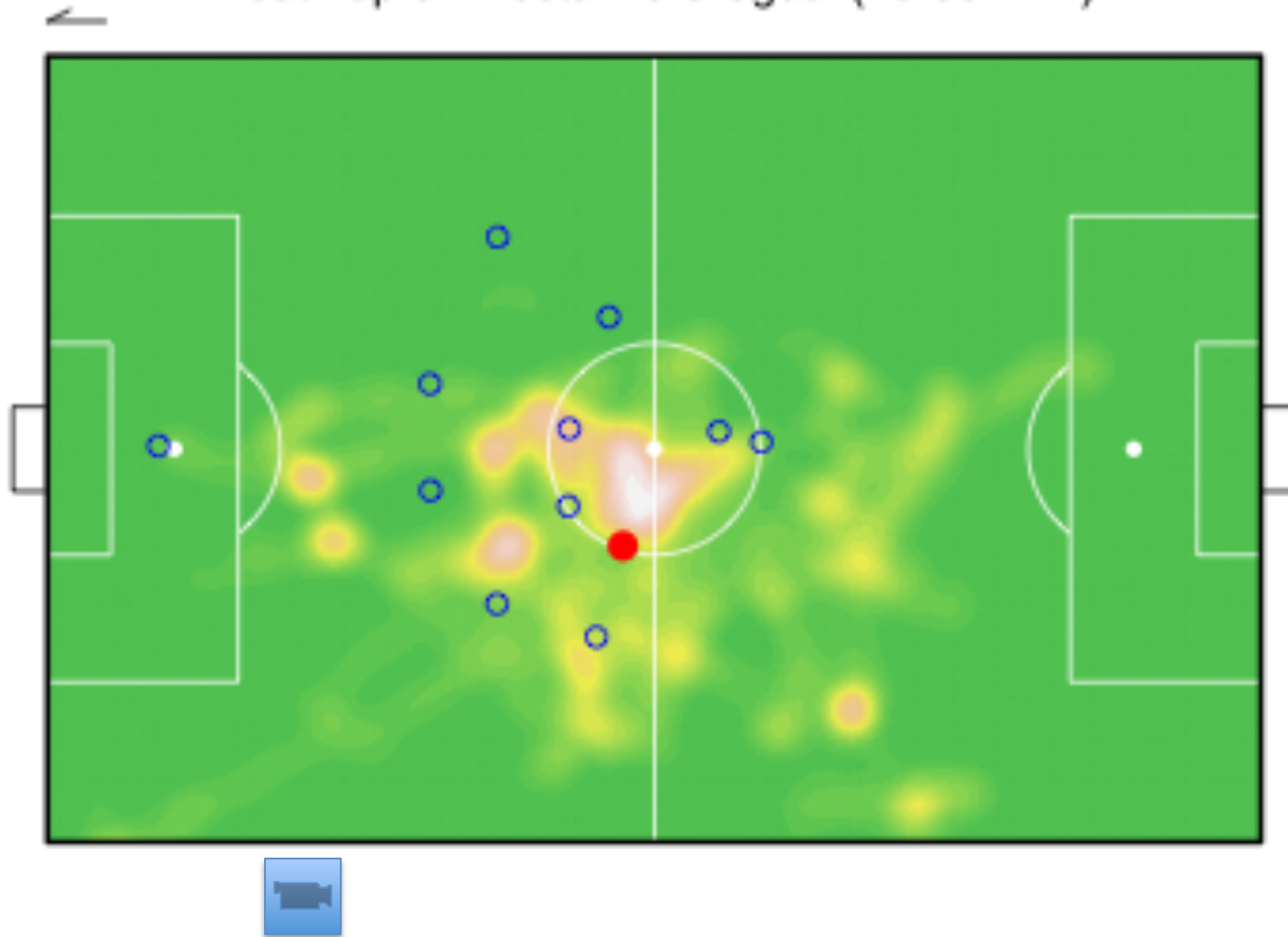
Target player of analysis

- Andrés Iniesta Luján
- One of the key player of Spanish National Soccer team



Dynamic heat map

Heatmap of Iniesta: vs Uruguai (45-60 min.)



Quadrat analysis (vs. Uruguay)

Quadrat Count of Iniesta: vs Uruguay



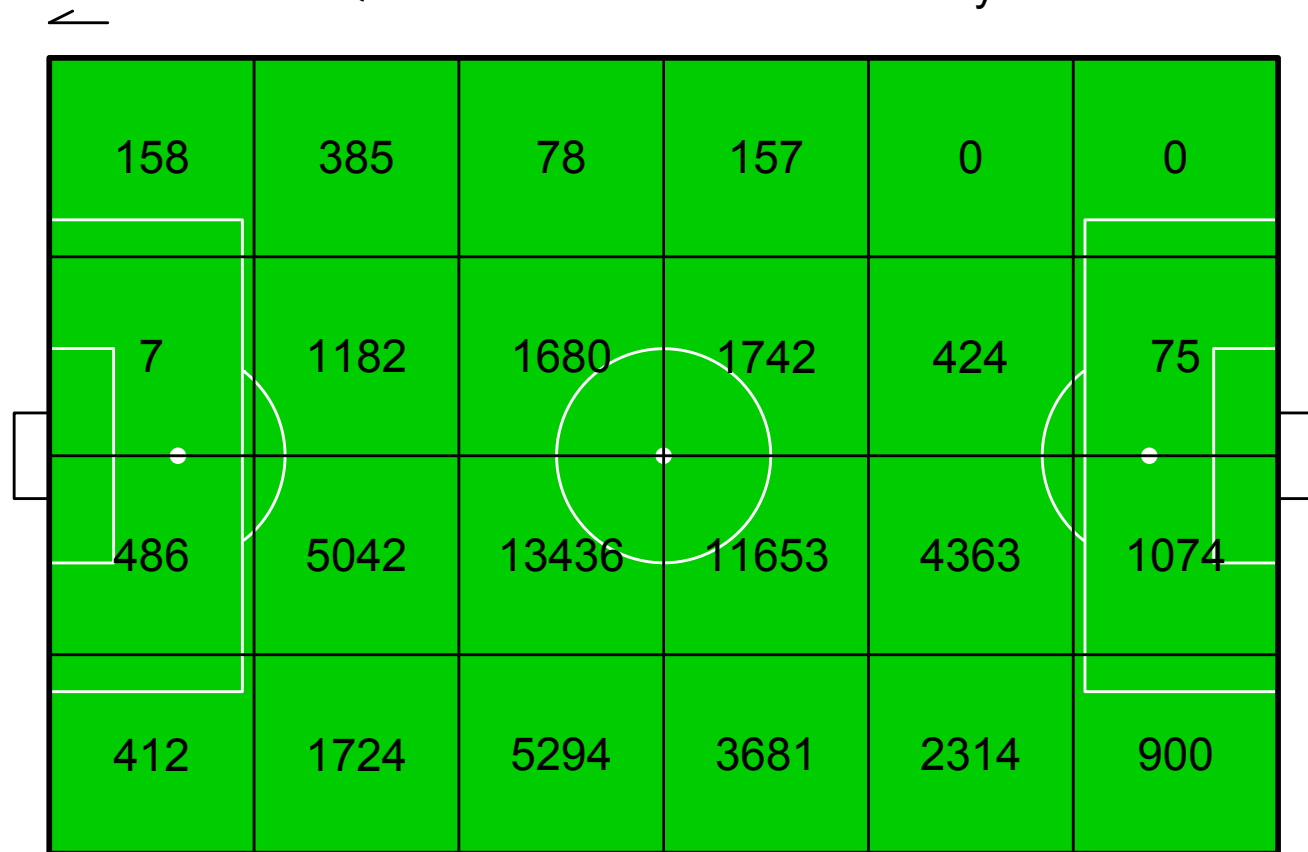
Quadrat analysis (vs. Nigeria)

Quadrat Count of Iniesta: vs Niger



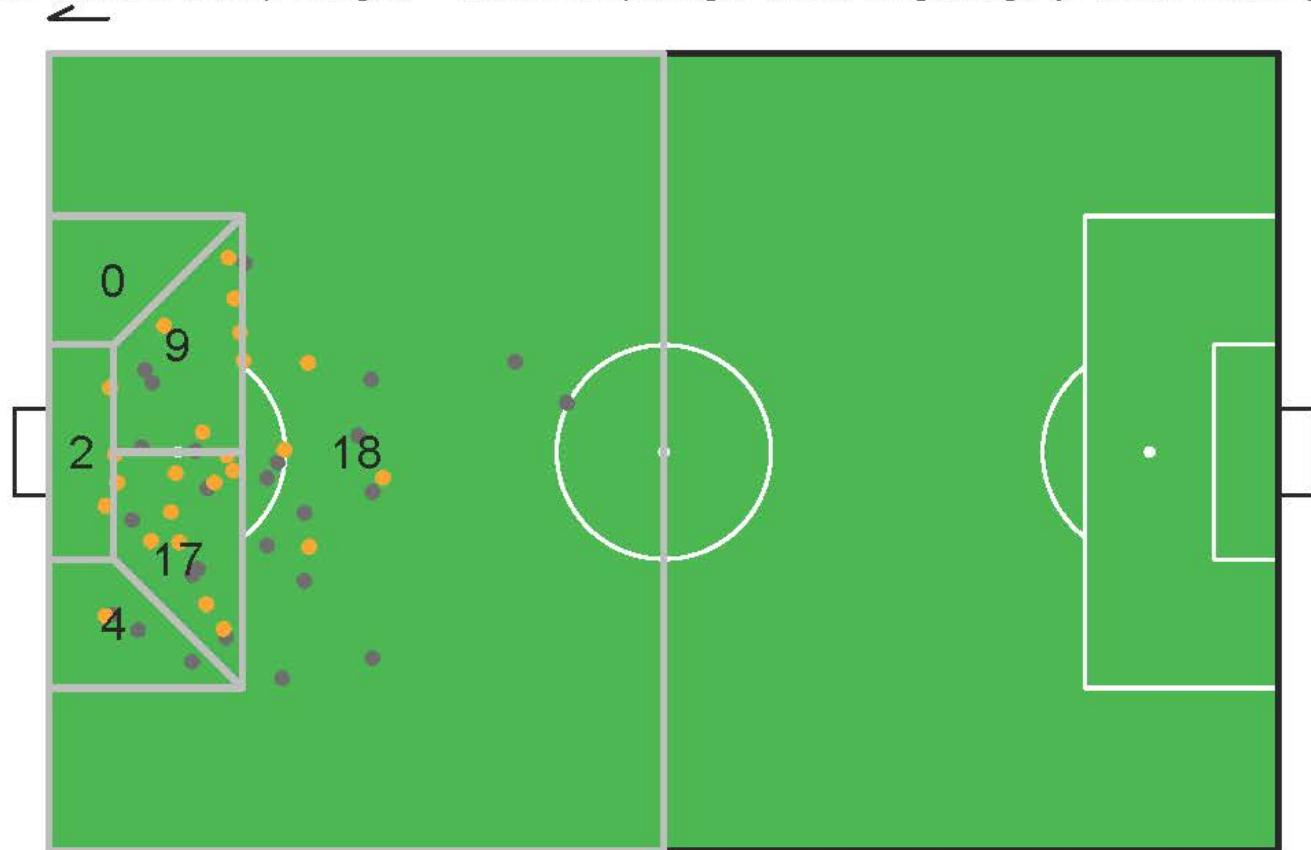
Quadrat analysis (vs. Italy)

Quadrat Count of Iniesta: vs Italy



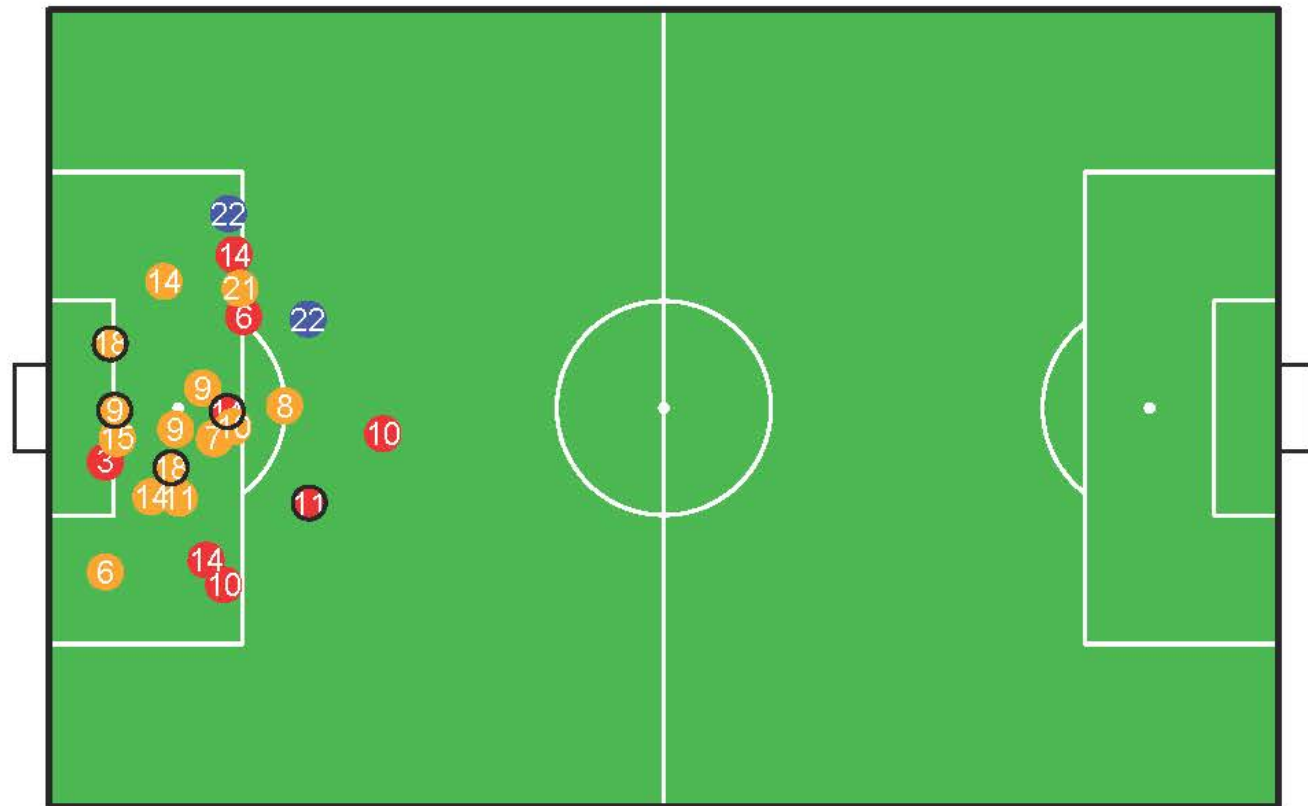
Place of shots

Shot Position: Group League + Semifinal (orange: shots on goal, grey: shots not on goal)

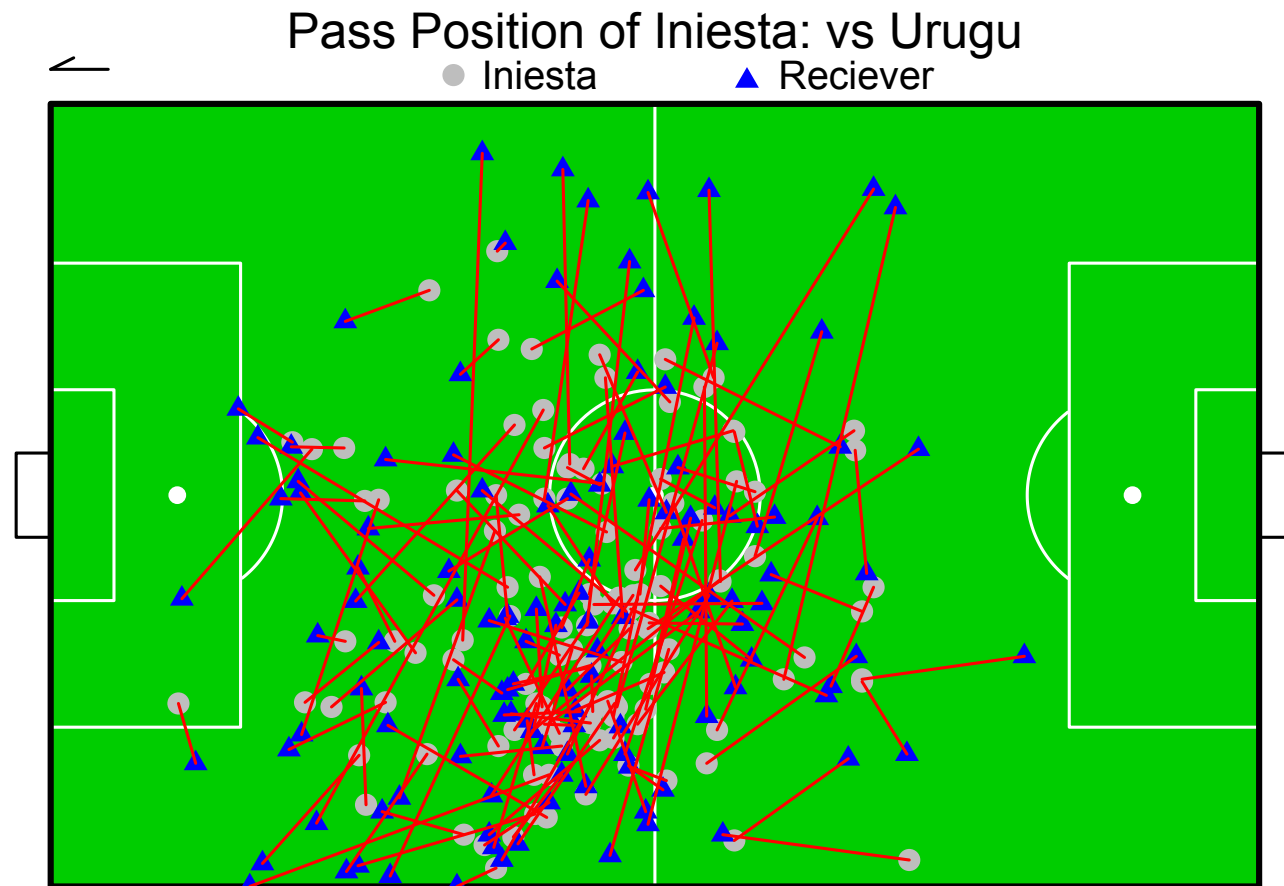


Place of shots

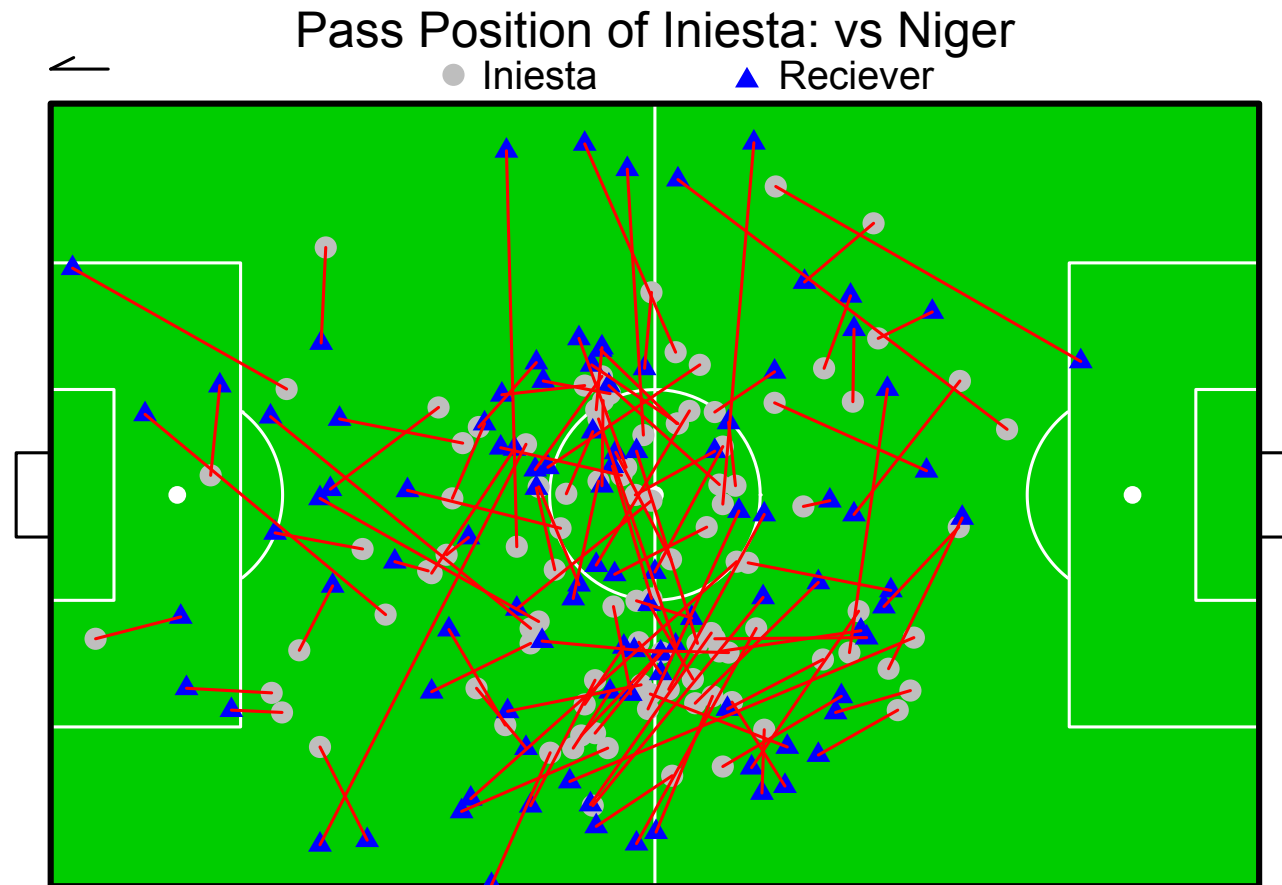
Shot Position (red: vs Uruguay, blue: vs Italy, orange: vs Nigeria)



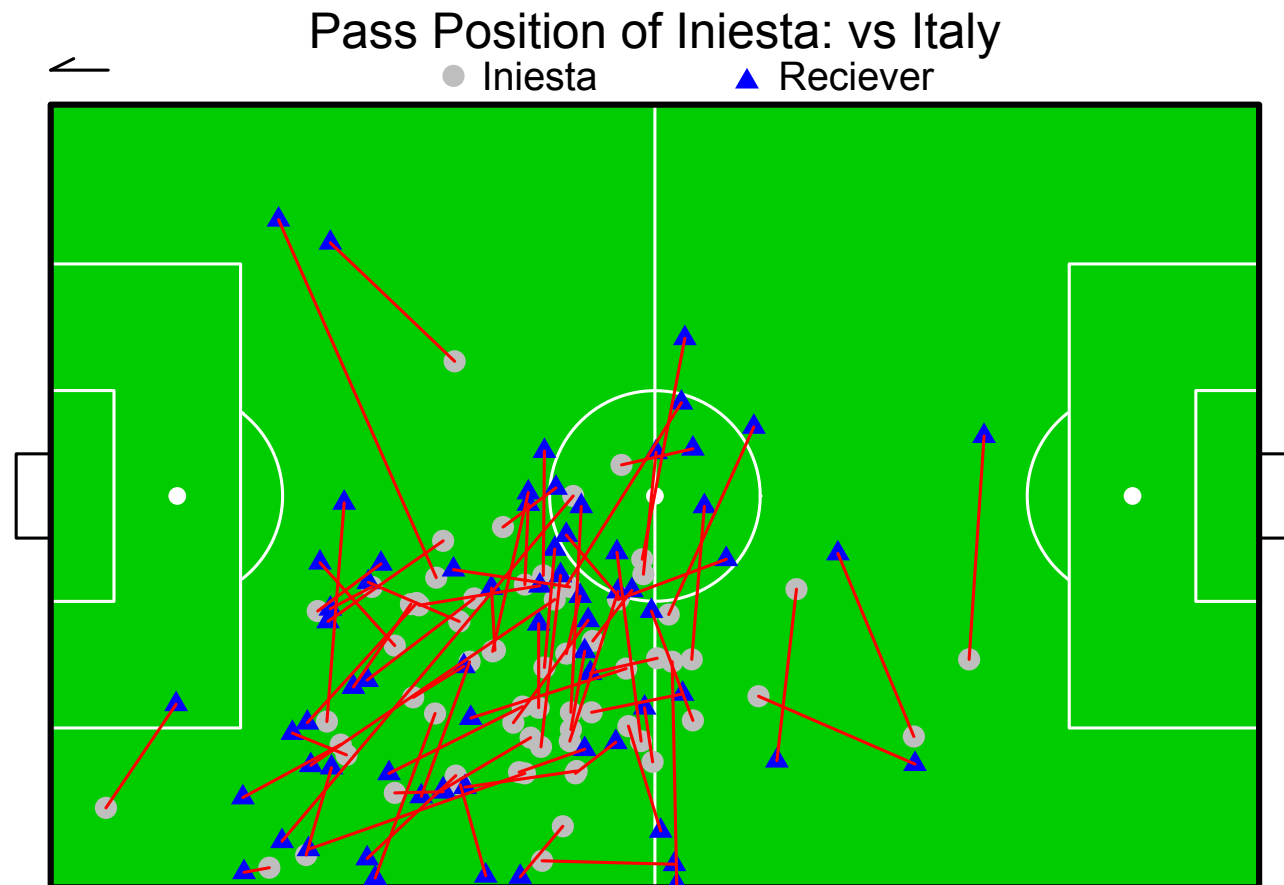
Direction of passes from Iniesta (vs. Uruguay)



Direction of passes from Iniesta (vs. Nigeria)



Direction of passes from Iniesta (vs. Italy)



Delaunay triangulation and distance analysis

- Extract passes
 - from Iniesta to other players
 - from Xavi to Iniesta
- Calculate Delaunay triangulation of opposing players including the target player (= Iniesta, in this case)
- Calculate distances from Iniesta to the nearest (three) opposing players

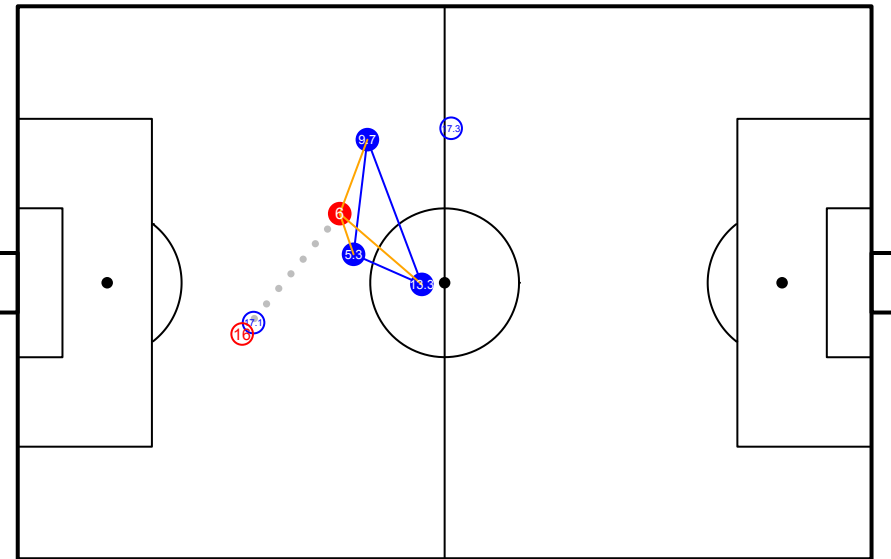
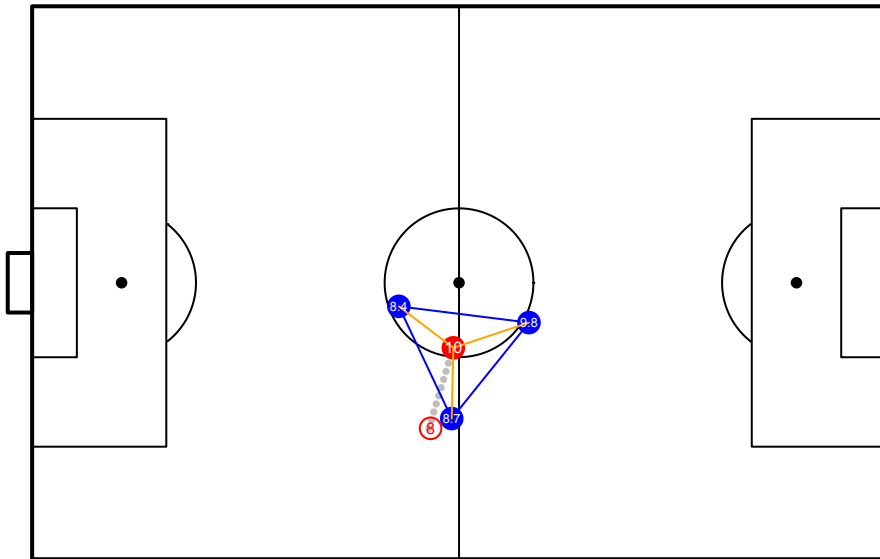
Passes to Iniesta

Passer	vs. Uruguai	vs. Nigeria	vs. Italy
Busquets	22	13	19
Xavi	15	10	12
Alba Ramos	18	10	17
Sergio Ramos	10	7	6
Other	23	35	18
Total	88	75	72

Positions that Spanish players receive passes (typical patterns)

1st Half. Time 2 : 43 : 1

1st Half. Time 23 : 46 : 5

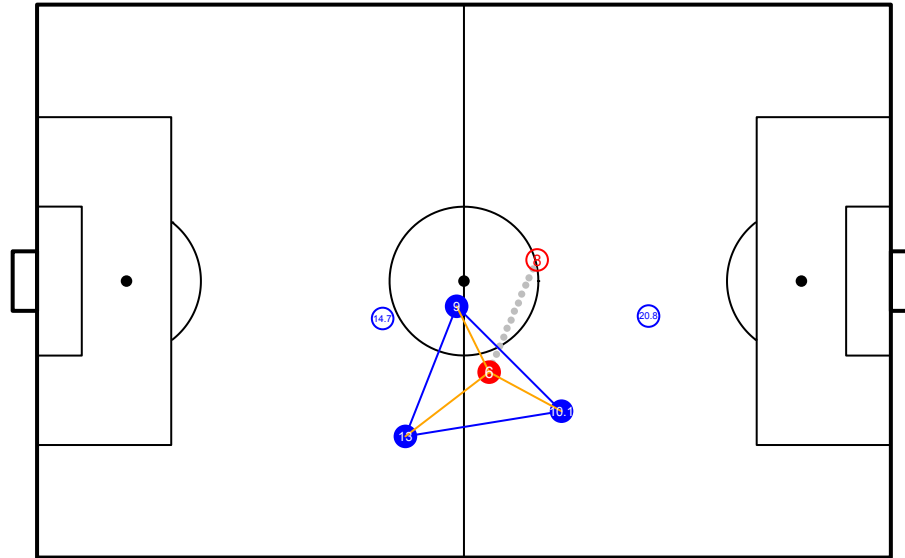


Type I

Type II

Passes from Xavi to Iniesta

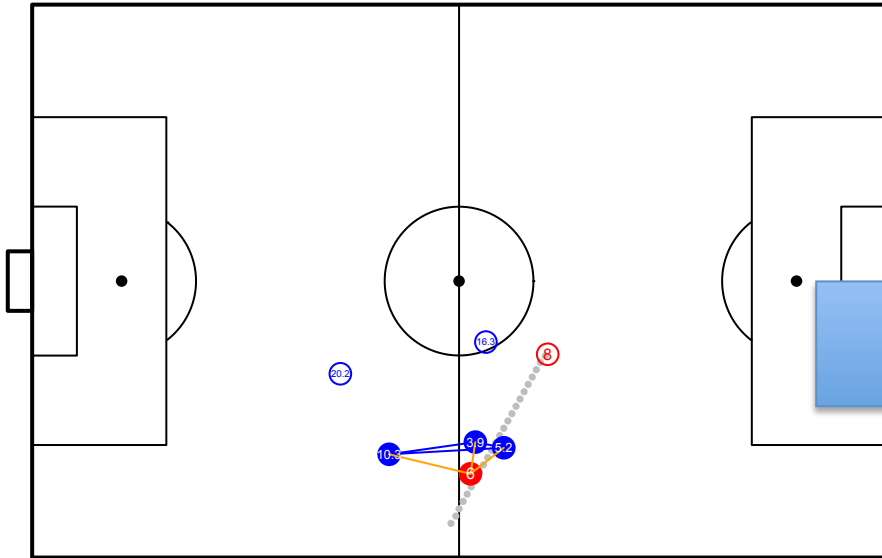
2nd Half. Time 18 : 54 : 4



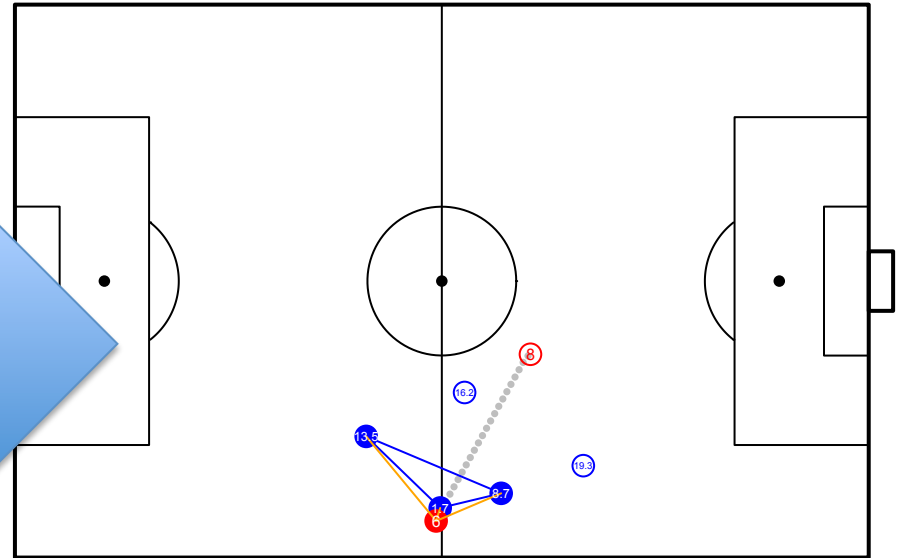
Typical pattern

Passes from Xavi to Iniesta

1st Half. Time 39 : 53 : 0

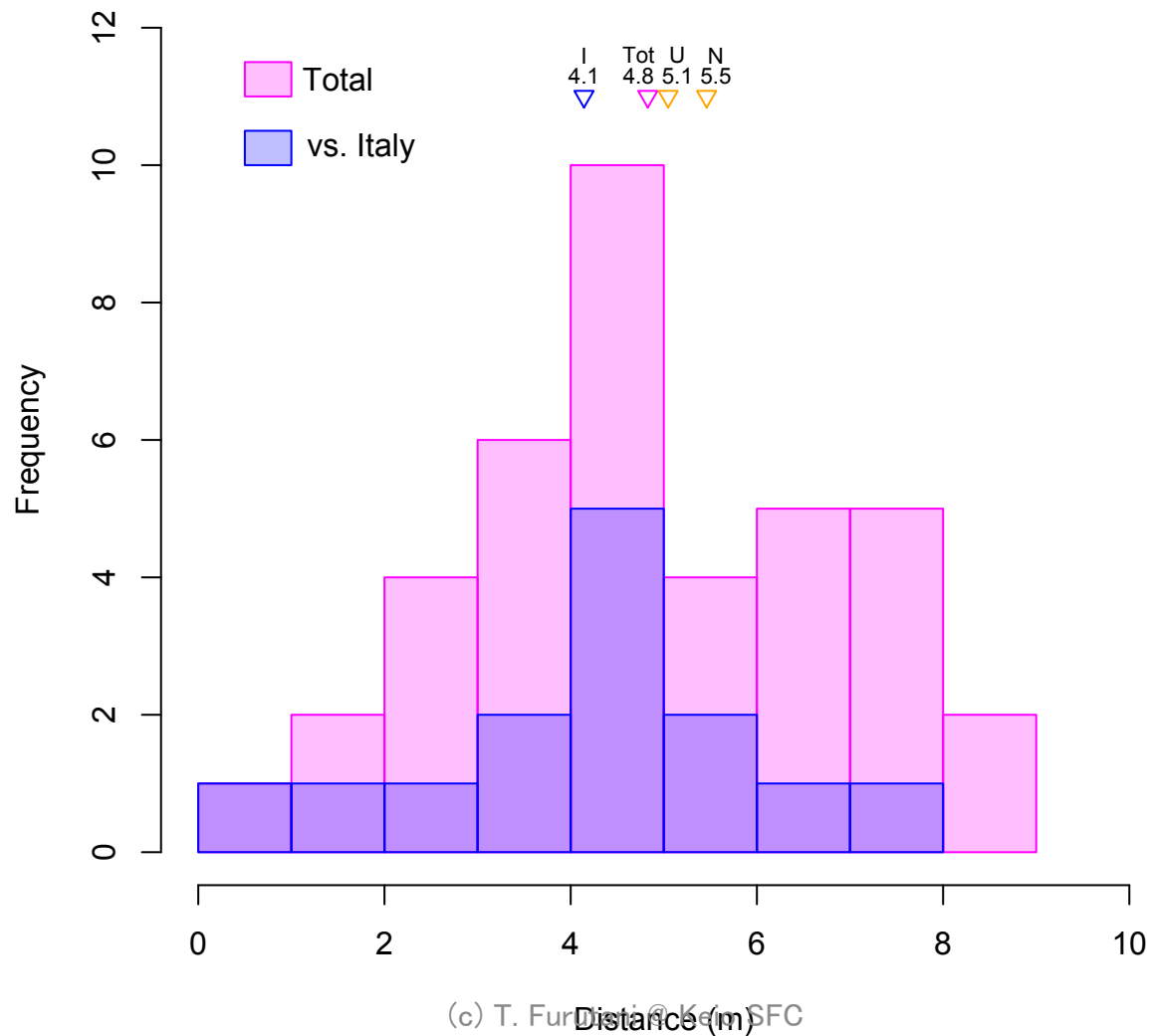


1st Half. Time 39 : 55 : 3



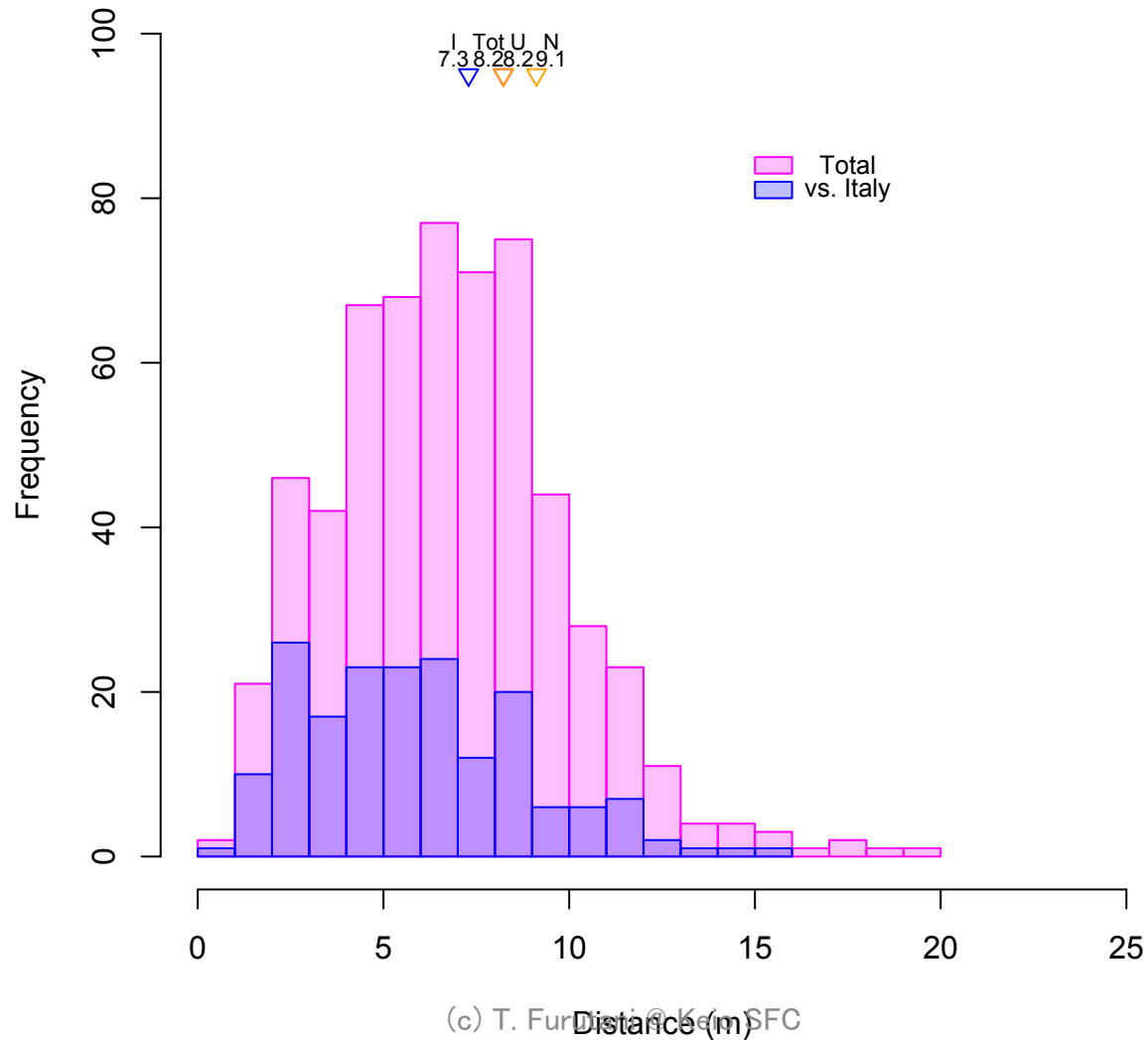
Distances from Iniesta to the nearest opposing player when he receives passes

Distance between Iniesta and the closest enemy player



Distances from Iniesta to the nearest three opposing players

Distance between Iniesta and the closest enemy player



Conclusions and future works

- Soccer data analysis is a kind of “expensive hobby” for data scientists
- “Usual” spatio-temporal statistical analysis could reveal weak points of the past King of soccer
- Comparative analysis between training data and match data

Acknowledgements

- Thanks to
 - NHK Japan
 - Data Stadium Co. Ltd.