Visualisation - Final Project (SS 2018)

Football Match Pass Relationship Explorer

Aziz Niyazov - 119029
Gareth Rendle - 119027

Summary

We present a visualisation technique that allows the user to investigate how players on a football team interact throughout a match. Our interactive radial node diagram shows links between each players, with the thickness of the link showing a large number of passes between players.

Performance statistics of individual players can also be viewed and compared to opponents, using a clear relatively-scaled bar graph system. Players' tactical positions are also shown to give the user better context of the players' roles within a team.

Motivation and Purpose

Sports data visualisation is an area that has received lots of attention, due to its wide appeal to many people across the world, who share a common interest in the same sports events. Vast amounts of data can be generated from sports events, and this variety and depth of data made the subject an attractive one for us when deciding on the topic for this project. We decided to focus on football (soccer).

Our idea centred around a focus on the relationship between players within a team, rather than only showing individual performance statistics, as is common in sports visualisation. In our case, we focused on showing the number of successful passes between each pair of players (e.g. from Player 1 to Player 2, and vice versa).

This would allow interested parties (fans, opposition coaches, players etc) to identify which players are most vital in the way a team plays when attacking. Players with many passes can be identified as 'Ones to Watch', maybe when viewing forthcoming games as a fan, or from a tactical point of view for analysts and coaches. Strong relationships between players can be identified, which is also useful information for tacticians.

Implementation

After research into related work, we found that people had attempted to show passing relationships between players, but usually had shown players on a pitch, with lines between them to indicate passes. This often became messy, as lines signifying connections often crossed confusingly. We realised it could be difficult to show all relationships, because many connections are possible with a team of 11 players plus 3 substitutes (in this case up to the 14th triangular number: 105).

To avoid this chaotic appearance, we decided instead to use a radial node graph, taking players as nodes, and relationships between them as links (fig1: A). Using a radial layout meant that links no longer crossed over other nodes. Although this loses the direct representation of where a player plays on a pitch, players are not static during a game, and showing just one position does not meaningfully represent their position during a game, even if an average is taken. To preserve some context of where a player usually plays on the pitch, we provided a secondary, linked 'map' of the pitch, from which players can also be selected (B).

To deal with the problem caused by the large amount of links that need to be shown, we decided to highlight only those links that relate to a selected player. Other links are shown as transparent, to deal with the problem of overplotting: allowing the shapes of links to be seen when they are not selected.

While line thickness is not a characteristic that people can easily make precise value estimates from, it does provide enough variation to show relative differences. In order to emphasise relative differences, we reduced the possible number of line thicknesses to 5, and quantised the value (number of passes) to those thicknesses. It is more difficult to distinguish differences across a continuous line thickness scale. The exact number of passes is shown when hovering over the link (C).

Detail on Demand

As it is difficult to give a lot of information about a player on their actual 'node', we included a multi level detail-on-demand system. When hovering over a node, the player's name and nationality is shown below the node diagram (D). Then, when a player is clicked, further statistics about their performance are shown in the comparison box (E).

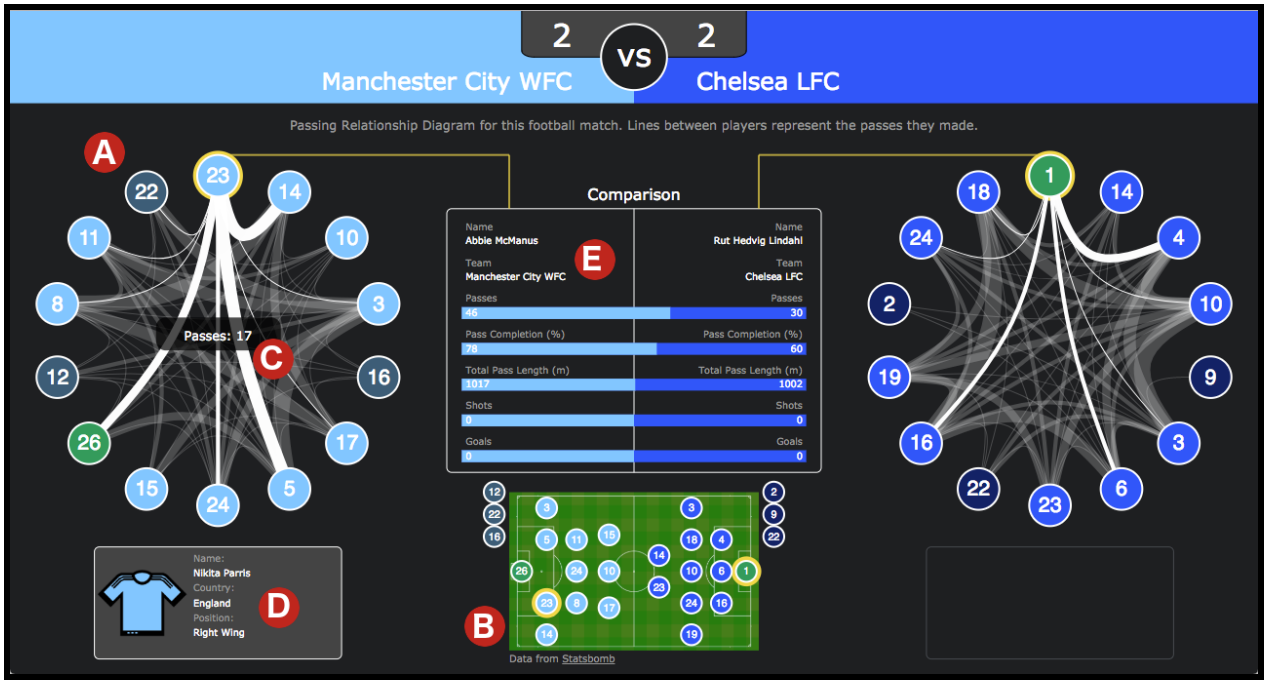

Fig 1: Passing Relationship Interface

Comparison

In addition to allowing detailed viewing of a players statistics, the central box also allows comparison between two players from opposing teams. A relative bar graph system is used, that clearly shows which player scores higher in that area of play. Linear length is the most effective way of differentiation between values. Although the bars are not aligned in this case, a central marker is provided as a clear reference.

Data Source

The data set used here is one match from a larger database of English Women's Super League data. It is provided by Statsbomb [2].

Tools

This project was mostly written in Javascript, using the Data Driven Documents (D3) [1] library. This was a learning experience for both of us, as we had no experience in Javascript specifically. CSS was used for some styling.

References

1. Bostock, M. *D3.js - Data Driven Documents,* 2017. https://d3js.org/
2. Statsbomb. *Data*, 2018. statsbomb.com/data