Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
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School of Computer Science and Statistics

Assessment Submission Form

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Signed - Taranvir Singh Date – 19-04-20

1 Introduction

Slowly and steadily data analyses is creating its footholds in the field of football. There is a lot of data to consume from one single football match, and this data has far deeper story to tell than any average human eye can extract from the match broadcast.

With the advent of companies that record, and store data related to football, a lot of different ideas and influential works have come forth. One such area under progress is visualization of this data. No matter how much data is being recorded, it will only be a bunch of numbers without proper visualization or storytelling.

In this project I tried to recreate a visualization, Pass Sonars, the idea first made popular by Eliot McKinley, who used this concept in MLS. Pass Sonar, is an idea inspired from Wagon Wheels, a concept very popular for visualizing an inning of a batsman in Cricket.

There were already some ideas widely used in football analytics to visualize passing data, like the one shown in Figure 1. However the major problem with this kind of visualization is that it becomes overcrowded too easily. Consider plotting passes in the range of 700-800, these kind of graphs will be crowded with arrows making it hard to observe. Hence there was need of some more sophisticated way of visualizing more data in a sophisticated way.

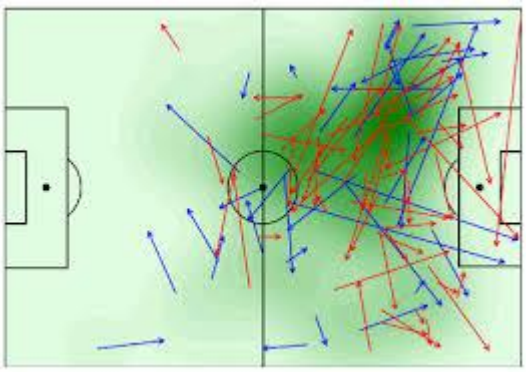

Figure 1

Hence, Pass Sonar, can become a solution to this problem here. Pass Sonars use Rose charts to visualize passing data for each player of a team. Rose charts can visualize three types of data in one diagram using length of bars, color of bars and angle of bars. Hence it is best suited for the problem in hand. We can visualize Pass lengths, Passing angles and Passing Frequency using just one figure which will make the visualization much neater than the one presented in Figure 1.

2 Data Set

Recently StatsBomb released a lot of football match data for free, in this project I have used match data of Germany vs South Korea, World Cup 2018 [1]. The data files are given in json format. There are abundance of data features to work with like pass type, pass angle, pass length, pass outcome etc. In total the data set of one match contained 106 different features. I decided only to use features related to passes.

I converted the given json file to a pandas data frame and used pass angle, pass length and player's position from the data. In order to work with Rose charts, I distributed pass angle into 24 bins, pass length into 5 bins. Eventually the data was grouped by pass angles to get frequency of passes and average pass length in each angle bin.

3 Task

The basic task of the project is to visualize passing data of whole team in one figure. Rose chart for each player is plotted on a football pitch according to the playing position of the player. Using this figure the user will be able to explore different facts about the passing performance of the players.

4 Approach

Figure 2 shows a rose chart plotted for the passing data collected for all the passes made by Tony Kroos.

Figure 2: Toni Kroos

Encodings:

- Bar angle – Passing angle on the pitch is encoded by the angle of bar. 0 degree means a straight pass on the pitch and 180 means a backward pass.
- Bar color – Bar color represents the average length of pass in that particular angle.
- Bar Length – Length of bar represent the frequency of passes in that particular range of angles.

11 different Rose charts are displayed on the pitch according to the plauing position of the player.

Different possible inferences the user can infer from the plot.

- Is the player used to more sideways passing or straight key passing.
- Who is the major playmaker in the team.
- Looking at the graph of the goalkeeper the user can observe if the team tried to build from the back or if they tried a more direct approach by passing long.
- Is the player used to pass long or short.

5 Limitations

- The plots can only provide information about angle, frequency and length. However to analyze passing performance deeply, positioning of pass is also required.
- No information about passing accuracy can be observed from the graphs.
- Using radial charts hardly leaves any useful interactive features for the user.
- The data has to be transformed into a form suitable to feed to radial charts.

6 Future Possibilities

- Showing passing heat map on pitch on selecting a player, to give a better sense of player positioning while initiating a pass.
- Encoding passing accuracy within the bars.
- Show number of passes between two players using arrows connecting two graphs.

References

[1] StatsBomb, “Free football data from StatsBomb,” [Online]. Available: https://statsbomb.com/resource-centre/.