Introduction

The area of study that the report will cover is how clustering of football players can be conducted. To narrow down the problem a little bit further only the football players who plays as forwards has been included in the study. Hence, the main aim with the report is to investigate what types of clusters forwards from the top European football leagues can be clustered into.

The top European football leagues are the English Premier League, German Bundesliga, Italian Serie A and Spanish La Liga. In the world of football it is a well-known fact that these leagues are the strongest and it is also stated in a more official way by the UEFA ranking of the European leagues [1]. During the 2015-16 season a total of 181 players from these leagues had playing time as forwards corresponding to at least six full games. Data for 51 different variables (more about the data set in the background chapter) is collected for each player and the amount of variables makes it hard to just by the eye detect and group similar players together.

This difficulty, to find players which are similar, is a constantly ongoing problem for football clubs all over the world. How to replace your star player when he leaves? In the summer of 2014 Luis Suarez joined FC Barcelona from Liverpool leaving the latter club with the hard task of replacing their forward star [2]. The British club signed the Italian striker Mario Balotelli to cover up for the loss of Suarez, but he failed miserably and the signing of Balotelli has been heavily criticized [3]. This summer a similar case is on our hands as Zlatan Ibrahimović will leave PSG at the end of the season. How the Frenchman’s are going to replace Ibrahimović will be one of the hottest topics this summer [4].

In many cases it is reasonable to think that the clubs want to replace the forward that leaves with a similar forward. To find a forward that is similar to Suarez or Ibrahimović is of course always going to be very difficult, but perhaps you at least want to find someone who takes a similar number of shots per game or creates goal opportunities’ for his teammates at a similar rate. Here is where the use of Data Mining techniques, and especially clustering techniques, becomes interesting.

Earlier studies in which football players has been clustered is quite rare. However, the article published on the blog pena.lt/y is one example of this [5]. In this article the author clusters players playing on all possible positions by using principle components and the k-means clustering algorithm. Principle components is used for reducing the dimensionality since the amount of variables is high. The k-means algorithm splits the players into five different groups and the given results are not very surprising. Goalkeepers are in one cluster, defenders in another and so on. The article does not examine any further if, for example, the group of midfielders can be divided into any subgroups of midfielders.

To find more examples of similar studies it is necessary to look at sports other than football. In the article “*Exploring Game Performance in the National Basketball Association Using Player Tracking Data*” by Sampaio et al. are basketball players clustered to create game performance profiles based on different game roles [6]. The authors used k-means to create the profiles and presented seven different types of game performance profiles which according to the authors agrees well with the existing roles that a basketball player can take.

<http://www.uefa.com/memberassociations/uefarankings/country/> [1], 20/5

<http://www.liverpoolecho.co.uk/sport/football/football-news/luis-suarez-barcelona-how-liverpool-7383131> [2], 20/5

<http://www.sportskeeda.com/football/brendan-rodgers-explains-liverpool-failed-signing-mario-balotelli-instead-alexis-sanchez> [3], 20/5

<http://www.espnfc.com/club/paris-saint-germain/160/blog/post/2871975/zlatan-ibrahimovic-replacements-ronaldo-neymar-hazard-griezmann-sanchez> [4], 20/5

<http://pena.lt/y/2014/02/10/comparing-players-using-cluster-analysis/> [5], 20/5

[6], “*Exploring Game Performance in the National Basketball Association Using Player Tracking Data*” by Sampaio et al.

Background

Data

The data used for the study is collected by Opta and made available via the website WhoScored.com. The dataset consists of 181 players and for each player there are 51 variables.

Is for the full season 2015/16 in the English Premier League, German Bundesliga, Italian Serie A and Spanish La Liga. Must have playing time as a forward that corresponds to at least six full games.

There are more variables available. Did not collect data for variables that seemed uninteresting/meaningless (variables of a more defensive nature, actions that are very rare for forwards).

The players’ position is logged, so the data is for the time during the season the players has played as forwards.

Have not just taken the players who normally plays as forward and taken all their data. Want to see what the player contributes with when used as a forward.

Do use the number of 90’s played instead of the number of appearances or minutes. All variables are measured per 90 minutes instead of per game or in total. This to see what a player on average contributes with during 90 minutes of football.

**Appearance data**: The player, number of appearances, minutes played, the league

**Count variables** (top-level):

|  |  |  |  |
| --- | --- | --- | --- |
| Goals | Shots | Passes | Other |
| Six-yard-box | Six-yard-box |  | 90s |
| Penalty area | Penalty area |  |  |
| Out-of-box | Out-of-box |  |  |
| Open play |  |  |  |
| Counter |  |  |  |
| Set Piece |  |  |  |
| Penalty |  |  |  |
| Normal (exclude!) |  |  |  |
| Footed |  |  |  |
| Headed |  |  |  |
| Other |  |  |  |
|  |  |  |  |

**Count variables** (lower-level):

Example of player, Roberto Firmino: