Visualization of FIFA 18 Statistics

Shikhat Karkee
s.karkee@jacobs-university.de
Jacobs University, Bremen

Sabin Bhandari
sa.bhandari@jacobs-university.de
Jacobs University, Bremen

ABSTRACT

This paper attempts in highlighting an interactive tool that was implemented to visualize the FIFA 18 video game. With the industrial explosion of data in 21st century, it has been essential to effectively visualize the data such that anyone can understand the idea it is trying to convey. It is to encourage the power of human perception in understanding the visual representation of data. FIFA 18 is one of the most played video game, and there is an availability of large amount of data consisting of statistics of the players. By visualizing such data, we were able to address the difficulties from the gamer's point of view, and finally provide strategy as revealed by the visualization. The final visualization tool is a problem-driven project.

Index Terms: FIFA 18—Visualization—FIFA 18 Statistics—Video Game Visualization; D3 Visualization—Tableau Visualization—Sports Visualization—FIFA 18 Visualization

1 INTRODUCTION

Visualization is a technique for creating images, diagrams, or animations to communicate a message [7]. Computer-based visualization (vis) systems provide visual representations of datasets designed to help people carry out tasks more effectively [4]. The main goal of any visualization methods would be to convey an information through the visual representations (such as maps, graphs, etc.) so as to tell a story and inspire the viewers. By analyzing the data, the hidden information which were not apparent through data would be extracted to gain some insight on the topic. The audience who would be interacting with the visualization are experts and non-experts. The visualization should be presented in a such a way that an expert would be guided in a right direction while even a non expert would understand the content.

In this project, visualization of digital game is carried out where by leveraging the information of the statistics of the player, the visualization of player, their abilities and potential would be shown. This is essential due to inability of the visualization in the game to effectively deliver the insights of the game to the users. The visualization would cover different aspects of the game. Firstly, the general information about the player and their nationality would be shown to know about the composition of the team. Secondly, by analyzing the properties of player such as potential, age and value, the insight about strategy on playing the game would be revealed by looking at the visualizations. A web page is made such that the information is accessible to the user in an organized manner. For this project two main visualization tool are used, which are Tableau and D3. The project would analyze the data in two basis: (1) athlete based and (2) judgment based.

2 MOTIVATION

Football is one of the most popular sports around the world. The statistics and data involved in the sport are huge as well. The data and statistics can be visualized using different tools and thus, it can be quite enjoyable. Being one of the most popular video game of this sport, FIFA 18 still has many visualization shortcomings in the game. This visualization shortcomings can be seen from two different perspectives. The first perspective is from the point of view of people who play it in a daily or frequent basis and the visualization difficulties they have. For example, the people, who play this game in a frequent basis, play by being a manager of a team. While being a manager of a team, they would certainly want to buy young players having huge potentials. A visualization consisting of young players having huge potentials isn't available in the game. The second perspective is from the point of view of people who are very new to the game. There are different visualization that can certainly help the this group of people. For example, people who are new to the game or who have don't have much information about the sport, would certainly be tempted to play with national teams having high rated players. But a visualization consisting of high rated players and the national team they play for isn't available in the game. Also, FIFA 18 visualization can be used to provide a different strategic view to the people playing the game. It can help them to think differently and use their own creative mind to approach and implement the strategies.

3 RELATED WORK

Many works have been carried out in the field of the visualization in general. The main problem in visualizing is the data itself. In one of the paper, Godfrey, Gryz and Lasek [3] have talked about two major points relating to the interactive visualization on large data sets. First, large databases make interaction more difficult once query response time exceeds several seconds. Second, any attempt to show all data points will overload the visualization, resulting in chaos that will only confuse the user. They concluded that they have not encountered any system that would deliver truly interactive performance under the requirements of fast data abstraction in low budget. To achieve their goal of processing large data for visualization purposes, they concluded that using system built to handle specific data (like time series), using parallel computing methods, pre-processing the data and queries helps in handling such amount of data.

In the domain of sports data visualization, *"Sports data tends to be hypervariate, temporal, relational, hierarchical, or a combination thereof, which leads to some fascinating visualization challenges"* [2]. Soccer team management simulators such as SEGAs Football Manager [6] provide automatically generated visualizations of entire games to help users make their decisions. The visualizations that they provide are detailed; it included features such as videos, statistics and textual transcripts. However, these are based on simulated data which give more information than a real dataset about a game.

In last paper, [5] presents SoccerStories, a visualization interface to support analysts in exploring soccer data and communicating interesting insights. SoccerStories enabled the experts to support their existing work flow, but also gave them a novel way to explore games, challenging their natural biases. It effectively enhanced the experts examination, regardless of whether the investigator felt that the correspondence of his discoveries embedded in the content with little visualizations was not appropriate for his users. As for their

future work, they need to do manual selection of phases to explore; manual interaction to refine the automatic grouping within a phase; the synchronization between the interface and the video of the game; the adaptation of SoccerStories to live data streams; and a deeper exploration of sport lines design.

4 Approach

A normal **2D bar chart** was used as one of the visualization designs. It was used for visualizing players having high values and their potentials. **Aggregation of variables** like name, value, rating and potential was done. This design choice was a suitable choice because that data that was being visualized was categorical, and the final result had high data to ink ratio. Also, 2 labels were used in the y-axis due to aggregation of variables, and it would have been too long to appear on the x-axis. A horizontal line was used at the end of each bar representing the potential of the player. This design choice was also necessary to provide a different strategic view to the people playing the game. An example of for this can be found in the results section.

A **vertical bar chart** was used as another design choice. This design choice was used in two ways. The first way was by removing the vertical bars and using **photographs as bar labels.** It was used for visualizing countries having high rated players. A **tooltip** was used in order to provide extra information about the player when the mouse pointer was hovered on top of the photograph. A **legend** showing which photograph belonged to which player was used with this design choice. This was done in order to make the visualization more user-friendly. Also, a **drop-down filter** was used which would enhance the user experience, as they will be able to choose between countries that they want. This visualization design was targeted towards people playing the game for the first time. The second way of use of vertical bar chart was a normal one. It was used to visualize youth players having very high potentials, where bars of the chart represented the potential.

A normal **table** with three columns consisting of nationality, player's name and their rating was used as another design choice. It was used to visualize countries having high rated youth players. The design choice was essential in order to group the players by their countries and show the required data in a clean manner. A **slider filter** was used with this design choice in order to allow user to choose the range of ratings and age. A **map** view was used to show the countries whose player play in a specific club. **Brushing and linking** was used to connect this map to the another table such that players of the country we click on the map who play for the selected club can be seen on the table. **Parallel co-ordinates** was another design choice used in order to provide better alternative to the polygonal visualization of the players' statistics available in the game itself. This design choice was also used in order to compare multiple players at the same time, which is not available in the game.

5 Implementation

The visualization tool was implemented using FIFA 18 dataset from `www.kaggle.com` which was provided by Aman Shrivastava [1]. The .csv file consists of 70+ attributes and personal information of all the players featured in the game. In order to avoid data pre-processing in the visualization tool, a new .csv file, consisting of the data that were only going to be used, was made from the original .csv file

The visualization tool was implemented using Tableau and D3. Tableau was used as certain features, as, for example, tooltip and brushing and linking, were easy to implement. D3 was used as certain design choice like parallel co-ordinates were quite complicated to implement in Tableau. HTML, CSS and JavaScript were used to implement a website where the visualization could be uploaded, making the the website a complete visualization tool.

One of the implementation challenge arose as a parallel co-ordinate design choice wasn't available in Tableau. Another challenge was to import the faces of the players, as only a link was provided in the original dataset and it was not working. So, photos were imported as shapes for the bar chart label in Tableau. Importing the flags of the countries in the map view was another challenge as it had to be imported as shapes, and each country in the dataset and the flag had to be matched manually. Data pre-processing in D3 was one of the other implementation challenge.

6 Results

The following sub sections would present the system in use.

6.1 Website options

The navigation bar in the website is shown in the figure.

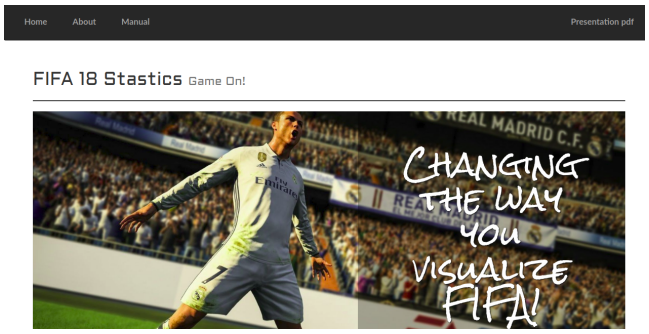

Figure 1: Overview of the website.

The navigation bar is composed of three buttons: **home** for returning to homepage, **about** to show the information about the web page as well as about the creators and the **manual** consists of the information about how to use the webpage.

6.2 Tableau

The body of the website is composed of the storyboard with several visualization in tableau.

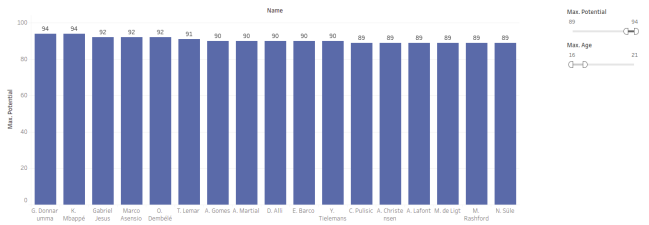

Figure 2: Youth with high potential.

Figure 2 represents a vertical bar chart which aggregates three variables: player name, their age and their potential.The chart can be controlled by two sliders where a user can manually choose which potential range or which age group of players they want to compare. As a result, we can see the players of certain age group arranged as according to the descending order of their potential.

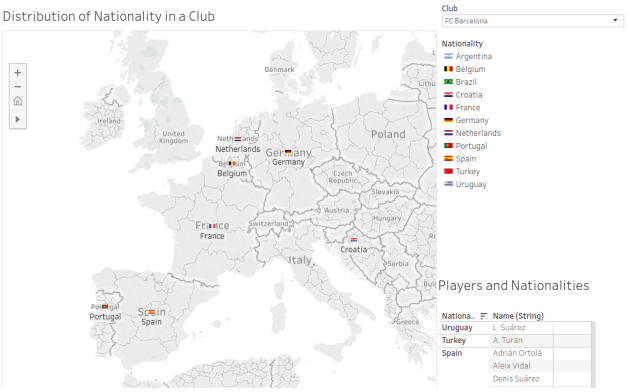

Figure 3: Nationality distribution of the clubs.

Figure 3 uses a dashboard consisting of a map and a table to visualize the nationality distribution of the clubs. A drop down menu which has a list of names of clubs is provided. By selecting a desired club, the user can see the nationality of the players in the club in a table along with their names. Brushing and linking is used in this map to allow the user to select a flag in the map to filter out players from that specific country.

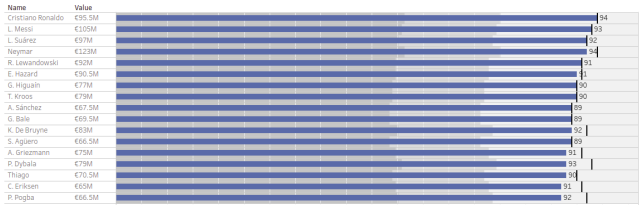

Figure 4: Top Values and Potentials.

Figure 4 uses a horizontal bar graph to show the top valued players and their potential. There is an aggregation of three variables: player name, their value and their potential. The bar shows the current rating of the player whereas the black margin shows the maximum potential that a player can reach.

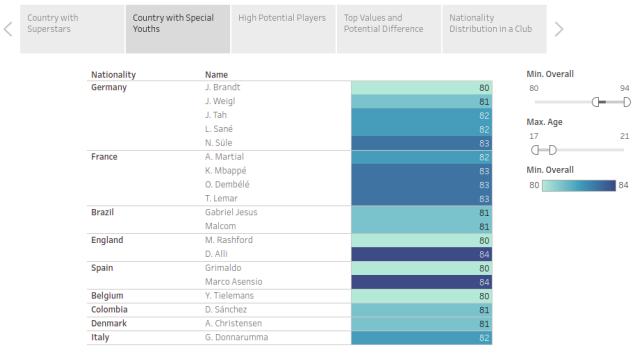

Figure 5: Country with Special Youths.

Figure 5 uses a table to show young players having high ratings and their nationality. There are three variables that are aggregated nationality, name and overall rating. There are two sliders, (1) to choose a specific range of overall rating and (2) to choose specific age of the player. The legend displays the maximum overall distribution of rating in that range.

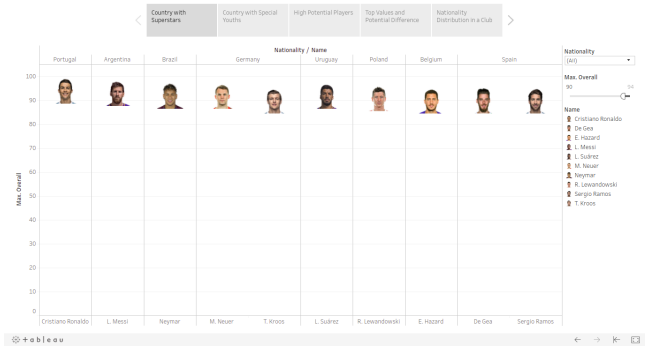

Figure 6: Country With Superstars.

Figure 6 is just a bar graph where a bar is replaced by a picture of the face of the player. It has players in x-axis and their rating in y-axis, grouped according to their country. There is a drop down menu to choose the nationality of the player. There is also a slider to change the range of overall rating. The names of the players will be listed in the legend.

6.3 D3

In this project, we have used only one visualization using D3.

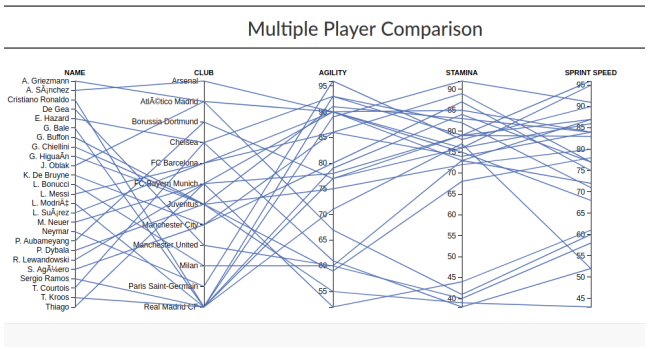

Figure 7: Statistics of Top 25 players.

A parallel coordinate as shown in figure 7 is used to visualize the players (only top 25 players were used) in their club according to three different skill set. Stamina, agility and sprint speed are compared among different players. The visualization is interactive, where a user can select any player, and the clubs and skills of that player will be displayed by a line.

7 Discussion

The strength of the tool lies in solving the visualization problem in FIFA 18 game. The figure 8, shows two major problem in visualization of the game: (1) it enables the comparison between only two players and (2) the polygon that shows the comparison between different attributes is hard to comprehend by the human mind. This has been solved in our implementation. The user can easily compare the statistics between different players at once.

Figure 8: Snapshot of the visualization in FIFA 18 game.

The dataset consists of every player that featured in the FIFA 18 video game with more than 70 attributes. As according to the feedbacks from the user, the website should have utilized many other aspects from the large pool of data. Most of visualization only focused on potential of the player, however other features should have been explored. For example, one of the user suggested a different problem. The problem was that if a player playing in a certain position is injured and there are no other players playing in the same position, there are no visualization available to help the player to choose another player who can be deployed at that position. So, problems like these should be looked addressed as well.

Figure 9: Potential comparison between two players.

By looking at the visualization, one can also develop strategy. One of the example can be explained using the figure 9. One may be tempted to buy Ronaldo in the game as he is one of the highest rated player. However, his value is too high. In the figure , one can observe that Ronaldo, whose value is 95.5M euro, has reached his potential of 94. However, Pogba, whose value is 66.5M euro, has yet to reach his potential and still stands at potential of 92. Thus, it is beneficial for a player to buy Pogba instead of Ronaldo.

Work Division

Before separating the task, ideas were conjured on a white board from the data set. Despite the separation of task, the authors worked on all the tasks. Sabin worked on making the web page and methods to integrate Tableau in the web page. Shikhat assisted on making the web page and worked on making the visualizations of the data. Since, making the visualization was a greater task, both the authors indulged in improving the visualization and generating different concepts. Half of the report was written by Sabin and half of the report was written by Shikhat.

Acknowledgments

The authors wish to thank Prof. Dr. Michael Sedlmair for his continued support and feedback throughout this project.

References

[1] FIFA 18 complete player dataset. Kaggle data set, [Online; accessed March 6, 2018].

[2] R. C. Basole and D. Saupe. Sports data visualization [guest editors' introduction]. *IEEE Computer Graphics and Applications*, 36(5):24–26, Sept 2016. doi: 10.1109/MCG.2016.85

[3] P. Godfrey, J. Gryz, and P. Lasek. Interactive visualization of large data sets. *IEEE Transactions on Knowledge and Data Engineering*, 28(8):2142–2157, Aug 2016. doi: 10.1109/TKDE.2016.2557324

[4] T. Munzner. Keynote speaker: Visualization analysis and design. In *2016 IEEE Pacific Visualization Symposium (PacificVis)*, pp. xiii–xiii, April 2016. doi: 10.1109/PACIFICVIS.2016.7465242

[5] C. Perin, R. Vuillemot, and J. D. Fekete. Soccerstories: A kick-off for visual soccer analysis. *IEEE Transactions on Visualization and Computer Graphics*, 19(12):2506–2515, Dec 2013. doi: 10.1109/TVCG.2013.192

[6] S. Interactive. . Football Manager.

[7] Wikipedia contributors. Visualization (graphics) — Wikipedia, the free encyclopedia, 2018. [Online; accessed 18-May-2018].