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Visualizing the Outcome of Matches of a Tournament in a Single Display

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Abstract: Visualization has by now become an integral part of modern-day research. With the advances in computation technology data display is extensively used in different fields of research, making data more explanatory and insightful. Graphical displays have also become very popular in sports, especially for television audiences. But with the improvement in technology, different stakeholders associated with sports have made use of data for measuring the performance of players, framing strategy, etc. Statistical graphics and tools of data visualization have played a significant role in sports analytics. In this paper, the authors try to develop a semi-graphical display that can be utilized to visualize the schedule of the tournament along with the outcome of all the matches. To explain how the display works, data from the ICC Twenty20 Cricket World Cup of 2022 was used. In the said tournament- 12 teams participated. Though the cricket tournament is taken as an example to produce the display the presentation can be extended to other sports as well where more teams participate. Some potential areas where the display can be used are also discussed.
Keywords: Sports Analytics, Data Visualization, Semi-graphic display

1. Introduction:

Data Visualization is a technique of expressing meaningful numbers through graphs and diagrams. But time has changed and now graphs are called infographics, which are interactive and dynamic as they are no longer restricted to pages of books and journals but are an integral component of websites and social media platforms. People are now working on making innovative displays that are user-friendly and interactive. The domain of data visualization, which was sometimes a mere tool of data display, has now been a subject of research and advanced-level computer programming.

Visual displays of information have become an order of modern-day research. High-quality and sophisticated graphs and diagrams are used to communicate results in most of the research papers in scientific publications. Today visualization tools play an important role in all aspects of statistical investigation – it begins with exploratory plots, supports various stages of analysis, and helps in the final communication and display of results (Bhattacharjee and Das, 2007). Data whether generated from an experiment in physical science or from any socio-economic phenomena needs to be visualized (Bhattacharjee, 2012). In one of the very early works on visualization, Playfair (1801) commented that the purpose of data visualization is to make statistics a little more palatable. But with technological advances and computational power- visualization has become an integral part of data presentation and analysis. In addition to scientific research, visualization tools are used extensively in our classrooms, in government reports, in newspapers and popular magazines, in television news, and in sports coverage. In the last two decades, many websites, books, and other publications have emerged that are focused on data visualization. One remarkable step in this regard is that of Gap minder - the author and inventor Hans Rosling found out attractive means of communicating several demographic and economic global phenomena to a wide audience using data visualization (Ralf, 2019).

Data visualization in sports has gained utmost popularity over the years, especially in sports reports appearing in relevant periodicals, on websites, and in television broadcasts. Some recent and excellent examples of data visualization related to cricket and football can be seen in the works of Subramanian (2019) and Tselova (2022). Perin et al. (2018) provide an extensive review of visualization in the arena of sports.

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This paper attempts to develop a visualization tool that can be utilized to envisage the outcome of all the matches of a tournament figuring multiple teams, in a single diagram. This shall help the onlooker to understand the run of victories and losses of the different participating teams when matches in the tournament are played as a league or on a league-cum-knock out basis. For display, real data is taken from the recently concluded ICC Twenty20 Cricket World Cup Tournament of 2022 hosted by Australia.

2. Review of Literature

With the accessibility to technological advances like color, computer graphics, computer animation, dynamic graphs, three-dimensional computer graphics, holography, etc. the solutions to many statistical problems are obtained through innovative use of both graphical and semi-graphical tools. Most of the recent versions of statistical software are now producing high-resolution self-explanatory graphics (Bhattacharjee, 2007). Semi-graphical displays are often used in newspapers and reports and in sports it is generally used for the formulation of strategy mostly in soccer, rugby, basketball, badminton, etc. (Zuo (2022), Tani et al. (2015), Haq et al. (2022)). Visualization has become easier these days and some websites have come up that can draw different types of static as well as dynamic graphics for user-defined data sets. Some graphs in websites are designed in such a way that a particular section of the graph gets highlighted and also displays the corresponding figures as tooltip text when the user hovers the mouse over that part of the figure. One such website is flourish-studio, which can be utilized to produce different types of graphical displays related to sports. The article by Tselova (2022) discusses how one can use flourish-studio to display sports-related data especially concerning soccer. In this work, there is a mention of a visualization tool for match schedules and outcomes of matches in FIFA World Cup 2022. But the author has shown the matches starting from the round of 16 to the final only. Displaying the entire tournament schedule along with all the match outcomes is a daunting task. A proper display for all the matches of a tournament shall give at a glance how the different teams progressed to the different rounds of the tournament. As the best of our search did not provide us with any such convincing display, that worked as motivation to generate a semi-graphical of this type. This is the area where the proposed graph excels over its existing competitors.

3. Objective of the Study

It is evident from the review of the literature that there is a need and inadequacy of a visualization tool that can be utilized to display the schedule and outcome of all the matches of a tournament. This sets the tone to spell out the objective of the study. The paper tried to develop one such tool of data visualization that can display the outcome of all the matches of a tournament in which multiple teams participate.

4. The Data Set

The data set consists of the outcome of the matches in the Twenty20 Cricket World Cup played in October-November 2022 in the different cities of Australia. After the qualifying round- 12 teams were named for the main phase of the tournament. The teams were divided into two groups viz. Group 1: New Zealand (NZ), Australia (Aus), England (Eng), Sri Lanka (SL), Ireland (Ire), Afghanistan (Afg) and Group 2: India (Ind), Pakistan (Pak), Bangladesh (Ban), Netherlands (Ned), South Africa (SA), Zimbabwe (Zim). Each team in the group plays with every other team in the group once and the top two teams from each group move forward to the semi-finals. The teams earns two points for a win and one point for a tie or no result. In case of a loss, no point is awarded. In the first semi-final, the top team of Group 1 plays with the second position holder of Group 2. Likewise, in the second semi-final, the top team of Group 2 plays with the second position holder of Group 1. The winners of the two semi-finals played each other in the final. The schedule and the results of each of the matches are collected from the website espncricinfo.com.

5. The Plot

The plot which can be named the Tournament Outcome Display is semi-graphical and is in the form of a table where color is gainfully applied to communicate different information. The display can communicate the following information- schedule of matches, winner and loser of all the matches of the tournament, teams in the different Groups, runs of victory of all the teams, matches segregated as league matches, and knock-out. The Tournament Outcome Display of the ICC Twenty20 Cricket World Cup of 2022 can be seen in Figure 1.

To understand the proposed semi-graphical display, it is essential to have some know-how about the tournament that the display visualizes i.e. the Twenty20 Cricket World Cup of 2022. The tournament was played in Australia from 22nd October to 13th November 2022 with 12 national sides playing in the final round

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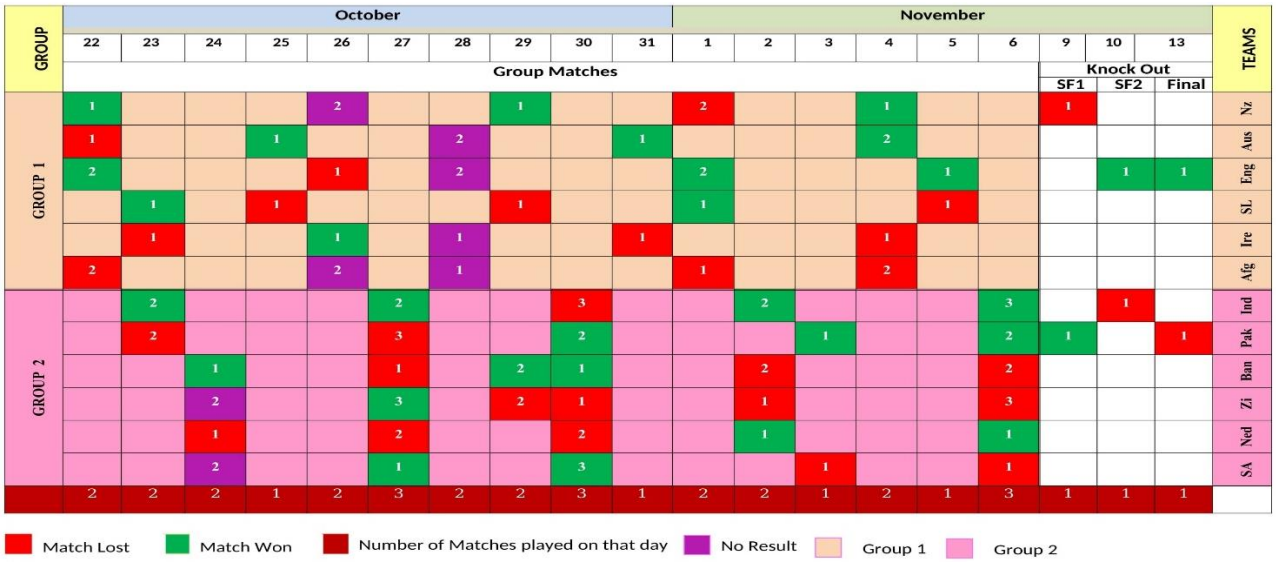
of the tournament. The teams were divided into two groups (Group 1 and Group 2) with six teams in each group. Within the groups round-robin matches were played and then the knock-out round started (semi-finals) with the two table toppers of each of the groups. From Group 1 New Zealand and England attained the top positions and from Group 2 India followed by Pakistan acquired the top two slots. In the knock-out stage as a crisscross rule, India took on England and New Zealand played Pakistan in the semi-finals. Following the semis-victorious teams Pakistan and England reached the finals of the said World Cup final which was played on the 13th of November, 2022 at the Melbourne Cricket Ground, Melbourne. Ultimately, England defeated Pakistan in the final by 5 wickets and won the tournament.

In Figure 1, the proposed semi-graphical display is portrayed. It attempts to visualize all the matches of the tournament viz. schedule i.e. the participating teams in all the matches and their outcome. The plot is a semi-graphical display which is in the form of a table and looks somewhat like a date calendar showing the winning team in a green-colored cell and the losing team in a red-colored cell. In case there is 'no result' in the match then violet color is used in those cells. The first column identifies the different groups of the tournament. As there are only two groups 1 and 2, there are only two cells in the first column distinguishing the two groups. The first row is used to specify the months and the second row displays the dates. These two rows in combination spell out the dates of the different matches of the tournament. The last column of the display is used to name the teams. Additional colors can be utilized to communicate different stages of the tournament like group league or knock-out matches. Sometimes, in a single day, multiple matches are played and they can be differentiated by the integers viz.- 1, 2, etc. used in the boxes to identify the teams that participated in the first match, second match, etc. on that day respectively. The last row of the display is colored in maroon and each cell of that row contains an integer which is the number of matches played on that day. The interpretation of the display can be as the second column signifies the matches played on 22nd October, in which two matches were played. Both the matches were played by the teams categorized in Group 1. The first match was played between New Zealand and Australia with New Zealand remaining victorious characterized by a green cell (in column 2 against New Zealand). Likewise, the second match was played between England and Afghanistan. Marked by cells with integer '2' in the rows dedicated to England and Afghanistan (c.f. last column of the display for country names). In those cells of the second column marked with integer '2' the cell dedicated in England's row is colored in green and that of Afghanistan is marked in red indicating that the latter lost the match to the former. A similar process can be used to interpret the outcome of the other matches of the tournament from the display. Looking at the plot some interesting reading can be made, like- all the matches played on 28th October were abandoned. Generally, if more than one match is played on a particular day then all the participating teams in those matches either belonged to Group 1 or Group 2. The exception is on the 23rd and 29th October. On both these days, two matches were played. The four participating teams in those two matches were from different groups.

Figure 1: A proposed graphical technique for representing the schedule outcome of all the matches of a tournament.



The figure can also inform the onlooker that the Group matches were played between the 22nd of October to 6th of November and the Knock-out phase started on the 9th of November and the Final was played on the 13th of November. England won the finals and were named the champions. The team that won the maximum number of matches is England (identified by counting the number of green squares in the row corresponding to their team). The worst performance is that of Afghanistan who ended the tournament without a victory, characterized by no green squares in the row assigned to them. As many as three matches were played on the 27th, and 30th of October and on the 6th of November.

6. Limitation of the study, Direction of Future Research and Conclusion

The paper attempted to introduce a novel plot named Tournament Outcome Display that can visually represent the fixture and outcome of several matches in a tournament. Though the display in Figure 1 uses a cricket tournament as an example, the display can also be applied to tournaments relating to other team sports.

The semi-graphical display is simple to implement. It can be drawn in any word processor with the facility to make tables using color. However, for any graphical display supporting software comes in handy. This enables the display to be produced in a much more objective manner. The current researchers have yet to develop any algorithm or code for producing the graphics discussed. This may be an area of future research concerning this display. Another extension of the display can be about including the margin of victory in the different matches. As the margin of victory widens, this can be achieved by intensifying the green hue used in the winner's box and vice-versa. Similar to this, the intensity of the red hue in the loser's box increases as the margin of defeat does. Future researchers may also consider creating a web application or software that would enable widespread usage of the display in TV programs and news items presented in magazines and periodicals. Drawing the display without software may prove to be time-consuming and brainstorming.

Representing the schedule and outcome of all the matches of the FIFA World Cup using the proposed semi-graphical display can be a big challenge. The last FIFA World Cup played in 2022 in Qatar was a tournament featuring 32 national teams. The teams were divided into eight round-robin groups and then the knock-out round started with the two table toppers of each of the groups. A total of 64 matches were played in the tournament in 29 days (Wikipedia contributors, 2023). It has been learned that the next FIFA World Cup to be played in 2026 shall be participated by 48 national teams. Though the format of the upcoming FIFA World Cup with 48 nations is yet to be made public it shall be a difficult tournament. Accordingly, the visualization of the tournament schedule along with the match outcome using the semi-graphical display discussed here might be a challenging proposition but not impossible. With the idea once being flown in the air, future researchers and data analysts may take the issue forward and apply the display to other tournaments with similar or even much harder formats like that of the upcoming FIFA World Cup to be played in 2026.

With technological advances and with different decision-making studies becoming data-driven the need and skill for data visualization have grown severalfold in the last few decades. This paper is a humble attempt in this regard to introduce another application of graphics in the field of sports. The same technique can be carried forward to other domains of knowledge as well. This might be another interesting area for future researchers to explore.

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