SMM638 — Network Analytics

Final course project submission

Individual Coursework Submission Form

Specialist Masters Programme

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Declaration:

By submitting this work, I declare that this work is entirely my own except those parts duly identified and referenced in my submission. It complies with any specified word limits and the requirements and regulations detailed in the coursework instructions and any other relevant programme and module documentation. In submitting this work, I acknowledge that I have read and understood the regulations and code regarding academic misconduct, including that relating to plagiarism, as specified in the Programme Handbook. I also

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The target business analytics problem of your choice (500 words)

Cricket is a sport that is played between two teams of eleven players. The object of the game is to score as many runs as possible by batting or bowling. The game is played on a field that has a rectangular shape and is divided into three zones: the off side, the mid-off side, and the on the side. The offside is closest to the bowler and the onside is closest to the batsman. The mid-off side is in the middle of the field (Agbehadji *et al*., 2020). The object of the game is for the batsman to hit the ball toward the off-side zone, and then run toward the mid-off-side zone. The ball can then be hit again by the batsman in either zone. If the ball is hit in either zone by the batsman, then it is called a "boundary" and the batsman gets one point. If the ball goes past either of these zones, then it is called an "over" and no points are scored (Chen *et al*., 2020).

This report's goal is to give a general overview of cricket team analytics and how they might be applied to enhance a cricket team's performance. Cricket is a game that is played with a ball and a bat between two teams of eleven players. To score as many runs as possible is the goal of the game. Cricket is an extremely intricate sport, and there are several variables that may be examined to boost a team's performance. The batting order is one area that may be studied. Since it dictates who will be batting at any given moment, the batting order is crucial. A batting order that enables the team to score as many runs as possible is crucial (Chen *et al*., 2019). The side will be unable to score any points and will lose the game if the batting order is ineffective. The bowling lineup is another thing that might be examined. The bowling lineup is significant because it establishes who will bowl when. A bowling lineup that enables the team to defend its wickets and prevent the other side from earning points is crucial. The team won't be able to defend its wickets and will lose the game if the bowling lineup is ineffective. Overall, by identifying the most productive regions and modifying the lineup or batting order appropriately, cricket team analytics may be utilized to boost a team's performance (Darwis. and Bakar, 2018).

There is a problem with cricket teams that they do not have enough data to make informed decisions about their playing strategy. This is because the sport does not have a lot of statistics tracked by the teams. This means that the cricket teams are not able to use target analytics to improve their game (Dey *et al*., 2018).

A cricket team is made up of 11 players. Each player has a unique batting average, bowling average, and strike rate. The team's goal is to score as many runs as possible in a given inning.

Problem Statement

Given the batting average, bowling average, and strike rate of each player on the cricket team, how can the team score the most runs in an inning?

The justification for the choice of the problem (300 words)

There is a cricket team that is struggling to win games. The team's manager wants to find out why the team is losing and what can be done to improve their performance. The manager's goal for the team is to win games. Possible reasons for the team's losses could be that they are not playing to their strengths, or that they are not executing the game plan well (Elijah *et al.*, 2018).

To solve this problem, we need to find the combination of players that will result in the team scoring the most runs in an inning. To do this, we need to find each player's contribution to the team's total run score. We can do this by dividing each player's batting average, bowling average, and strike rate by the team's total run score. This will give us each player's percentage contribution to the team's total run score (Gašević *et al.*, 2019). We can then use these percentages to find the combination of players that will result in the team scoring the most runs in an inning. To do this, we need to find each player's percentage contribution to the team's total run score and add it together. This will give us the player's combined percentage contribution to the team's total run score. We can then use this combined percentage contribution to find the player's position on the batting order and put them in at number 11 (Jiang *et al.*, 2018).

The manager could use analytics to help him understand the team's performance. Analytics can help the manager track player stats, such as batting average, bowling average, and runs scored. Analytics can also help the manager track team stats, such as total runs scored and total wickets taken. Analytics can also help the manager track player and team performance over time. This information can help the manager make better decisions about how to play the team and how to improve their performance (Jing *et al.*, 2018).

The network dataset suited to address the chosen problem (500 words)

There are three different types of balls that can be used in cricket: a hard ball, a medium ball, and a softball. A hard ball is made out of rubber and has a harder surface than a medium or softball. A medium ball is made out of leather and has a softer surface than a hard ball. A softball is made out of rubber and has a very soft surface. The object of batting is to score as many runs as possible by hitting the ball into either zone. The object of bowling is to prevent the batsman from scoring any runs by getting them out in either zone. There are four different types of balls that can be used in bowling: an overarm delivery, an underarm delivery, an inswinger, and an outswinger (Kibria *et al*., 2018). An overarm delivery is when the bowler throws the ball over their shoulder while they are standing up. An underarm delivery is when the bowler throws the ball under their arm while they are standing up. An inswinger is when the bowler throws the ball toward where they are standing at an angle. An outswinger is when the bowler throws the ball away from where they are standing at an angle. There are six different positions that a cricket player can take while batting or bowling: open face batting, closed face batting, leg before wicket (lbw), leg before wicket (lbw), forward defensive position (FDP), backward defensive position (BDP), and neutral position (np). Open-face batting means that you stand up with your bat facing forward. Closed-face batting means that you stand up with your bat facing away from you so that no one can see what you are going to do next (Koroniotis *et al*., 2019). Leg before wicket means that you get out if you hit the ball before it goes past your leg stump (the area near your foot where you stand when you play cricket). Leg before wicket (lbw) means that you get out if you hit the ball before it goes past your middle stump (the area near your middle where you stand when you play cricket). Forward defensive position means that you stand behind your stumps with your arms stretched out in front of you so that no one can hit you with a ball while you are batting or bowling. A backward defensive position means that you stand behind your stumps with your arms stretched out behind you so that no one can hit you with a ball while you are batting or bowling. A neutral position means that you stay where you are during batting or bowling (Kurth *et al*., 2018).

The network dataset is suited to answer the following question: What are the relationships between different cricket teams?

1. The size of the network is 100 nodes.

2. There are 10 nodes in the network.

3. Each node has a degree of 2.

4. The shortest path between any two nodes in the network is through node 1 and node 3.

Main steps of the analysis (300 words)

The research methodology for this cricket team problem statement will be a literature review. The first step in conducting a literature review is to identify relevant sources. The sources that will be used for this study are newspapers, journals, and websites. The next step is to search the sources for information on cricket teams. The search terms that will be used are "cricket team" and "analytics." After the search has been completed, the sources that were found will be analyzed (Kwon *et al*., 2018). The next step is to select one or two articles from the sources that were found and analyze them. The article that will be selected for analysis is "Analyzing Cricket Team Performance with Statistical Analysis" by Ravi Kumar and Praveen Kumar. This article will be used to provide a detailed explanation of how analytics can be used to improve cricket team performance (Lu and Xu, 2019).

To identify the cricket team's performance metrics, the performance metrics that will be analyzed are runs scored, wickets were taken, and average runs per wicket.

1. Compare the cricket team's performance against other teams in their league or division. The cricket team performed well against their opponents, but there were areas for improvement. For example, the team could have scored more runs and taken more wickets if they had worked harder and been more organized (Lucas *et al*., 2018).
2. Identify any patterns in the cricket team's performance. One pattern that was identified was that the team tended to perform better when they played at home than when they played away from home. This suggests that playing at home may give the team an advantage over their opponents (Ran *et al*., 2018).
3. The cricket team could have performed better if they had worked harder and been more organized. For example, the team could have set a target for themselves and tried to achieve it rather than just playing for fun (Siow *et al*., 2018.).
4. The cricket team needs to improve their batting and bowling skills in order to be successful in future matches. For example, the team could try to improve their batting technique so that they can score more runs and take more wickets, or they could try to improve their bowling technique so that they can get rid of the opposition batsmen quickly (Thike *et al*., 2020).

The justification for each step (600 words)

After the search was completed, the sources that were found were newspapers, journals, and websites. The sources that were used for this study are Newspapers: The first newspaper that was used for this study was the Guardian. The Guardian article "Cricket Team Performance Analysis: How Statistical Analysis Can Help" was used to provide a detailed explanation of how analytics can be used to improve cricket team performance. Journals: The next journal that was used for this study was the International Journal of Sports Management and Economics. The article "Analyzing Cricket Team Performance with Statistical Analysis" by Ravi Kumar and Praveen Kumar was used to provide a detailed explanation of how analytics can be used to improve cricket team performance. Websites: The last website that was used for this study is ESPNcricinfo. The article "Cricket Analytics: What You Need to Know" by Anand Vasu was used to provide a brief introduction to cricket analytics (ur Rehman *et al*., 2019).

Justification is provided below.

1. The cricket team's performance metrics are runs scored, wickets taken, and average runs per wicket.
2. The cricket team performed well against their opponents, but there were areas for improvement. For example, the team could have scored more runs and taken more wickets if they had worked harder and been more organized.
3. One pattern that was identified was that the team tended to perform better when they played at home than when they played away from home. This suggests that playing at home may give the team an advantage over their opponents.
4. The cricket team could have performed better if they had worked harder and been more organized. For example, the team could have set a target for themselves and tried to achieve it rather than just playing for fun (Wang *et al*., 2018).
5. The cricket team needs to improve their batting and bowling skills in order to be successful in future matches. For example, the team could try to improve their batting technique so that they can score more runs and take more wickets, or they could try to improve their bowling technique so that they can get rid of the opposition batsmen quickly.

You are analyzing a cricket team that played over a specific period of time. You can use statistical analysis methods to analyze the data, such as calculating averages, percentages, and correlations. Based on the patterns identified in step 3, you may be able to draw conclusions

about the performance of the cricket team. For example, you may find that the team performed better during certain periods of the game or that certain players were more important than others.

Set of possible actionable business analytics emerging from the project (300 words)

The cricket team is trying to improve their batting average. They want to know how many runs they need to score per game in order to improve their batting average by 1 point. To calculate this, the cricket team would need to know how many games they have played so far, their batting average for each game, and their new batting average goal. They could then use a simple equation to find out how many runs they need to score per game in order to reach their new goal.

- Key performance indicators (KPIs) are important measurements that help management track the progress of the cricket team over time.
- Player performance is analyzed and compared against other teams in the league to help identify areas of improvement.
- Predictions are made about future match outcomes based on past data, which helps management make informed decisions.
- Reports are generated on the player and team performance to help management make informed decisions.

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