CricVis: Interactive Visual Exploration and Analysis of Cricket Matches

Ayan Das[*]   Arjun Srinivasan[†]   John Stasko[‡]

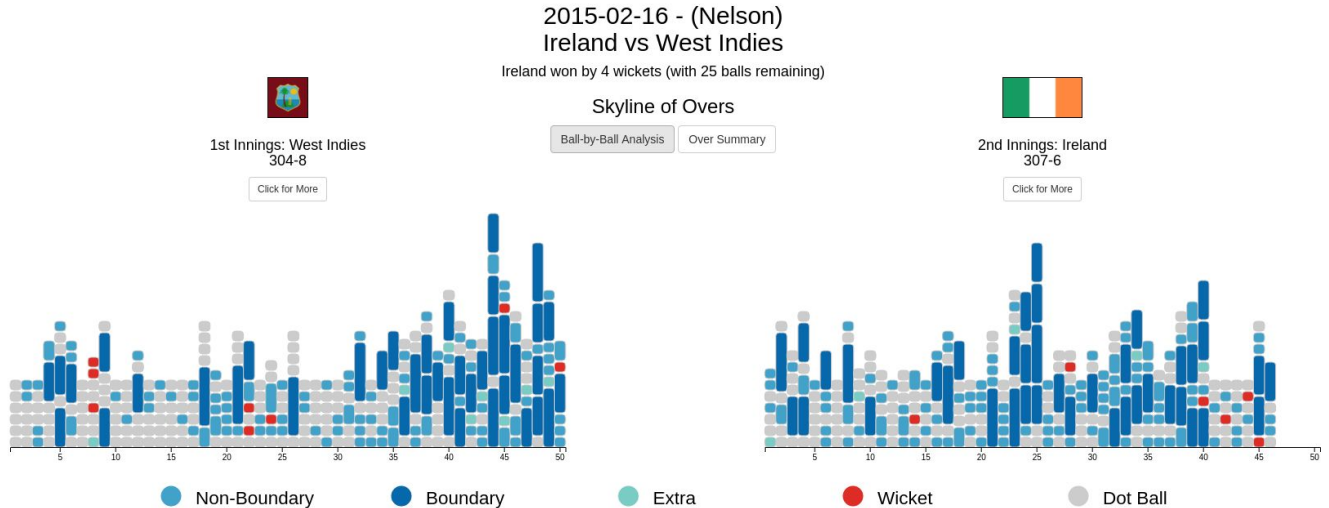School of Interactive Computing, Georgia Institute of Technology, Atlanta, GA

Figure 1: Skyline view in CricVis showing the ball-by-ball overview of a match between West Indies and Ireland. In this match, West Indies batted first and scored 304 runs for the loss of eight wickets at the end of 50 overs. In response, Ireland scored 307 runs for the loss of six wickets in 45.5 overs, hence, winning the match by four wickets and 4.1 overs (25 balls) to spare.

ABSTRACT

We present CricVis, a web-based system that visualizes cricket matches ball-by-ball. With six coordinated views and brushing-and-linking capabilities, CricVis allows users to gain both quick overviews and detailed insights about match events, team performances, and individual player patterns in cricket matches.

1 INTRODUCTION

Cricket is one of the most popular sports in the world with an estimated fan following of 2.5 billion people[1]. The sport has a rich tradition even in the United States; dating almost 140 years past baseball, which is considered to be cricket's direct descendant[2]. With the growing popularity of the sport, several visualizations have been developed that help cricket fans and experts explore cricket matches and track team and player performances[3,4]. However, few, if any, existing visualizations let users explore matches at the granularity of individual deliveries (also referred to as a ball). Such exploration can help in understanding team strategies and patterns of individual players. We present CricVis, a tool that lets users explore cricket matches ball-by-ball. Given the scope of this article, we cannot list

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[*]email: adas62@gatech.edu
[†]email: arjun010@gatech.edu
[‡]email: stasko@cc.gatech.edu

[1]http://www.topendsports.com/world/lists/popular-sport/fans.htm
[2]https://www.washingtonpost.com/sports/cricket-in-the-united-states-popularity-grows/2012/05/21/gIQAlAawfU_story.html
[3]https://knoema.com/insights/cricket
[4]http://www.espncricinfo.com/ci/content/stats/index.html

the rules of the sport but encourage readers to look up some basic terminology and rules to better understand the system[5,6,7].

2 DATASET

Our current implementation uses a dataset consisting of ball-by-ball details for all matches played during the ICC Cricket World Cup 2015. For each delivery, the dataset contains the following information: bowler name, batsman name, extras and extra type, runs scored, ball speed, the landing position of the ball on the pitch, the position where the ball reached the batsman, the location where the ball lands on the ground after it was hit, and if a wicket was taken in a delivery (i.e. a batsman was dismissed), along with the method of dismissal (e.g., bowled, caught, run out, etc.)

3 CRICVIS

CricVis lets users explore cricket matches by leveraging multiple coordinated views [2]. Below, we describe the six components of CricVis: skyline view, over summary view, pitch map, stump map, ground map, and a player stats view.

Skyline View. The skyline view (Figure 1) presents a ball-by-ball overview of the match. Each column represents an over (six balls) in . Each bar represents one delivery. The length of a bar indicates the runs added to the batting team's score. Colors are used to highlight the events a ball can result in: runs added by batsmen running between the wickets, boundaries (four or six runs added to the batting score), extras, wickets, and dots (when there are neither runs added nor wickets lost). Selecting an inning from the skyline view or the over summary view populates the other views with the data for that specific inning.

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[5]https://en.wikipedia.org/wiki/Cricket
[6]http://cricket-rules.com/
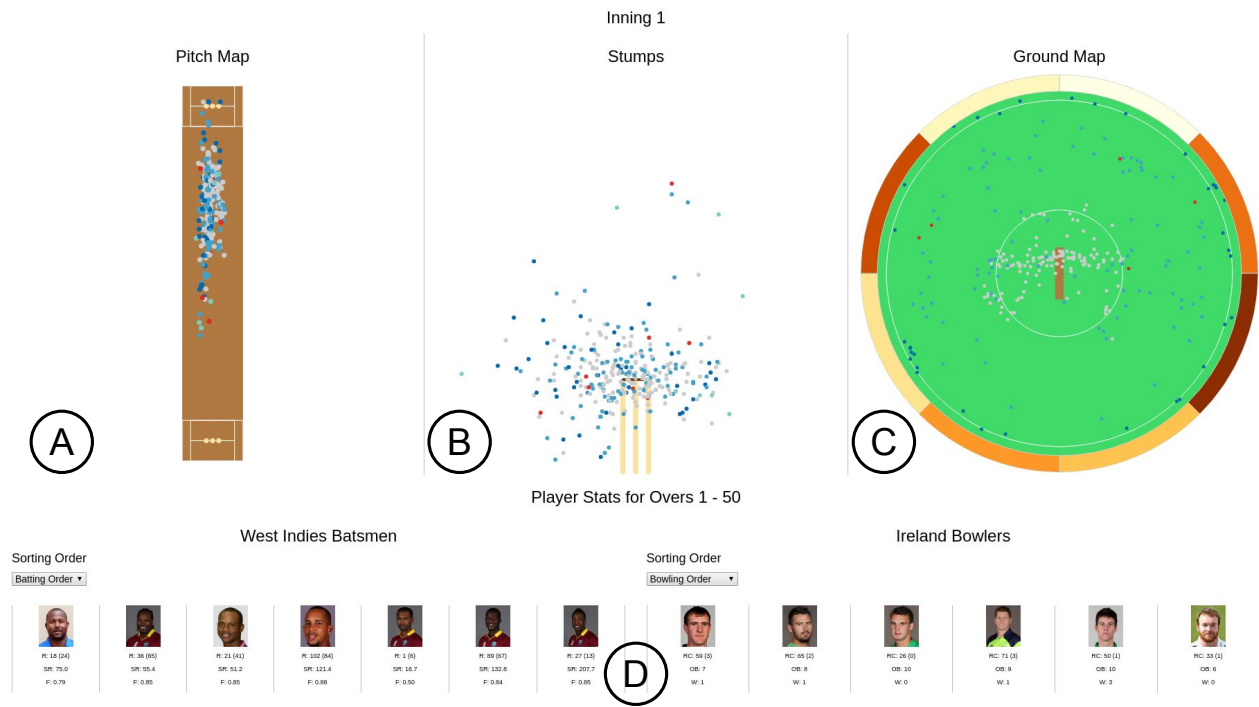[7]https://www.youtube.com/watch?v=AqtpNkMvj5Y

Figure 2: Inning-based views in CricVis showing the first inning of the match between West Indies and Ireland. (A) Pitch Map, (B) Stump Map, (C) Ground Map, and (D) Player Stats View.

Over Summary View. Instead of showing each delivery, the over summary view (Figure 3) presents an over-level summary highlighting only runs scored and wickets lost. In this view, each bar represents an over and all bars are colored by the team's national flag color (used to provide additional context). The height of a bar indicates the runs scored in an over. If one or more wickets are lost in an over, these are represented using a red stacked bar. The height of the red bar indicates the number of wickets lost in an over.
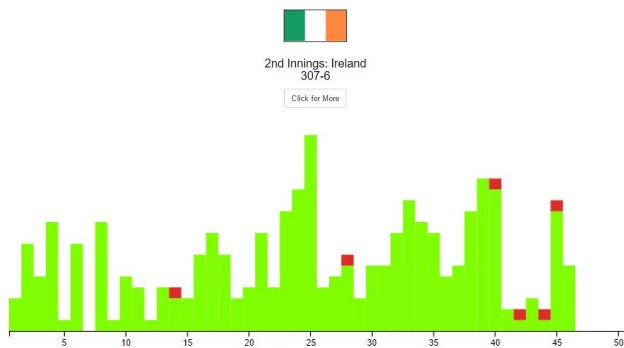

Figure 3: Over summary view showing the second inning of the match between West Indies and Ireland. (Figure 1)

Pitch Map. The pitch map (Figure 2A) shows the position on the pitch where each ball bounced before reaching the batsman. The view defaults to the batsman being at the at the top of the pitch i.e., the closer a point is to the top, the closer a ball bounced to the batsman. Colors indicate the event a ball resulted in (same as the colors used in the skyline view).

Stump Map. The stump map (Figure 2B) shows positions relative to the stumps where each ball reached the batsman. Deliveries that reach a batsman just around the corner or the top of the stumps

(three light brown rectangles in Figure 2B) are considered good deliveries.

Ground Map. The ground map (Figure 2C) shows ground positions each ball landed at after it was hit by a batsman. Deliveries that are within the smaller central white circle in Figure 2C are typically dot balls or balls off which fewer runs were scored. Balls that go outside the second white circle are regarded as boundaries (four runs are added if the ball bounces on the ground before crossing the perimeter and six runs are added if the ball lands outside the circle). The donut chart along the perimeter of the ground highlights the different zones (e.g., square-leg, mid-off, mid-on, covers, etc.) and is colored based on runs scored in each zone. The darker the color of a zone, higher the runs scored in the zone.

Player Stats View. The player stats view (Figure 2D) shows all players that batted or bowled during an inning in the match. For each batsman, the stats shown include the runs scored, balls faced, strike rate (ratio of runs scored to balls faced), and the batting form (computed based on the strike rate and how well controlled shots were). For bowlers, the stats shown include overs bowled, runs conceded (with extras), and wickets taken. By default, the players are ordered based on when they came to bat or bowl. Alternatively, users can choose to order lists based on different stats using the sorting dropdowns.

Brushing-and-linking [1] is supported across views. Users can add filters by selecting overs in the skyline or over summary views to focus on a specific portion of an inning (e.g., last 10 overs of an inning), and select players in the stats view to focus on a subset of players.

REFERENCES

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[2] J. C. Roberts. On encouraging multiple views for visualization. In *Proceedings of IEEE Conference on Information Visualization*, pages 8–14, London, 1998.