

**MAP BASED TOOL ON HISTORY OF CRICKET SINCE ITS
INCEPTION**

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In Partial Fulfillment
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Master of Science
in
Computer Science

by
Srinidhi Balaram
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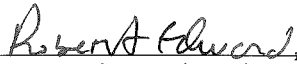
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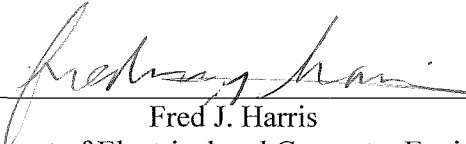
Map Based Tool on History of Cricket Since Its Inception



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DEDICATION

I would like to dedicate this thesis to my entire family, especially my parents Mr. Srivibhavan Balaram and Mrs.Padmashree Balaram, and my dearest sister Dhanashree Balaram who have inspired me to achieve my goal. Without their unconditional love and support this would not have been possible.

ABSTRACT OF THE THESIS

Map Based Tool on History of Cricket Since Its Inception

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Cricket is an 800 year old sport that originated in England. Since the early 19th century it spread to other parts of the world. The sport has gained immense popularity in India, Pakistan, Australia, and South Africa and in the Caribbean. The history of cricket as a game dates back to the early 14th century, when country boys used to bowl at a tree stump or at the hurdle gate into a sheep pen. In the mid-19th century, county championships began, and simultaneously domestic cricket in Australia, South Africa and India also began. In 1905, the Imperial Cricket Conference (ICC) was formed with England, Australia and South Africa as its members.

The first major international tournament to include all member countries was the 1975 World Cup, just a few years after One Day Cricket was introduced. After this 9 editions of the World Cup were played. The other major tournaments in international cricket are the Ashes (test series between England and Australia), World Twenty20(a multi-national Twenty20 tournament) and the Champions Trophy.

The main aim of this thesis is to create a GIS tool to provide information about all these events as well as many other events, like the Ashes, India-Pakistan Series, Cricket World Cup, and how cricket has developed into various forms across the world. There are multiple layers in this tool. Each layer represents a timeline in history. (Ex 1600-1700). When a layer is selected, all the events that took place during that timeline are shown on the map. The geographical locations of the events are highlighted. When a point is selected, the details of that particular event are shown, along with an image associated with it. The details include a brief description of the event, the location and date of the event, and statistic details like highest run scorer, highest wicket taker (if the event was a match or a tournament). To provide extra details, a hotlink is also available. This is a link to a webpage (Ex Wikipedia), which provides extra information about the event.

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CHAPTER 1

INTRODUCTION

The main aim of this thesis is to develop a GIS application that provides information on the history of cricket, right from its early days. Cricket has been played since the early 14th century. Over the years, cricket has evolved in various forms, and has gained popularity in various parts of the world. In this application, the various events in the history of cricket have been depicted with the help of various features of MOJO. Apart from the historical events, there are two more features that have been included. The two other features are ICC Hall of Fame and Highlights. Both are enabled with a button click. The Hall of Fame feature provides information on the various players who have been inducted into the ICC Hall of Fame. The Highlights feature provides information about the origin of cricket in various countries and the achievements of that country in world cricket.

1.1 OVERVIEW OF CRICKET

1.1.1 Origin of Cricket

Cricket is supposed to have originated sometime in the 13th century. During this period, it was a sport in which country boys bowled at a tree stump or at the hurdle gate into a sheep pen. The gate, which had two uprights and a crossbar resting on the slotted tops was known as a wicket and the crossbar was known as a bail [1].

The ball, which was at one time just a stone, has been quite the same since the 17th century. In 1774 its current weight in the range of 156 to 163 grams was established. The primitive bat which was a shaped branch of a tree was similar to a modern hockey stick in appearance but was much heavier and longer. The need to defend against length balls, caused a change to a straight bat. In Hambleton, a village in southern England, the bat was gradually evolving with cricketers. The shortening of the bat in the handle and straightening and broadening in the blade, enabled the batsman to play forward as well as play cut and drive

shots. During this period cricket was a batting dominated game, since bowlers did not have advanced techniques [1].

1.1.2 Growth and Evolution of Cricket

In 1709 Kent came face to face with Surrey in the first ever recorded inter county match at Dartford. According to sources, cricket was restricted to the southern counties of England during the early 18th century, but it became more popular and finally spread to London, especially to the Artillery Ground, Finsbury, where a historic match between Kent and All-England was hosted in 1744 [1].

The Hambledon Club was the main cricket force in the second half of the 18th century. The players of Hambledon club used to play in Hampshire on Broadhalfpenny Down. A few decades later the Marylebone Cricket Club (MCC) began to rise and became one the most popular cricket clubs in England. They used to play cricket in the Lord's Cricket Ground. MCC was formed from a cricket club which used to play at White Conduit Fields, and later shifted to Lord's Cricket Ground in St. Marylebone borough in 1787. This club was named as MCC, in the same year, 1787). In 1788 MCC published its first revised code of cricket laws. The Lord's Cricket Ground was named after its founder William Lords. Over the years, Lord's has had three locations. In 1814, Lord's moved to its current location in St. John's Woods and in the same year, it became the headquarters of world cricket [1].

The first ever encounter between North counties and South counties had taken place in 1736. This was the first indication that cricket had spread across England, and was no longer restricted to southern England. In 1846, William Clarke of Nottingham, founded a new team called All-England XI. This team began playing cricket in various parts of England. From 1852, many players left the All England XI and formed a new team called the United All-England XI. The All-England XI and United All-England XI were monopolizing the best talent in cricket until the rise of county cricket. They provided players to the first England team which travelled overseas for a tour in 1859 [1].

Some of the oldest organized matches were held between amateur and professional players. From 1806 to 1962, the Gentlemen versus Players match saw the best amateurs compete against the best professional players. The series was discontinued in 1962 since MCC and the counties did want segregation of players into amateurs and professionals. Other

cricket matches during the early period took place between universities across UK. The Oxford versus Cambridge match has been hosted most of the times at Lord's since 1827 and became a major encounter of the summer season in London [1].

In 1873, qualification rules for county cricket were formulated. In 1890 the format of the county championship was finalized by the counties. Gloucestershire was the dominant team in the 1870s, mainly because of W.G Grace, one of the best batsmen during that period. Nottinghamshire, Surrey, Yorkshire, Lancashire, Kent, and Middlesex together were known as the Big Six. These six teams were the most dominant teams in county cricket, right from the 1880s to World War I. After World War I it was the turn of the northern counties Yorkshire and Lancashire to dominate county cricket. In the 1950s, Surrey managed to stay at the top with seven championship titles, and then it was Kent and Middlesex in the 1970s. Middlesex, Worcestershire, Essex, and Nottinghamshire were the most dominant teams in the 1980s. The other county teams which became a part of the county championships, and still exist are Leicestershire, Somerset, Hampshire, Durham, Derbyshire, Warwickshire, Sussex, Northamptonshire, and Glamorgan [1].

1.1.3 International Cricket

International cricket began in 1877, when England toured Australia for a test series. The first test was held at the Melbourne Cricket Ground, and Australia won the match by 45 runs. In 1905 the Imperial Cricket Conference was founded. It was renamed as International Cricket Conference and then the International Cricket Council in 1965. The ICC eventually took up most of the administrative responsibilities of international cricket. In 2005 ICC shifted its headquarters from London to Dubai. The oldest full time members of ICC are Australia, South Africa and England. These three teams were the most dominant during the early part of the 20th century. ICC formulated a Code of Conduct for players, officials, and administrators, which ensures that the game is played in the right spirit. Some of the major international tournaments organized by ICC are the World Cup (a One-day tournament), the Champions trophy, and the World Twenty20. In 2000 the ICC set up the Anti-Corruption Unit to combat the growing threat of illegal gambling and match fixing. At the beginning of the 2010s, the ICC had 10 full members and dozens of associate and affiliate members.

Test cricket was the only format of cricket for a very long time [1].

In 1971, a new format called One Day International (ODI) was created. The first ODI was played between Australia and England at Melbourne. Australia won the match by 5 wickets. In ODI cricket, each team bats for a limited period, and the team with a higher total at the end of the match, is the winner. Initially ODIs used to be for 60 overs, but later ICC revised the laws and curtailed it to 50 overs. The first major ODI tournament to feature all the teams was the 1975 World Cup, hosted by England. This was the inaugural edition of the World Cup. West Indies won the 1975 World Cup by beating Australia in the final. Since then 9 world cups have been held in various parts of the world. Australia is the most successful team, winning the title four times. In the 21st century another new format was created, Twenty20 cricket. It is similar to ODIs, except that each team plays for 20 overs instead of 50 overs. The first Twenty20 international match was between Australia and New Zealand at Auckland. Australia won the match by 43 runs [1].

1.2 DEPICTING EVENTS

The major events that have occurred in the history of cricket have been mentioned in the previous section. The main aim of this thesis is to create a GIS tool to provide information about all these events as well as many other events, like the Ashes, India-Pakistan Series, Cricket World Cup, and how cricket has developed into various forms across the world. There are multiple layers in this tool. Each layer represents a timeline in history. (Ex 1600-1700). When a layer is selected, all the events that took place during that timeline are shown on the map. The geographical locations of the events are highlighted. When a point is selected, the details of that particular event are shown, along with an image associated with it. The details include a brief description of the event, the location and date of the event, and statistic details like highest run scorer, highest wicket taker (if the event was a match or a tournament). To provide extra details, a hotlink is also available. This is a link to a webpage (Ex Wikipedia), which provides extra information about the event.

In this tool, the layers represent a century. To take a specific case, suppose the layer 1900-2000 is selected. There were many events in cricket history that took place during this period (example First India England test series in 1934, first India – Pakistan series in 1954, first ever Cricket World Cup in 1975, the Ashes in 1972, 1975, 1977, 1978, 1982). The locations of all those events are highlighted on the map. The first test of the 1982 Ashes was

hosted in Brisbane, so Brisbane is highlighted. When that point is selected, the details are shown in a pop-up box. Example If New Delhi, i.e , the location of the first India – Pakistan series in 1954, is selected, the details and the statistics of the entire tournament would be shown. There will be a hotlink, which will redirect the user to the Wikipedia page of this tournament. In 1970, The Western Australian Cricket Association Stadium in Perth, hosted its first ever test match. If Perth is selected, just as in the previous case, the details of the test match would be shown.

Two more special features are a part of this tool. They are the highlights and Hall of Fame features. Both are implemented with a button click event. When the Highlight button is clicked, certain points begin to flash on the map. These points represent certain historical locations where cricket first began in various countries. When the point is clicked, a pop-up box is displayed, which shows the timeline of the various events associated with cricket that have occurred in that particular country. Example If a flashing point in India(Mumbai) is clicked, a timeline of all the major events that have taken place in the history of Indian Cricket would be selected.

When the Hall Of Fame button is selected many points begin to flash. These points represent the birthplace of a particular cricketer who has been inducted into the ICC Hall of Fame. When the point is selected, a pop-up window is displayed which gives the details of that particular player, like the year of induction, country, and background.

1.3 MOTIVATION

The goal is to create a map-based interactive multimedia look at the history of cricket. The advantages over plain textual information include the ability to include many film clips to illustrate textual descriptions, and other visual improvements over text like horizontal sidebars that give visual emphasis to historical evolution.

The maps themselves can be dynamic since clicking a point can display a pop-up box with text, photos and a web link related to that event or location.

1.4 SUMMARY

Cricket has evolved over the centuries, and so have the laws that govern the game. The purpose of this thesis is to cover all the major events in the history of cricket, provide information about the legends of the game and help people understand the rules of cricket,

along with the evolution of the laws. The information is provided to the users through textual data, images, hyperlinks and scrollbars and video clips.

CHAPTER 2

TOOLS USED

The entire code has been written in Java. To add various functionalities a few packages like Swing and Map Objects Java Edition (MOJO) have also been used. Due to various advantages, which will be covered soon, Java has been chosen as the language for writing the code. Map Objects Java Edition is written by ESRI (Environmental Systems Research Institute) to work on GIS (Geographic Information System) applications, and is also known as MOJO(Map Objects Java Objects).

2.1 JAVA

Java is an object oriented programming language that has been designed to have minimum implementation dependencies. It is intended to allow application developers "write once, run anywhere" (WORA), which means that compiled the Java code or bytecode can run on all platforms that support Java , without any recompilation. Java applications are compiled to bytecode that can run on any Java virtual machine (JVM) that is independent of the platform. Java is one of the most popular programming languages particularly for client-server web applications. Java was developed by James Gosling at Sun Microsystems and released in 1995. Java has derived most of its syntax from C and C++.

Java has many advantages, due to which it has gained immense popularity [2].

- **Java is a simple language** - Java has a very simple syntax compared to other languages. It does not have complex features like pointer arithmetic and virtual base classes.
- **Java is Object Oriented** – Java is a purely Object oriented language, which means every variable or function must be a member of a class. This enforcement helps in increasing modularity and reusability
- **Java is secure** – Java has been designed in a way that certain attacks can be thwarted like accessing files without permission and corrupting memory due to pointers

- **Java is Platform Independent** – One major advantage of Java is its platform independence. The Java code is compiled into a machine independent bytecode by the JVM. This bytecode can be run on another machine or platform. This way the same code can be used on different platforms, as long as JVM is installed for that particular machine.
- **Java is robust** – The robustness of Java can be seen in its ability to detect errors at an early stage. Error checking is done well before the execution, unlike other languages, which helps the programmers to make the changes early enough
- **Java is Easily Deployable** – Java code is compiled to bytecode and can be packaged into a JAR file. If all the requirements can be packaged, then the application can be run by double clicking the JAR file.
- **Java is distributed** – Another advantage of Java is its ability to perform distributed operations, since the networking capabilities have been integrated into it. Writing network programs is as simple as reading and writing contents from files.
- **Java is Multithreaded** – A single program can have multiple tasks running in parallel. Multithreading can help in enhancing performance and functionality of the code.

2.2 MAP OBJECTS JAVA EDITION

Map Objects Java Edition is a collection of pure Java components that helps programmers to build GIS applications. It provides programmers with the tools to build client-side or server-side applications for standalone deployments or delivery over the internet. Here are some of the features offered to programmers by Map Objects Java Edition 1 [3].

- Map Objects Java offers a feature to display maps and add various layers like countries, lakes, rivers and boundaries.
- Map Objects Java provides various in-built features like Zoom Pan Toolbar and selection toolbar, that can be used to view details of a particular area or region, create SQL style queries to get certain specific information , pan in , pan out , zoom in and zoom out from any area on the map.
- Map Objects Java provides graphical features like construction of points, lines, circles and polygons This can be useful in depicting certain geographical regions like a particular city or a river or a mountain range.
- Map Objects Java permits programmers to build certain user defined tools like a customizable toolbar with the help of standard Java classes.
- Map Objects Java provides a feature to dynamically add layers to a map, based on geographical data like latitudinal and longitudinal coordinates.

- Map Objects Java enables programmers to build special tools which provide geographical information, like latitudinal and longitudinal coordinates of the current point , and the distance between two geographical points.
- Map Objects Java has many projection classes that help programmers use various projected coordinate systems.
- Map Objects Java provides a Legend Editor which allows users to dynamically change the display format of a layer. It also allows certain layers to be displayed as opaque or transparent.
- Along with adding and removing layers dynamically, Map Objects Java provides functionality to programmers, for promoting and demoting existing layers. When a layer is promoted, its priority is increased and its position in the layer order is exchanged with the layer right above it. The same logic applies for demotion.
- Map Objects Java provides a unique feature of creating new layers from certain selected regions on the current layer. A region can be selected using a circle, rectangle or line, and then a new layer with a specific name can be created, and added later.

CHAPTER 3

REQUIREMENTS

The objective of this GIS tool is to provide information on the history of cricket along with providing information about the Hall of Fame. The thesis project has been developed under the guidance of Dr. Carl Eckberg from San Diego State University. Since this tool is GIS based, Dr. Eckberg suggested the platform and functional requirements for this tool.

The three main requirements are

- Data Requirements
- Platform Requirements
- Functional Requirements

3.1 DATA REQUIREMENTS

The data required for this tool are locational shape files for the major events in the history of cricket for 5 centuries, highlights of major events related to cricket for all the major countries, the various players inducted into the ICC Hall of Fame, actual information about the events, images of the events and web links associated with them. The shape files are used to create and add new layers. This tool provides information about the various events in the history of cricket, their location, and the date of occurrence and a description of the event.

3.2 PLATFORM REQUIREMENTS

Since this application is built using MOJO, it can be developed in any environment. To build this tool, Eclipse Helios was used, but any Java IDE can be used as an alternative. The whole application was built on Windows operating system, and with the assumption that it will be run only on a machine that has Windows operating system.

3.3 FUNCTIONAL REQUIREMENTS

Functional requirements give an insight into all the functionalities offered by the application. There are multiple tools through which the functionalities are provided to the user. These tools would be discussed in the coming topics. The functional requirements are given below

- The application should be available as a packaged JAR file. Running the application only requires the JAR file to be clicked.
- Every century time period in the history of cricket should be represented as a layer.
- The location of an event during that century should be marked on the map with a star symbol.
- It should be possible to click the location marked on the map with help of the hotlink tool.
- The user should be able to add or remove a layer dynamically.
- When the application is loaded, the default layer should be visible.
- The user should be able to view the geographical distance between two points by selecting the distance tool, and drawing a line between the two points.
- The latitude and longitude of the current location of the mouse should be displayed at the bottom of the window.
- The user should be able to select a certain section of the layer, and create a new shape file from it.
- The zoom pan toolbar and selection toolbar should be present at the top of the window.
- When the Highlight button or the Hall of Fame button in the custom toolbar is clicked, various locations should be marked on the map, with a flashing star.
- A legend editor should be available, which can be used to change the display features of the layer.
- When a location is selected using the Hotlink tool, a pop-up box should come up which provides certain information based on the location and the active layer.
- A Help menu should be provided, which guides the user on how to use the tools.
- A ReadMe menu option should be provided, which familiarizes the user with all the features of the application.

CHAPTER 4

DATA REQUIREMENT AND ANALYSIS

The aim of this tool is to provide information about the History of Cricket. This information includes the major events that have taken place, the location and results of the event. Figure 4.1 explains how the information provided was processed and rendered on the map through layers. The CSV files are also used to add layers and display specific information from these layers.

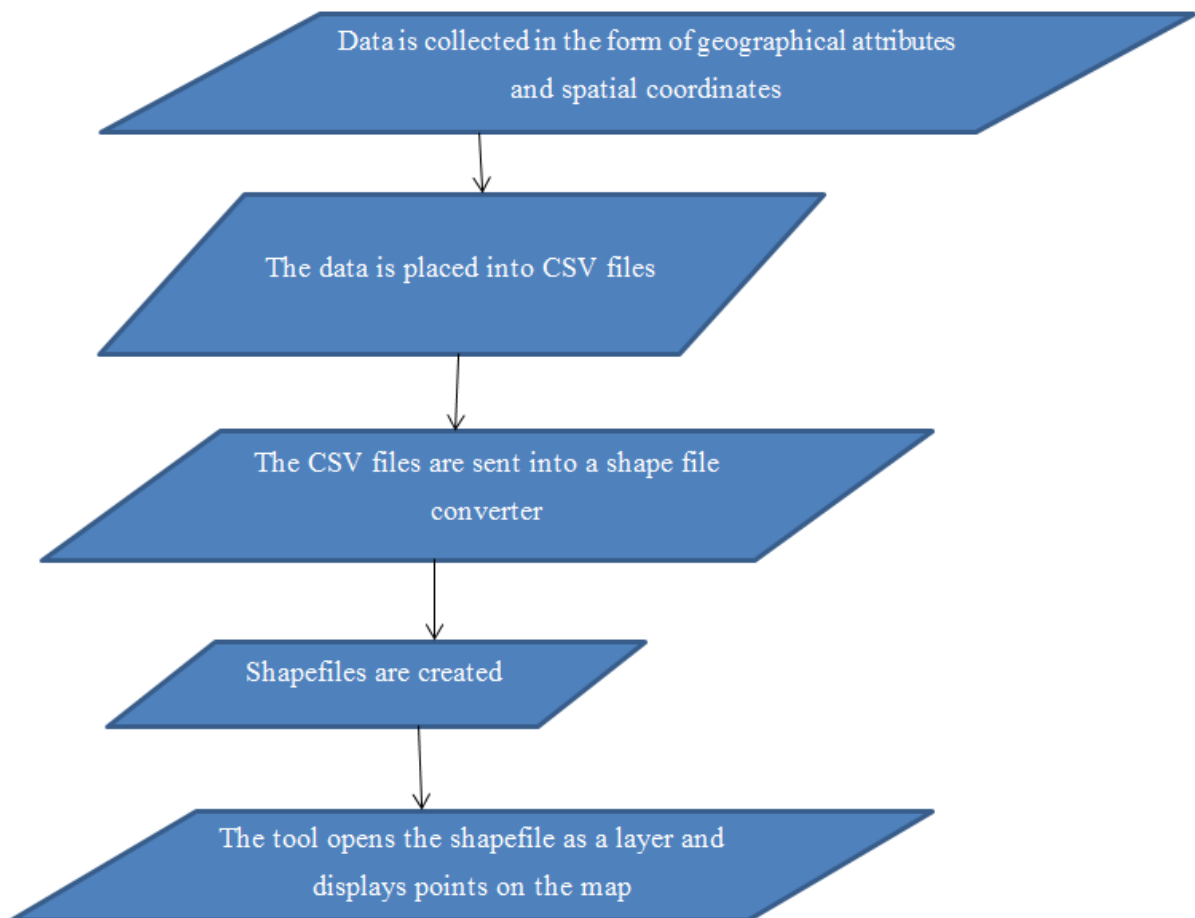


Figure 4.1. Steps in data processing.

4.1 DATA COLLECTION

There are various layers in this application. Each layer represented a particular century. All the events that occurred during that period are described. Totally five centuries will be shown (17th-21st centuries). In addition to these layers, two more layers are there. One layer provides information about players who have been inducted to the ICC Hall of Fame, and the other layer shows the highlights of all the major cricket related events that taken place in each country. The events described in the application are mentioned below.

4.1.1 Cricket in the 17th Century

According to the first reference to cricket in 1598, cricket was first played at Guildford in 1550. .During the early 17th century; working men used to play cricket. The first reference to cricket in Sussex was in 1611. The reference was found in old court record which states that two parishioners of Sidlesham in West Sussex were playing cricket due to which they skipped church on Easter Sunday. They were fined 12 pence each and all of them had to perform penance [4].

The first clear reference to cricket in Kent, and the first reference to village cricket was obtained from a 1640 court case which provides details regarding a match between "Weald and Upland" and "Chalkhill" at Chevening ". The case was related to the land on which the game was held. Village cricket gained popularity in the early 17th century. When the first Laws of cricket were formulated in 1744, it was illegal to hit the ball more than once, and a batsman who does that would be given out. The evidence of the development of village cricket is another recorded case in 1624, where a batsman named Edward Tye struck the ball twice to avoid getting out, which caused a fatal injury to a fielder named Jasper Vinall [4].

The first reference to cricket being played at Oxford University states that it began in 1673. The oldest reference to cricket outside England is dated 1676 [4].

4.1.2 Cricket in the 18th Century

In 1705, a West of Kent vs Chatham match was held at Malling, Kent. 1707, Croydon and London met each other twice. The first match played in Croydon at Duppas Hill, and the second match was played at Lamb's Conduit Field in Holborn. In the same year, London and Mitcham played against each other at Lamb's Conduit Field [5].

The earliest known match to involve county teams was in 1709, when Kent and Surrey met at Dartford Brent. The first major rivalry in cricket was between the Dartford and London clubs, who first came face to face in 1722. In 1719, a match between London and Kent was played at White Conduit Fields. Kent won the match. London managed to exact revenge for this defeat from Kent, when the two teams met again 1920 at White Conduit Fields. London won the match [5].

A match between London and Surrey was played in 1730 at the Artillery Ground in Bunhill Fields, Finsbury, London. London won by 6 runs. This was the first recorded match that was played at the Artillery Ground. In 1787, the Marylebone Cricket Club was founded, and in the same year MCC played its first match at Lords [5].

During the 18th Century, there were very few references to cricket being played outside England. The oldest reference to cricket in the new world is in 1709, when William Byrd of Westover was playing cricket on his estates near James River in Virginia. The first reference to cricket in India is in 1721, when British sailors from the East India Company were playing cricket at Cambay, near Vadodara .The East India Company was largely responsible for introducing cricket in India [5].

4.1.3 Cricket in the 19th Century

During the 19th Century, Cricket began to spread across other parts of the World as well as across England. Many official county clubs like Yorkshire, Surrey, Sussex, and Middlesex cricket clubs were formed in this period. By 1816, the Lord's Cricket Ground had become a major sports venue. It was also the home of MCC. MCC's influence over the game also gradually increased as it also become one the major body that defined and protected the Laws of cricket [6].

Cricket is supposed to have begun in Australia in 1803. The first ever match in Australia had taken place in December 1803. Inter colonial cricket in Australia began in 1851, when players from Victoria went to Tasmania for a match. The match was played held in Launceston. Tasmania emerged victorious, by defeating Victoria by 3 wickets. In 1861 an English team had visited Australia for the first time .This was followed by another tour by the English Team in 1863. In 1868, a team of Aboriginal cricketers toured England. This was the first ever tour by an Australian team to England. The tour consisted of 47 matches. The

Australian team won 14, lost 14, and drew 19 matches. The first ever official International test match was played between England and Australia at the Melbourne Cricket Ground. Australia won the match by 45 runs. This was the first official tour of England. In 1892, Australia's first domestic tournament, the Sheffield Shield began, with teams from the six states participating in the tournament [6].

In 1889, the official County Championship was formalized in a meeting at Lord's Cricket Ground with representatives of the various county clubs in 1889. The new competition began in 1890. In the first season, Kent County Cricket Club, Lancashire County Cricket Club, Gloucestershire County Cricket Club, Middlesex County Cricket Club, Surrey County Cricket Club, Sussex County Cricket Club, Nottinghamshire County Cricket Club, Yorkshire County Cricket Club and Surrey County Cricket Club had participated [7].

The oldest reference to cricket in South Africa is in 1808, when two teams of British officers played a match. In 1862, an annual game, where Mother Country and Colonial Born teams played against each other, was held for the first time in Cape Town. International test cricket as well as first class cricket began in South Africa in 1889, when South Africa played England at St George's Park Cricket Ground in Port Elizabeth. England won both the matches of that tour. Domestic first-class matches began towards the end of 1889, when the Currie Cup competition was held for the first time. Transvaal won the inaugural edition by defeating Kimberley. The 1890–91 domestic season had four first-class matches. The first three matches were between Griqualand West, Eastern Province, and Western Province in the Champion Bat Tournament. Western Province won the tournament. The fourth and last first-class match of the season was a part of the second edition of the Currie Cup. This time Kimberley avenged the defeat that they incurred at the hands of Transvaal in the previous season, by beating them [8].

4.1.4 Cricket in the 20th Century

International cricket started to grow from the 20th Century, and every cricket playing nation had a governing body that took all major decisions and selected players.

In 1905 the Australian Board of Control for International Cricket was formed. In 1909, the Imperial Cricket Conference was founded at Lord's Cricket Ground. At that time

the first members were Australia, England and South Africa. In India, the sport began to spread very quickly [9].

The Board for Cricket Control in India was established in 1928. The Ranji Trophy was launched as India's national championship following a meeting of the Board of Control for Cricket in India (BCCI) in July 1934 and the competition began in the 1934-35 season. The trophy was donated by the Maharajah of Patiala but named after KS Ranjitsinhji ("Ranji"), even though he barely played any of his cricket in the country. The first winner was Bombay. India's debut in Test cricket was in the 1932 English season when they played England at Lord's Cricket Ground. England won by 158 runs [10].

In 1920, the West Indies Cricket Board of Control was formed and became a full member of ICC in 1926. West Indies cricket received a tremendous boost when its team defeated England in the 1950 Test series [9].

The next few years had seen the emergence of truly great players like Frank Worrell, Everton Weekes and Clyde Walcott, and Gary Sobers followed during the 1950s. First-class cricket in the West Indies had begun in February 1865 and the federation began playing Test cricket in 1928, but it was not until the 1965-66 West Indian cricket season that a formal domestic competition was founded, this being the Shell Shield which has subsequently evolved into the Carib Beer Cup [9].

The international one-day game is a late twentieth-century development. The first ODI was played on 5 January 1971 between Australia and England at the Melbourne Cricket Ground. When the first three days of the third Test were washed out officials decided to abandon the match and, instead, play a one-off one day game consisting of 40 eight-ball overs per side. Australia won the game by 5 wickets. ODIs were played in white kits with a red ball [9].

The first ever major tournament to include all members of ICC was the 1975 World Cup. This was a one-day competition between all the members, and was hosted by England. West Indies won the tournament after beating Australia in the final. West Indies won the next edition of the World Cup in 1979 by beating England at Lord's. In the 1983 World Cup, India beat West Indies in the final, to win the World Cup for the first time [9].

The 20th Century had seen some of the greatest legends play the game and set astonishing records. West Indies produced some of the world's best players like Clive Lloyd,

Andy Roberts, Vivian Richards, Brian Lara, Garfield Sobers and Malcom Marshall. Shane Warne was one of the world's best spinners. He was known as the king of spin. During his career of 15 years, he picked up 700 wickets. Another legendary spinner was Muttiah Muralitharan from Sri Lanka. He made his test debut in 1992 and retired in 2011. He picked up 800 wickets in his career, and is currently the highest wicket taker in the world. Sachin Tendulkar is regarded as one the greatest batsman in the world. He is nicknamed as "Little Master", because he was short. Sachin scored over 17,000 runs in tests and ODIs. He made his debut in 1989 against Pakistan at the age of 16. At that time he became the youngest player to make a debut in International Cricket [9].

4.1.5 Cricket in the 21st Century

The 21st century saw a new format come up, Twenty20 Cricket. It began in 2003 in England as a domestic tournament. The first International Twenty20 match was played between Australia and New Zealand at Auckland. Australia won the match by 44 runs. The first major International Twenty20 tournament was the ICC World T20 in 2007. It was hosted by South Africa. India won the inaugural edition by beating Pakistan in the final at Johannesburg [9].

There have been 3 ODI World Cups played in the 20th Century (2003 in South Africa, 2007 in West Indies and 2011 in India). On February 24th 2010, Sachin Tendulkar created history by scoring a double hundred in an ODI against South Africa at Gwalior. This was the first time any batsman scored a double hundred in ODIs [9].

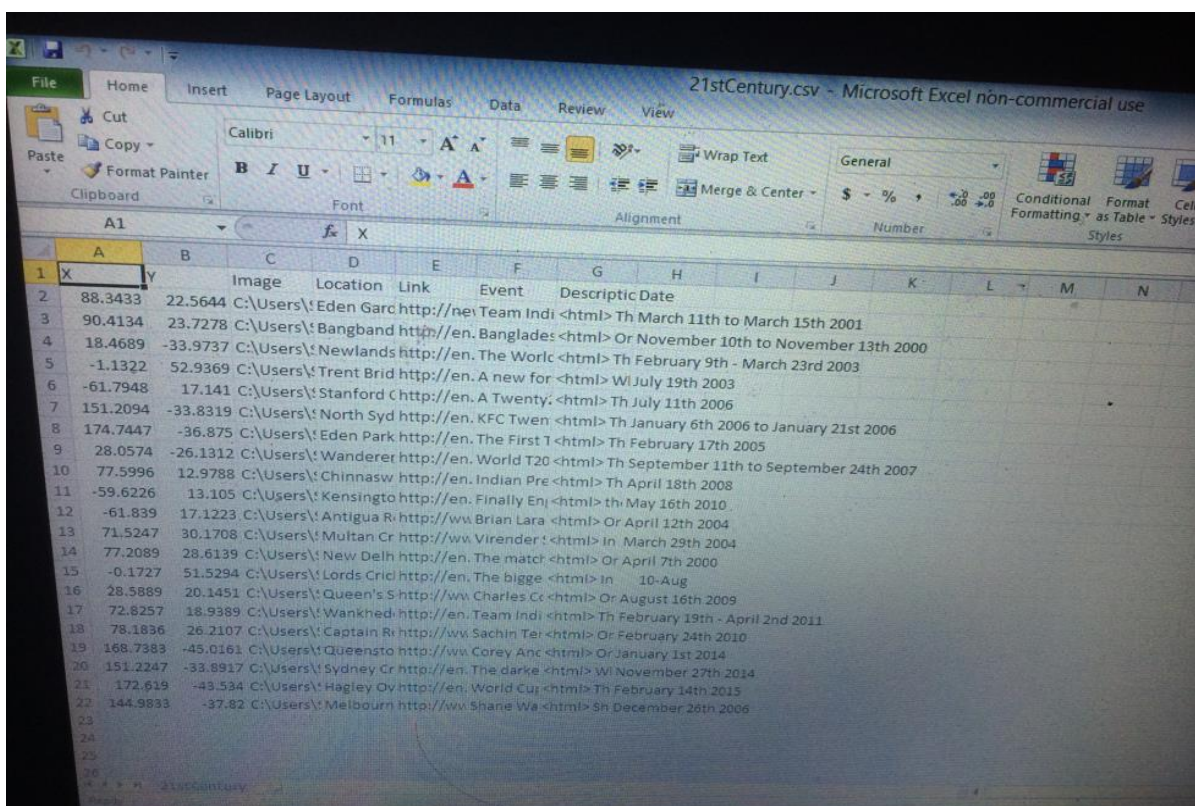
In September 2007, BCCI founded a new Twenty 20 cricket league known as Indian Premiere League, which would include 8 teams representing 8 Indian cities. The teams would be franchises, and each franchise would have an owner. The player auction for IPL was held in February 2008, over 200 players were bought by various teams, through a bidding process. The first season of IPL began on April 18th 2008. Rajasthan Royals won the inaugural season by beating Chennai Super Kings in the final at Mumbai [9].

There have been incidents of batsman getting struck by bouncers, but there was one more shocking incident which took place in 2014. On November 25th 2014, a Sheffield Shield match between New South Wales and South Australia was taking place. It was the second day of the match. The batsman Philip Hughes got struck by a bouncer from Sean

Abbott, and he immediately collapsed. He was rushed to the hospital, but in two days his battle for life ended unsuccessfully. This was one of the saddest days in the history of cricket. This was the first time a player died due to an injury on the field.

4.2 DATA ANALYSIS

The information is collected for each layer, and categorized into different properties like latitude, longitude, date, location and description. The features that are collected are placed into a CSV file, with the features separated by commas. The shapefile is created using the CSV file and the shapefile converter. Figure 4.2 shows a sample CSV file.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	X	Y	Image	Location	Link	Event	Descriptive	Date						
2	88.3433	22.5644	C:\Users\Eden Garc	http://ne	Team Indi	<html>	Th March 11th to March 15th 2001							
3	90.4134	23.7278	C:\Users\Bangband	http://en	Banglades	<html>	Or November 10th to November 13th 2000							
4	18.4689	-33.9737	C:\Users\Newlands	http://en	The Worlc	<html>	Th February 9th - March 23rd 2003							
5	-1.1322	52.9369	C:\Users\Trent Brid	http://en	A new for	<html>	Wl July 19th 2003							
6	-61.7948	17.141	C:\Users\Stanford C	http://en	A Twenty	<html>	Th July 11th 2006							
7	151.2094	-33.8319	C:\Users\North Syd	http://en	KFC Twen	<html>	Th January 6th 2006 to January 21st 2006							
8	174.7447	-36.875	C:\Users\Eden Park	http://en	The First 1	<html>	Th February 17th 2005							
9	28.0574	-26.1312	C:\Users\Wanderer	http://en	World T20	<html>	Th September 11th to September 24th 2007							
10	77.5996	12.9788	C:\Users\Chinnasw	http://en	Indian Pre	<html>	Th April 18th 2008							
11	-59.6226	13.105	C:\Users\Kensingto	http://en	Finally Enj	<html>	th May 16th 2010							
12	-61.839	17.1223	C:\Users\Antigua R	http://ww	Brian Lara	<html>	Or April 12th 2004							
13	71.5247	30.1708	C:\Users\Multan Cr	http://ww	Virender	<html>	in March 29th 2004							
14	77.2089	28.6139	C:\Users\New Delh	http://en	The match	<html>	Or April 7th 2000							
15	-0.1727	51.5294	C:\Users\Lords Crid	http://en	The bigge	<html>	in 10-Aug							
16	28.5889	20.1451	C:\Users\Queen's S	http://ww	Charles Co	<html>	Or August 16th 2009							
17	72.8257	18.9389	C:\Users\Wankhed	http://en	Team Indi	<html>	Th February 19th - April 2nd 2011							
18	78.1836	26.2107	C:\Users\Captain R	http://ww	Sachin Te	<html>	Or February 24th 2010							
19	168.7383	-45.0161	C:\Users\Queensto	http://ww	Corey Anc	<html>	Or January 1st 2014							
20	151.2247	-33.8917	C:\Users\Sydney Cr	http://en	The darke	<html>	Wl November 27th 2014							
21	172.619	-43.534	C:\Users\Hagley Ov	http://en	World Cur	<html>	Th February 14th 2015							
22	144.9833	-37.82	C:\Users\Melbourn	http://ww	Shane Wa	<html>	3h December 26th 2006							

Figure 4.2. Sample CSV file.

CHAPTER 5

MOJO TOOLBAR

MOJO provides certain built in tools that can be used in GIS applications .A few of them have been used in this application. Some the well-known tools are zoom in, zoom out and pan. There are two built-in toolbars. They are the zoom pan toolbar and selection toolbar.

5.1 ZOOMPAN TOOLBAR

The Zoom Pan toolbar provides some useful zoom and pan related features. The Figure 5.1 shows the Zoom Pan toolbar.

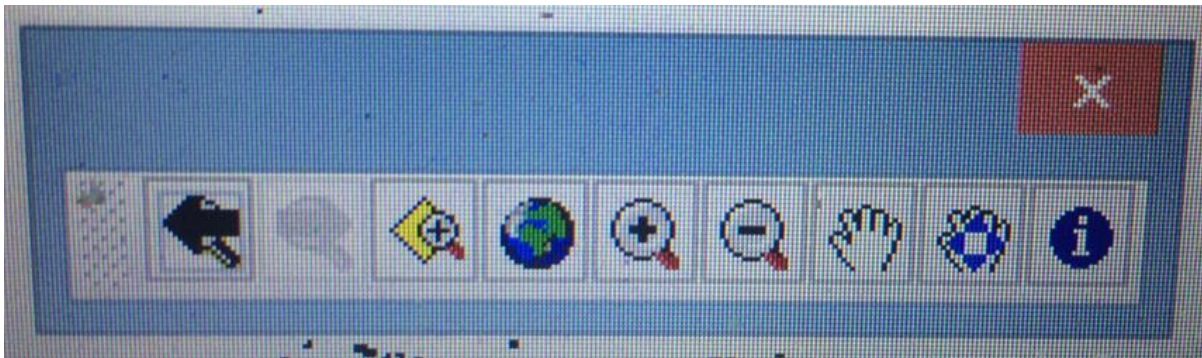


Figure 5.1. Zoom Pan Toolbar.

The tools in the Zoom pan toolbar are the following

- **Zoom In** – Zooms into the region selected on the map
- **Zoom Out** – Zoom out of the current region
- **Pan** – Drag the map in the direction of the mouse
- **Pan in one direction** – Drag the map in a particular direction
- **Zoom to Full Extent** – Zooms to the entire area of the map
- **Zoom to Active Layer** – Zooms the map to all the selected regions
- **Zoom to Previous Extent** – Zooms to the previous display of the map
- **Zoom to Next Extent** – Zoom to the next display of the map

- **Identify** – Identifies features of the active layer, and displays information from a particular row , depending on which point or region is clicked

5.2 SELECTION TOOLBAR

Selection toolbar is a built-in toolbar that provides many selection operations that can be performed on the active layer (see Figure 5.2).

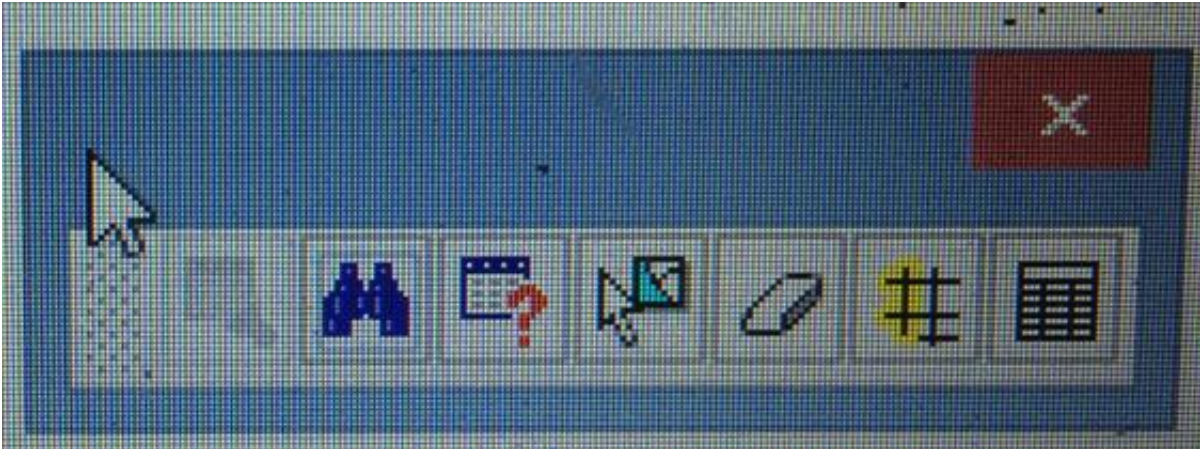


Figure 5.2. Selection Toolbar.

These are the tools offered by Selection Toolbar

- **Search** – This tool can be used to find features based on a pre-defined query
- **Find** – Opens a Dialog Box where a layer can be selected, and a value can be entered. Based on the value, a subject is chosen and highlighted in yellow on the map.
- **Query Builder** - Opens a dialog box which helps to build and run an SQL like query on the database related to the selected layer. When the query is run, the results are displayed and the region that matches the criteria is highlighted on the map
- **Select** – This tool can be used to select a particular region or area of the map and flash it in yellow. The region can be selected with help of a rectangle, circle, line or polygon. All the features that intersect the selected region are highlighted in yellow.
- **Clear All Selections** – Clears all the features that had been selected previously
- **Buffer** – Helps to create a buffer region from the selected features, of a particular distance.
- **Attributes** – Displays the attributes of the active layer in the form of a table

CHAPTER 6

CUSTOMIZED TOOLBAR

The custom toolbar is a toolbar that has been built to add extra features, over and above those offered by the zoom pan toolbar and selection toolbar. There are nine tools in this toolbar, each of which provides its own functionality. The purpose of creating a custom toolbar is to offer certain special features that are not available in the built-in toolbars. This toolbar has been built using JToolBar from the Java swing utility. Figure 6.1 is a snapshot of the custom toolbar.

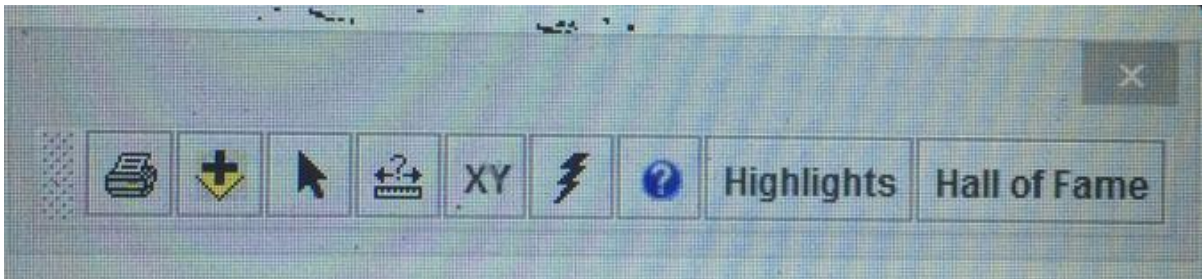


Figure 6.1. Custom Toolbar.

6.1 PRINT

The purpose of this tool is to print the map. When the print button is clicked, the printer options come up, and then the printer prints the map. This tool is built using the MOJO class `com.esri.mo2.ui.bean.Print`. Figure 6.2 is the window that comes up when the print tool is selected.

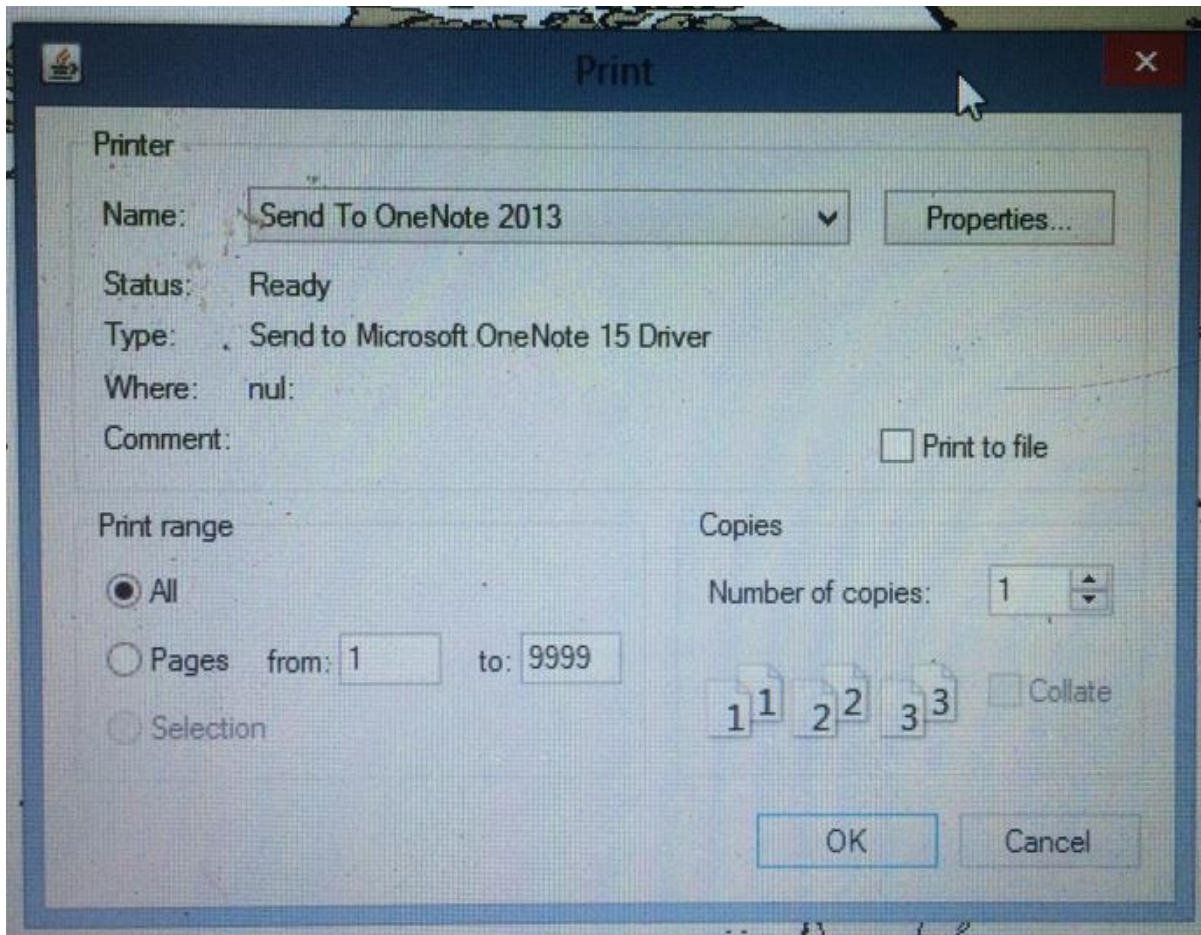


Figure 6.2. Print Tool.

6.2 ADD LAYER

This tool helps in dynamically adding layers to the table of contents (TOC). This tool is designed using the MOJO class `com.esri.mo2.ui.tb.LayerToolBar`. When the tool is clicked, a dialog box is opened, which helps the user to navigate across folders and select the desired shapefile. Once the desired shapefile is selected, a new layer is added. It has to be selected in the TOC to be visible. Figure 6.3 is the window that comes up when add layer is selected.

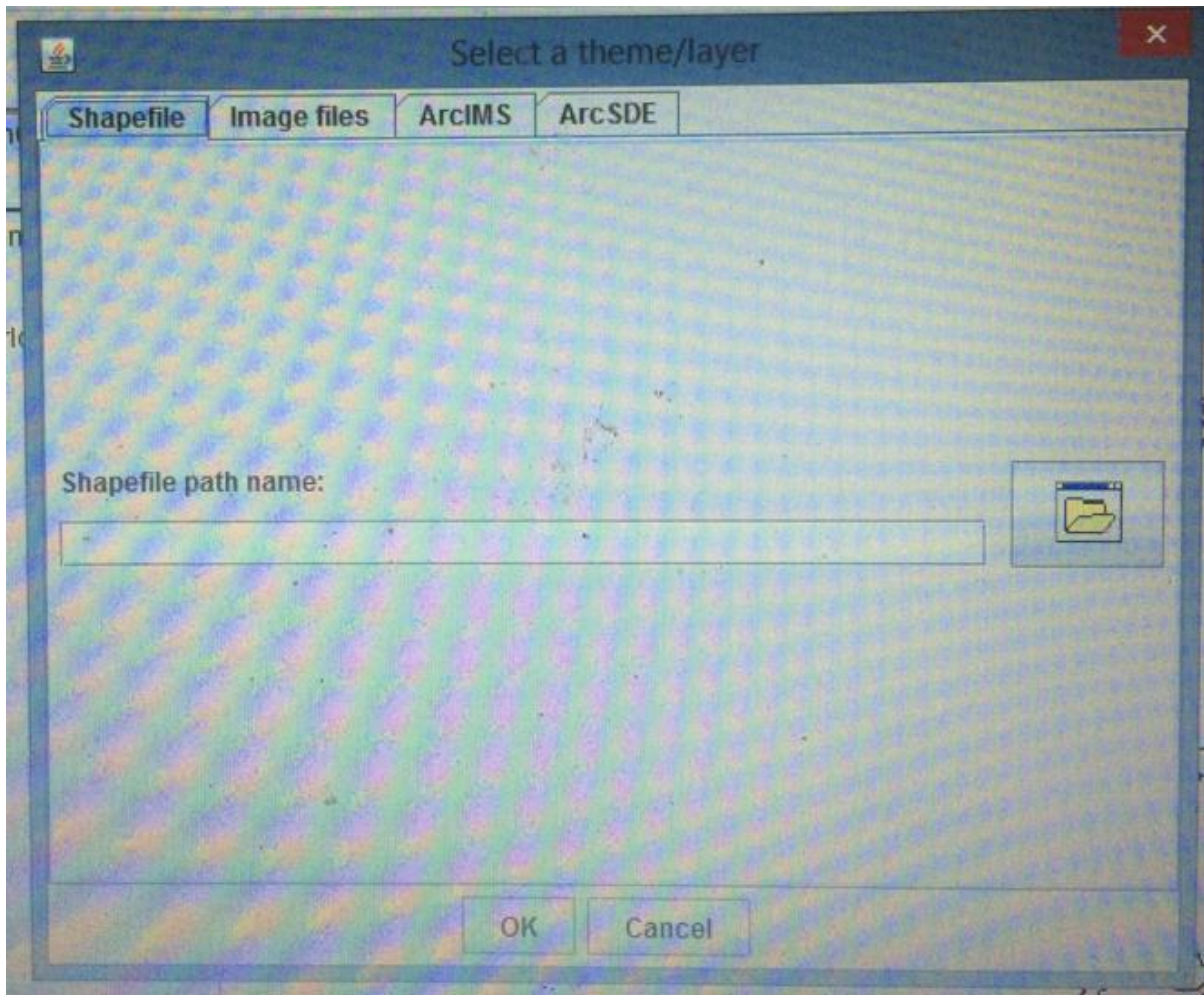


Figure 6.3. Add Layer tool window.

6.3 POINTER

When any special tool is clicked like the zoom in, pan or any other tool, the icon of that tool replaces the default mouse tip icon and a specific mouse function is initiated. In order to reverse this effect, the pointer tool, is used. The moment it is clicked, the current tool icon is replaced by the default icon on the mouse tip and the mouse behavior is discontinued. This tool is built using the MOJO class `com.esri.mo2.ui.bean.Tool`.

6.4 DISTANCE TOOL

This tool is used to measure the geographical distance between any two points on the map in miles as well as in kilometers. The distance is shown at the bottom of the window. To find the distance between two points, first the tool should be clicked, then the mouse should be clicked and dragged from the first point to the second point. Once the mouse is released, a

blue line is drawn with the two points as its end points, and the distance is displayed at the bottom of the window.

6.5 XY TOOL

XY tool is used to create a layer dynamically from a CSV file (containing the longitude, latitude and other details) which is displayed on the TOC. When this tool is clicked, a file browser comes up, through which the user can select a particular CSV file. Once the file is selected, the points that have been mentioned in the file are marked on the map. Figure 6.4 is a window that comes up when the XY tool is selected.

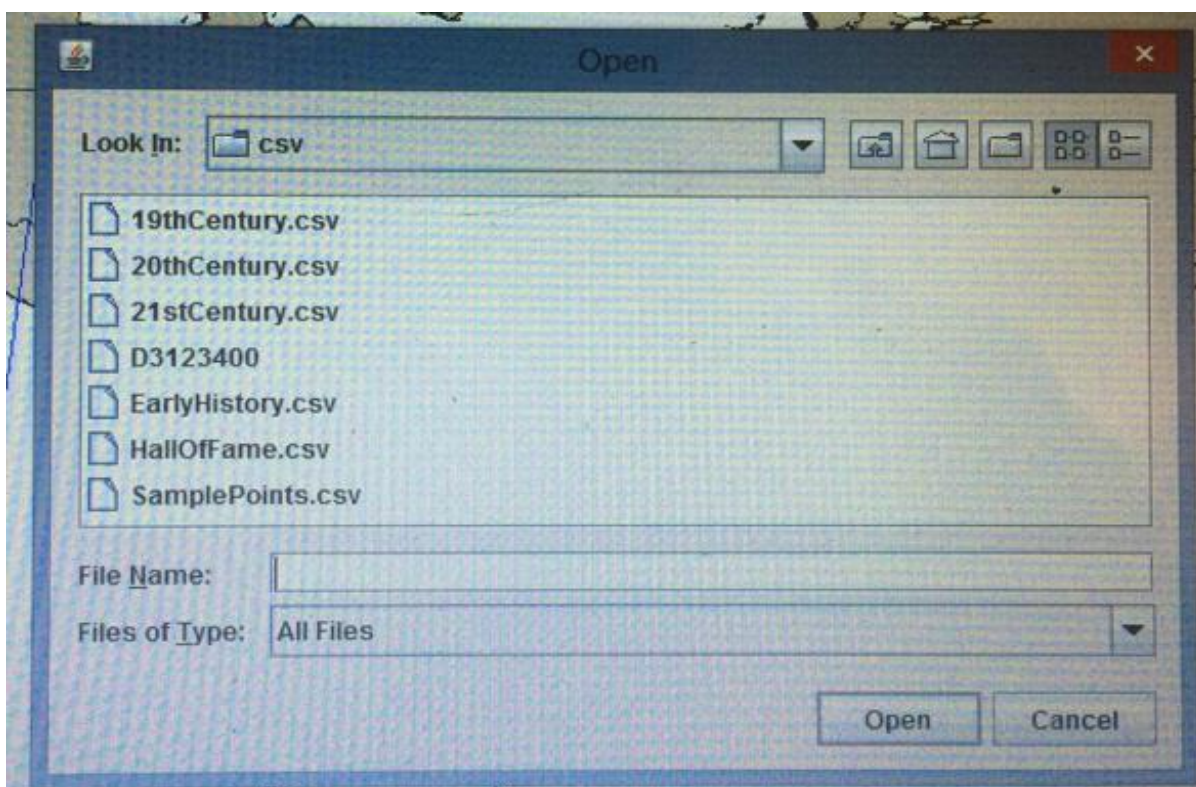


Figure 6.4. File Browser which opens when XY tool is clicked.

6.6 HOTLINK

The Hotlink tool is used to get information about a particular event or location, depending on the selected layer. When a particular point is selected after clicking the hotlink tool, the information about a particular event or the highlights of cricket related events or information about a particular player in the Hall of Fame is displayed, depending on the active layer. An image is also included with the details.

6.7 HIGHLIGHTS

This is another tool which creates a new layer, but with a pre-defined CSV file. It will be easier to just view the special events related to cricket in each country, instead of viewing each event individually. This is where the Highlights tool comes in handy. When it is clicked, the various points in the major cricket playing countries are highlighted. These points represent the place where cricket began in that particular country. Instead of marking the points, they highlighted or flashed, so that they can be clearly noticed.

6.8 HALL OF FAME

This tool is similar to the Highlights tool. But instead of showing the highlights of cricket related events, it provides details of players who have been inducted to the ICC Hall of Fame. When this tool is selected, a new layer is created and all the birth places of all the players who have been inducted to the ICC Hall of Fame will start flashing. When any flashing point is selected, a pop-up box comes up. This displays all the information related to the corresponding player like description, country and year of induction. An image of the player is also displayed.

CHAPTER 7

MENU

There are many more features in this application. They are provided through a menu. This menu bar is built using JMenu from the Java swing utility. The menu helps people understand not only the features of this application but also the general GIS functionalities like adding a layer, promoting or demoting a layer, removing a layer and using the legend editor. In this chapter all the menu options will be covered. Figure 7.1 is a picture of the menu bar.

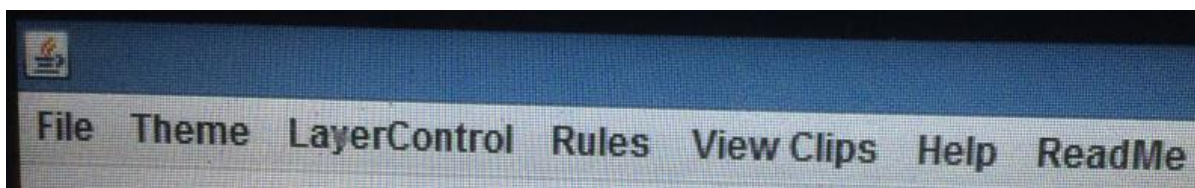


Figure 7.1. Menu Bar.

7.1 FILE MENU

The file menu has four sub-menus. They are add layer, remove layer, print and legend editor. The add layer sub-menu is used to perform the same task that the add layer tool in the custom toolbar performs. Similarly the print submenu performs the same task as the print tool. The remove layer sub-menu is used to remove a layer from the TOC. Before this sub-menu is clicked, a layer in the TOC should be selected, and once remove layer is clicked, the selected layer is removed from the TOC. The legend editor is used to make changes to the display features or to attach a label to all the points that are displayed. Figure 7.2 is a picture of the file menu.

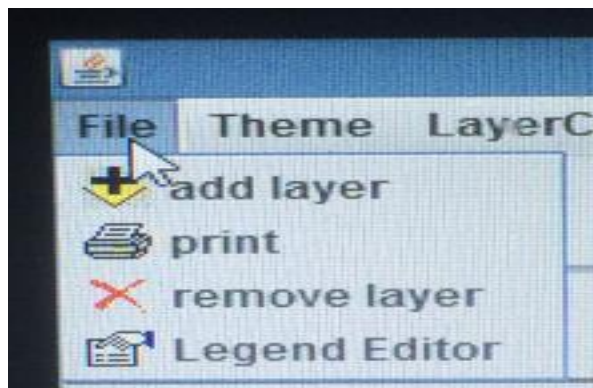


Figure 7.2. File Menu.

7.2 THEME MENU

The theme menu has two sub-menus; open attribute sub-menu, which displays the attributes of the selected layer in a tabular format, and the create layer from selection sub menu which creates a new layer from the region selected on the map, and adds it to the TOC. Figure 7.3 is a picture of the theme menu.

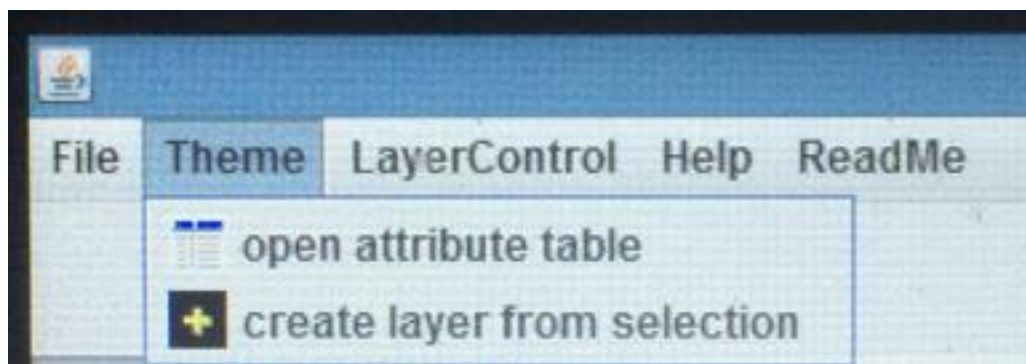


Figure 7.3. Theme Menu.

7.3 LAYER CONTROL MENU

The layer control menu has two sub-menus, promote selected layer and demote selected layer. The “promote selected layer” sub-menu is used to move the selected layer, one level up in the map window and in the TOC. Similarly the “demote selected layer” moves the selected layer one level down. Both the sub-menus can be used only when a layer is selected. The topmost layer cannot be promoted and the lowermost layer cannot be demoted. Figure 7.4 is a picture of the layer control menu.

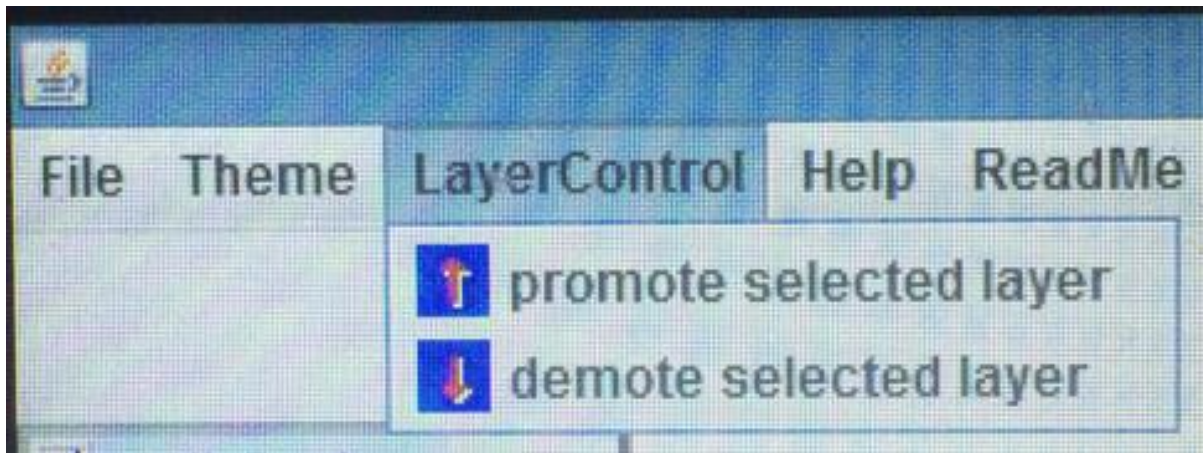


Figure 7.4. Layer Control Menu.

7.4 HELP MENU

The help menu has one sub-menu, which is the “help using the tool” sub-menu. When this sub-menu is clicked a help window comes up. The window contains information about the various tools and toolbars that are a part of the application. Figure 7.5 is a picture of the help menu.

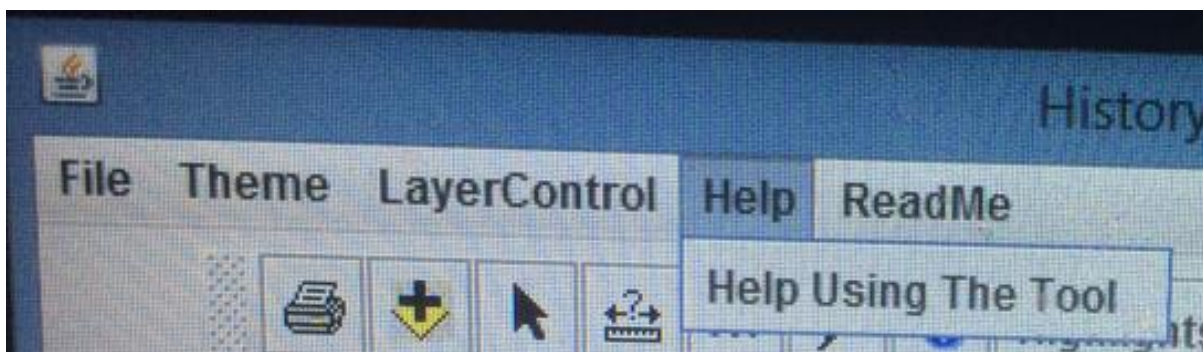


Figure 7.5. Help Menu.

7.5 README MENU

The readme menu has one sub-menu, which is the “readme doc” sub-menu. When this sub-menu is clicked, a window comes up which displays the complete user guide of the application. An image is present in the window, which indicated where the tools, toolbars and TOC are located in the application. Figure 7.6 is a picture of the readme menu.

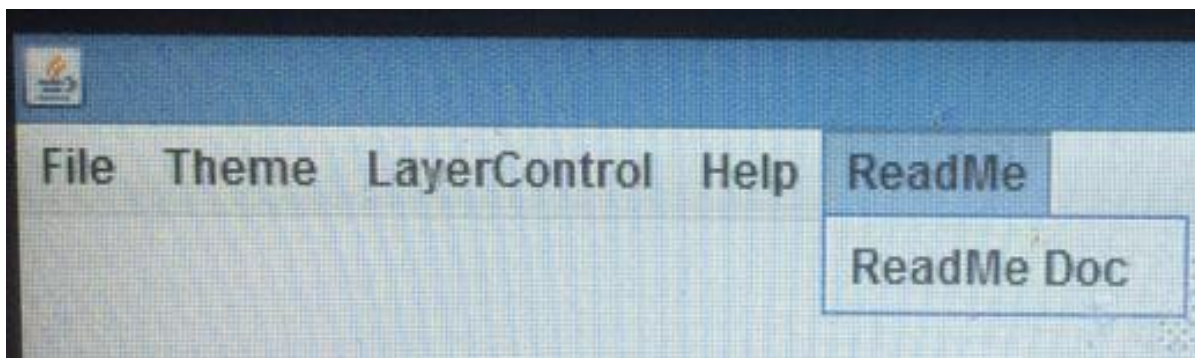


Figure 7.6. ReadMe Menu.

7.6 RULES MENU

The rules menu helps users to understand the various rules of cricket and how they have evolved since the inception of cricket. There are two sub-menus that are present inside the rules menu; they are “evolution of cricket laws” and “rules of cricket” sub-menus. When the “evolution of cricket laws” sub-menu is selected, a pop-up box is displayed, which provides information regarding the original laws of cricket, and how they have evolved with time. When the “Rules of cricket” sub-menu is selected, a pop-up box is displayed which explains the latest rules of cricket and the various forms of cricket. At the bottom, there is a button, which when clicked, opens a web link to a video that explains the rules of cricket. Figure 7.7 is a picture of the rules menu.



Figure 7.7. Rules Menu.

7.7 VIDEO CLIPS MENU

The Video Clips menu helps users understand the various forms of cricket with the help of video clips. The 5 sub-menus are Test, ODI, Ashes, World Cup and Twenty20. Each sub-menu provides information regarding the particular format or tournament as well as a links to related videos. Figure 7.8 is a picture of the video clips menu.

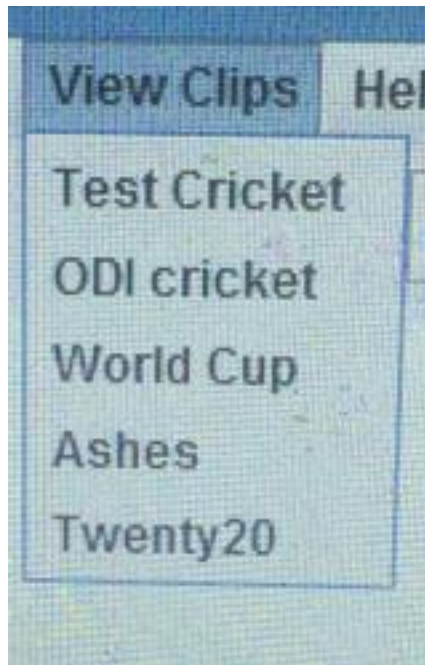


Figure 7.8. View Clips Menu.

CHAPTER 8

SCREENSHOTS

When the application is run, a default window comes up. In this window all the toolbars and the menu are visible at the top. A default layer is rendered, and the points associated with the default layer are marked on the map. The entry of the default layer is visible in the Table of Contents (TOC) section at the left of the map. Figure 8.1 is the default application window.

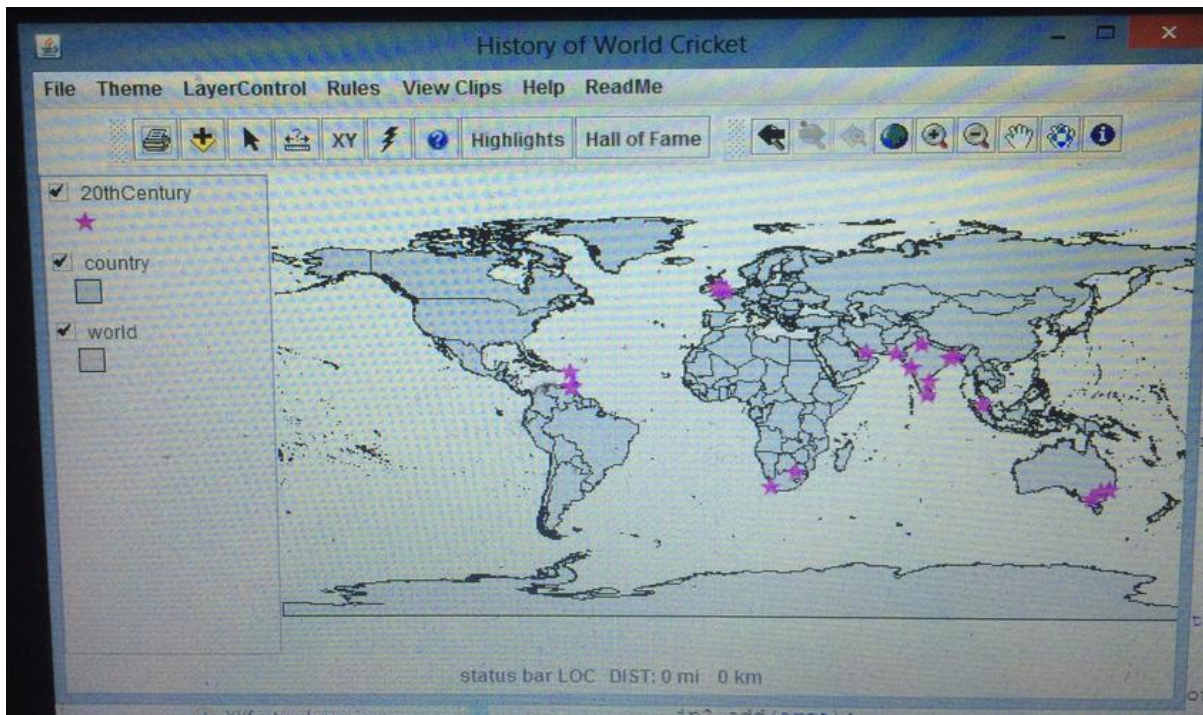


Figure 8.1. Application Window.

When the Legend Editor sub-menu in the File menu is selected, the Legend Editor window is opened. Here the user can make changes to the display features of the layer, like font, color, size and shape of the marker. Figure 8.2 is the Legend Editor window.

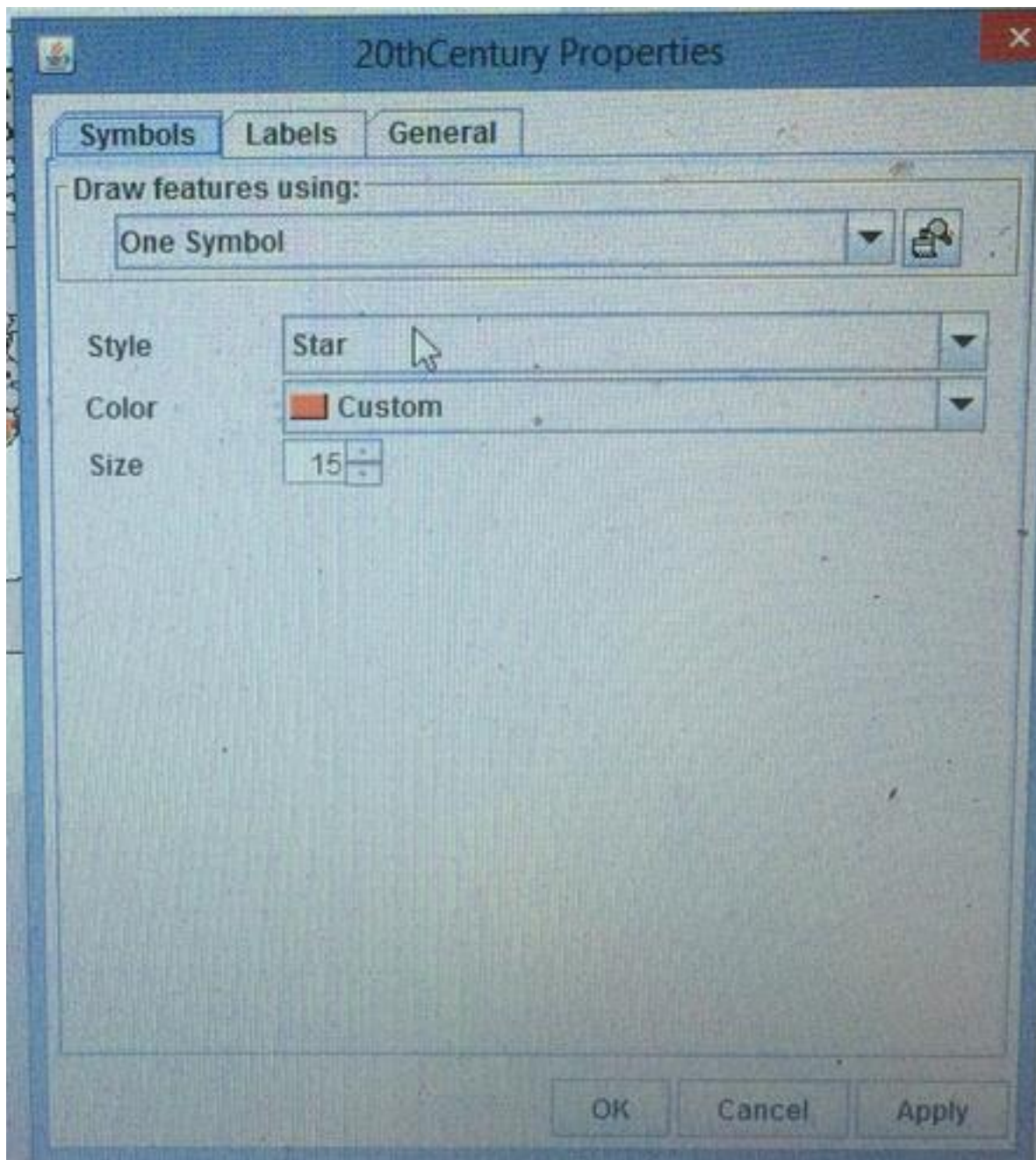


Figure 8.2. Legend Editor Window.

As explained in the previous chapter, the Rules menu helps the users understand the latest rules of cricket and how they evolved with time. When the first sub-menu, the Evolution of Laws is selected, a window is brought up, which displays the evolution of cricket laws. At the bottom of the page there is a scrollbar. The scrollbar contains various years, and when the scroll is moved to a particular year, the change implemented in that year,

is displayed above the scrollbar. As and when the scroll is moved, the text changes.

Figure 8.3 is the Evolution of Laws window.

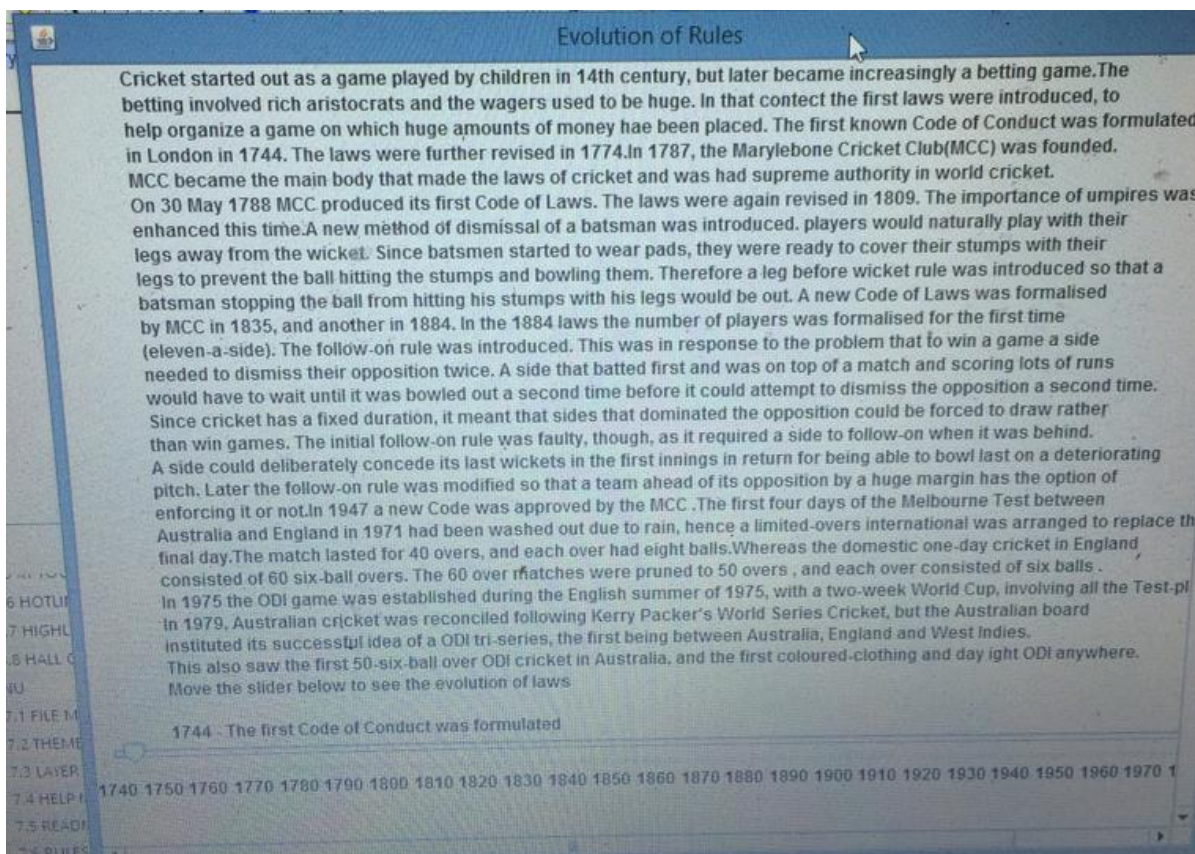


Figure 8.3. Evolution of Laws Window.

When the “Rules of cricket” sub-menu in the Rules menu is selected, another window is brought up, that explains the current rules of cricket, scoring techniques and methods of dismissing a batsman. At the bottom of the window, there is a button, which when clicked, opens a link to a video. This video explains the rules of cricket in detail.

The two Figures 8.4 and 8.5 show the top half and bottom half respectively, of the Cricket Rules window.

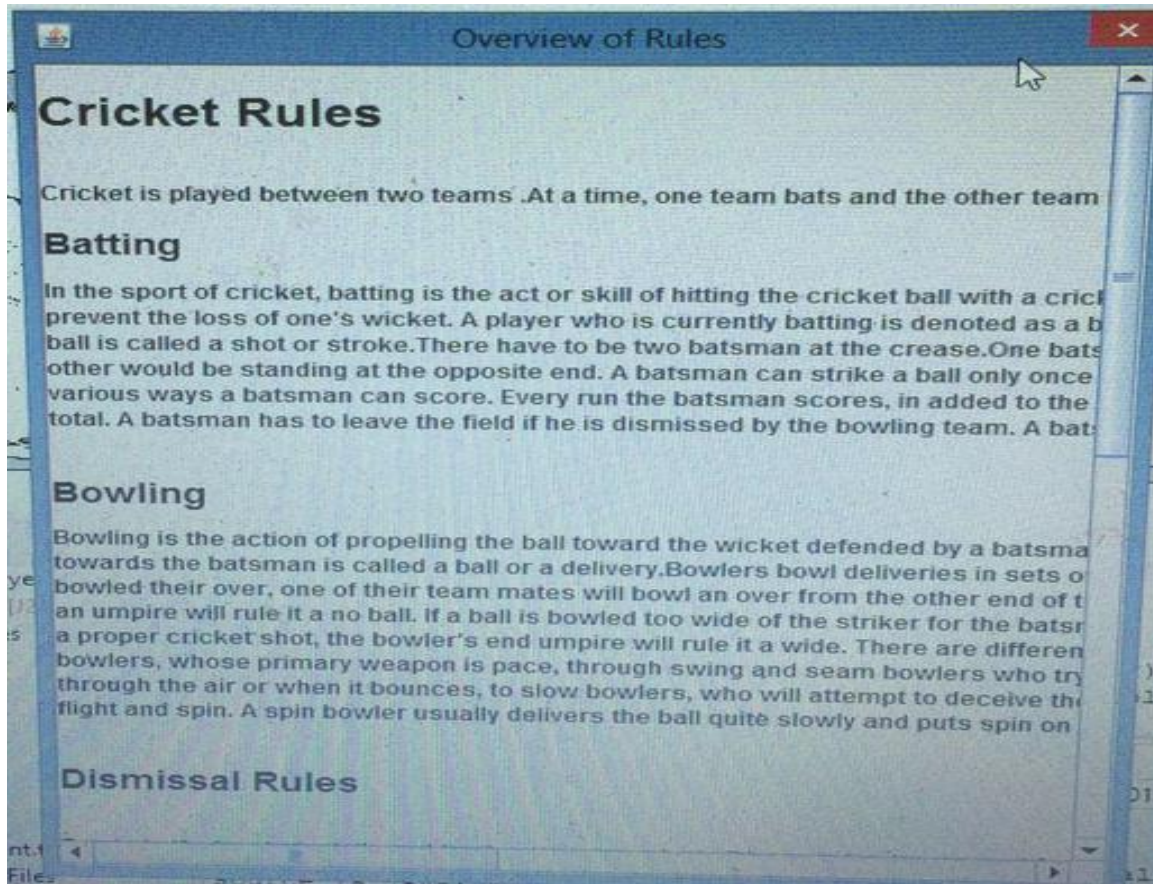


Figure 8.4. Overview of Cricket Rules from the Rules Menu(Top half).

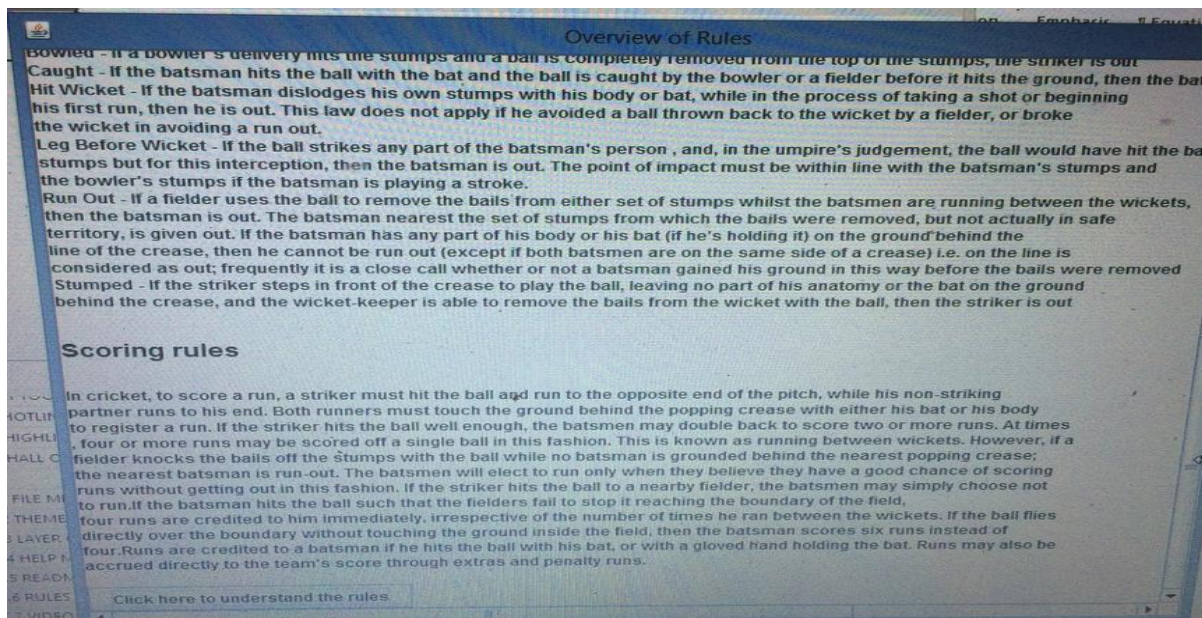


Figure 8.5. Overview of Cricket Rules from the Rules Menu(bottom half).

In the Video Clip menu, there are five sub-menus, each of which opens a new window when selected. The window contains textual information about the particular format or tournament, images related to it and buttons at the bottom. There are two buttons in the window. When either of the buttons is clicked, a link to a video related to the tournament or format is opened. The purpose of having two buttons(except the World Cup window which has five) is to have two video links, one which provides historical information about the tournament and another which shows the highlights of the latest match of that tournament that was played. The five sub-menus are Test Cricket, ODI Cricket, Ashes, World Cup and Twenty20.

Figure 8.6 and 8.7 are the top view and bottom view of the Test Cricket Window. At the bottom of the window there are two buttons, each of which opens a link to a video , that shows the highlights of a test match.

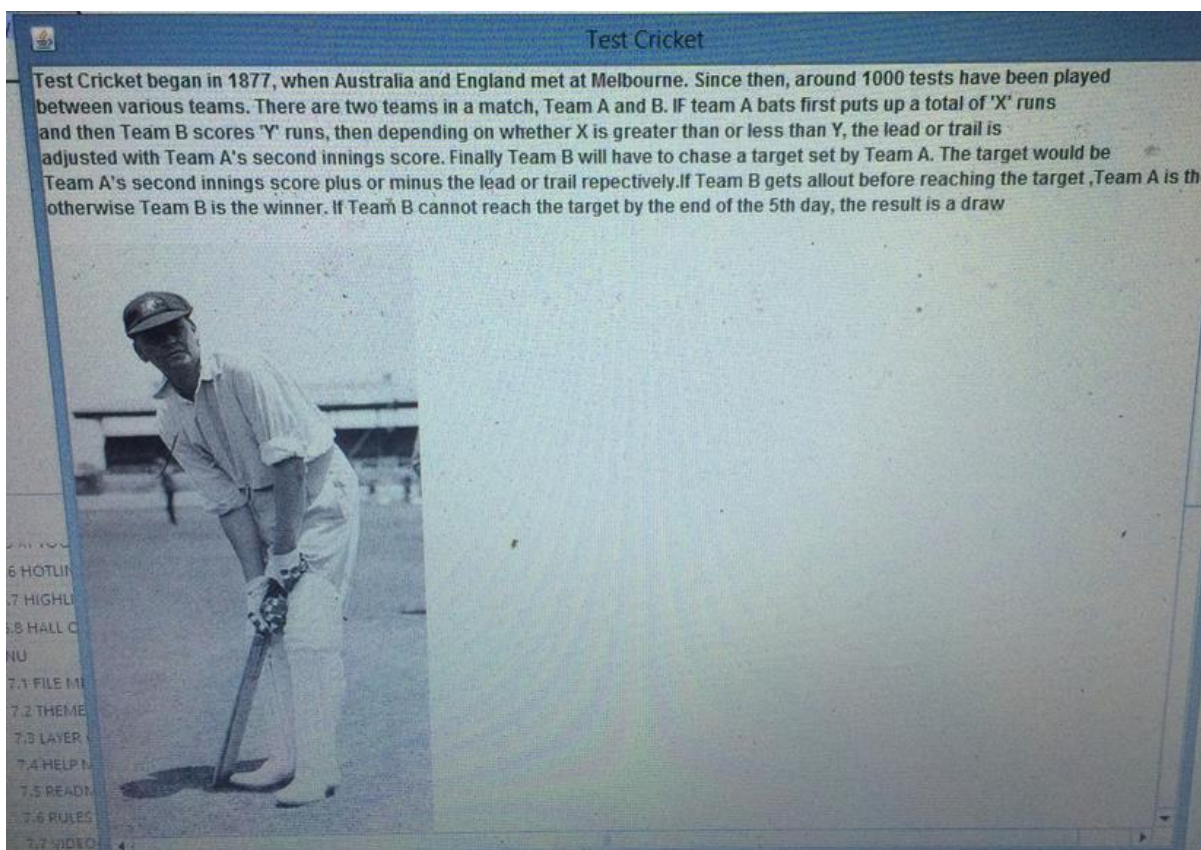


Figure 8.6. Test Cricket Window(top half).

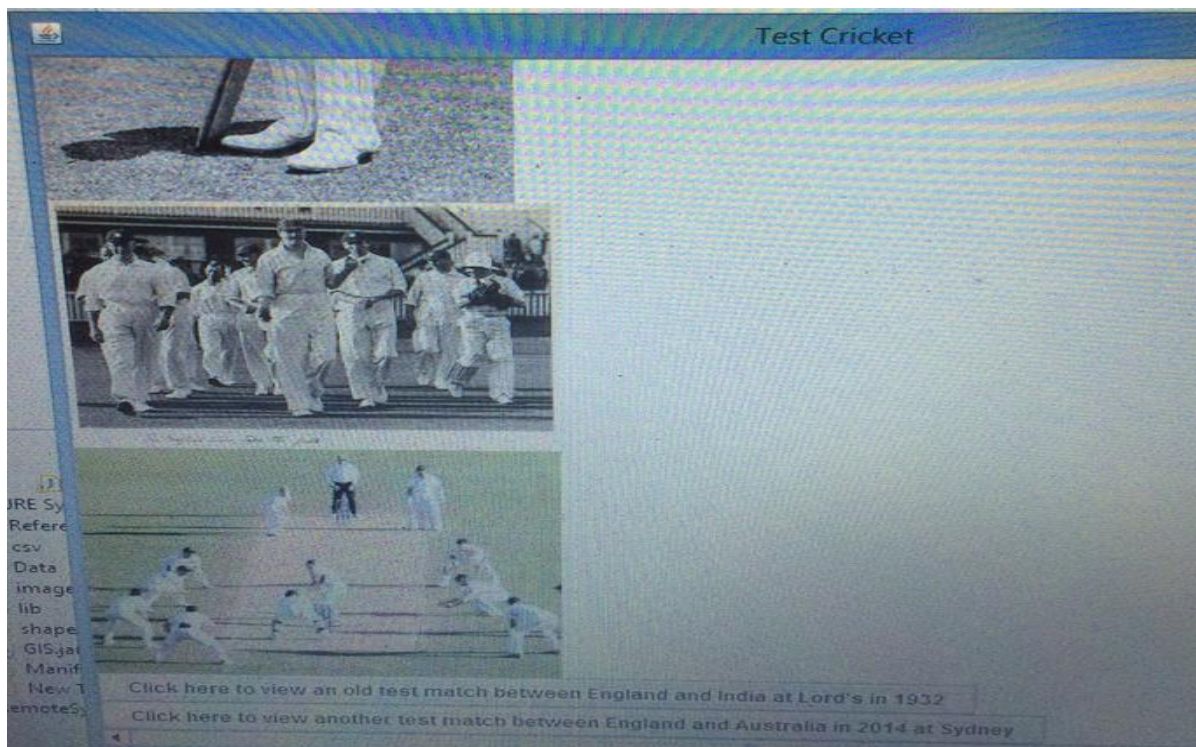


Figure 8.7. Test Cricket Window (bottom half).

Figures 8.8 and 8.9 are the top view and bottom view of the ODI Cricket Window. At the bottom of the window there are two buttons. The first button, when clicked opens a link to a video, which contains historical information about the first ODI played in 1971. The second button when clicked opens a link to a video that contains highlights of an ODI between England and Pakistan in 2006.

Figures 8.10 and 8.11 are the top and bottom views of the Ashes Window. The Ashes is a test series between Australia and England. At the bottom of the window there are two buttons. The first button, when clicked opens a link to a video, which contains historical information about the Ashes. The second button when clicked opens a link to a video that contains highlights of an Ashes test at Adelaide in 2010.

Figures 8.12 and 8.13 are the top and bottom views of the World Cup Window. The World Cup is an ODI tournament in which all the full members participate. At the bottom of the window there are five buttons. Each button when clicked opens a link to a video that contains highlights of a particular World Cup.(1975,1983,1992,2003 and 2011 World Cup).



Figure 8.8. ODI Window(top half).

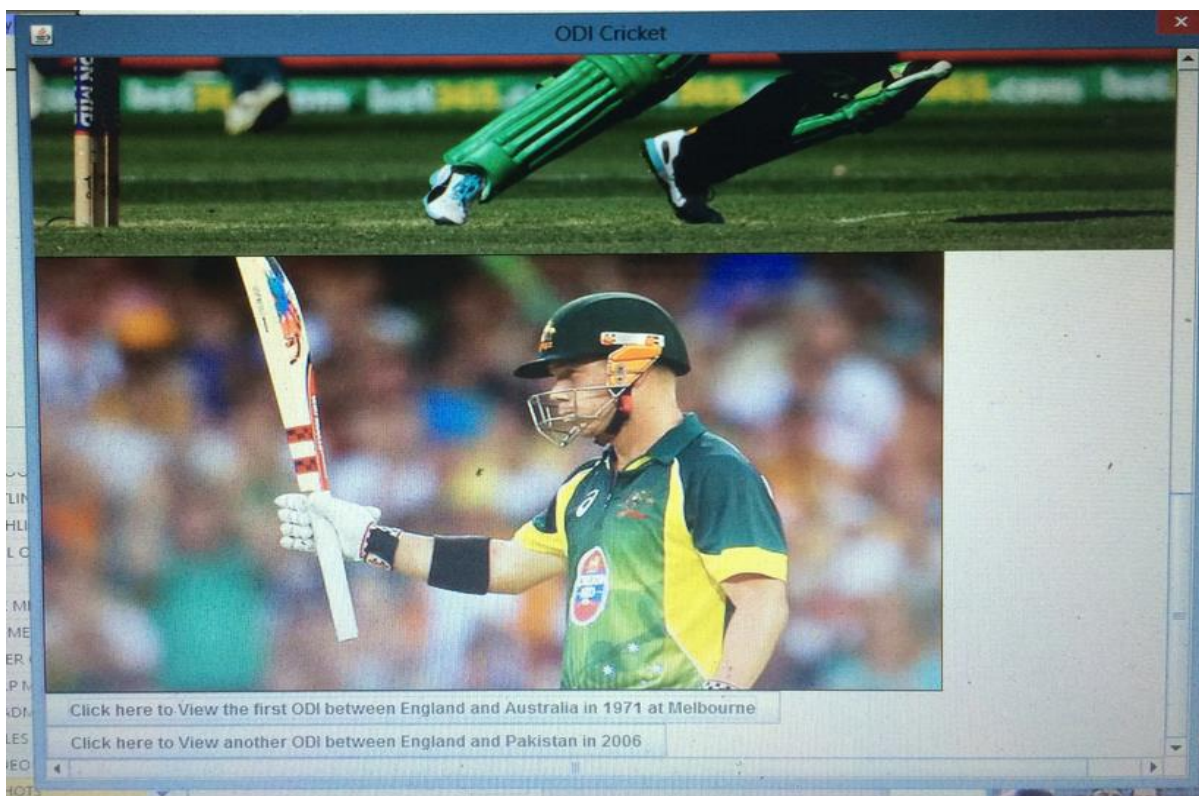


Figure 8.9. ODI Window(bottom half).



Figure 8.10. Ashes Window(top half).

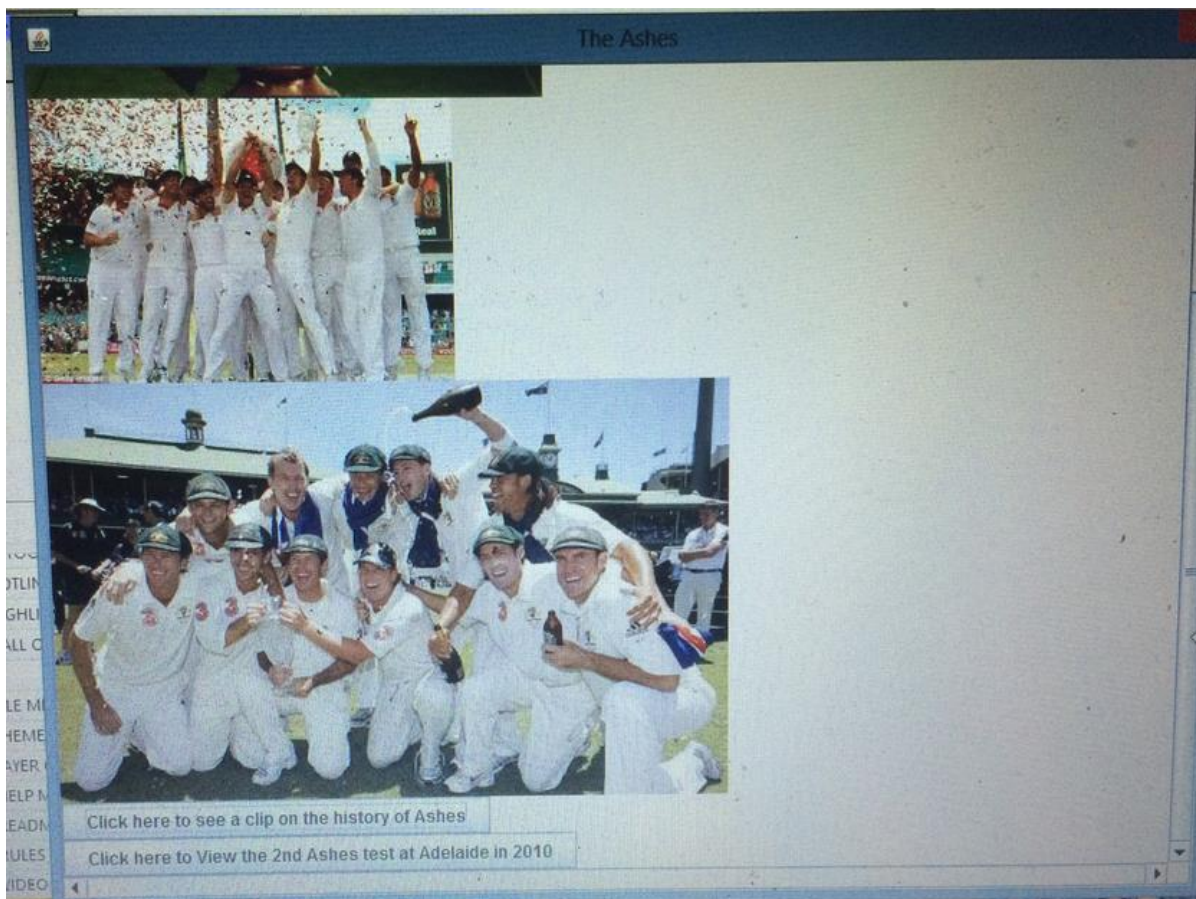


Figure 8.11. Ashes Window(bottom half).

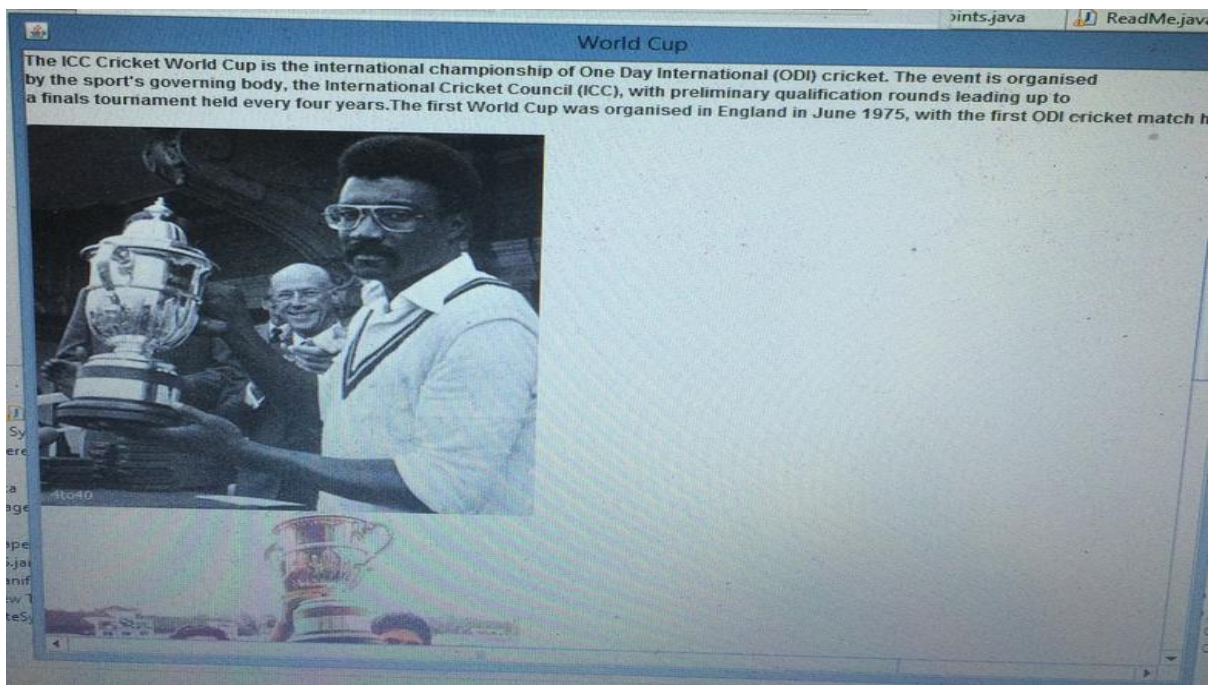


Figure 8.12. World Cup Menu(top half).

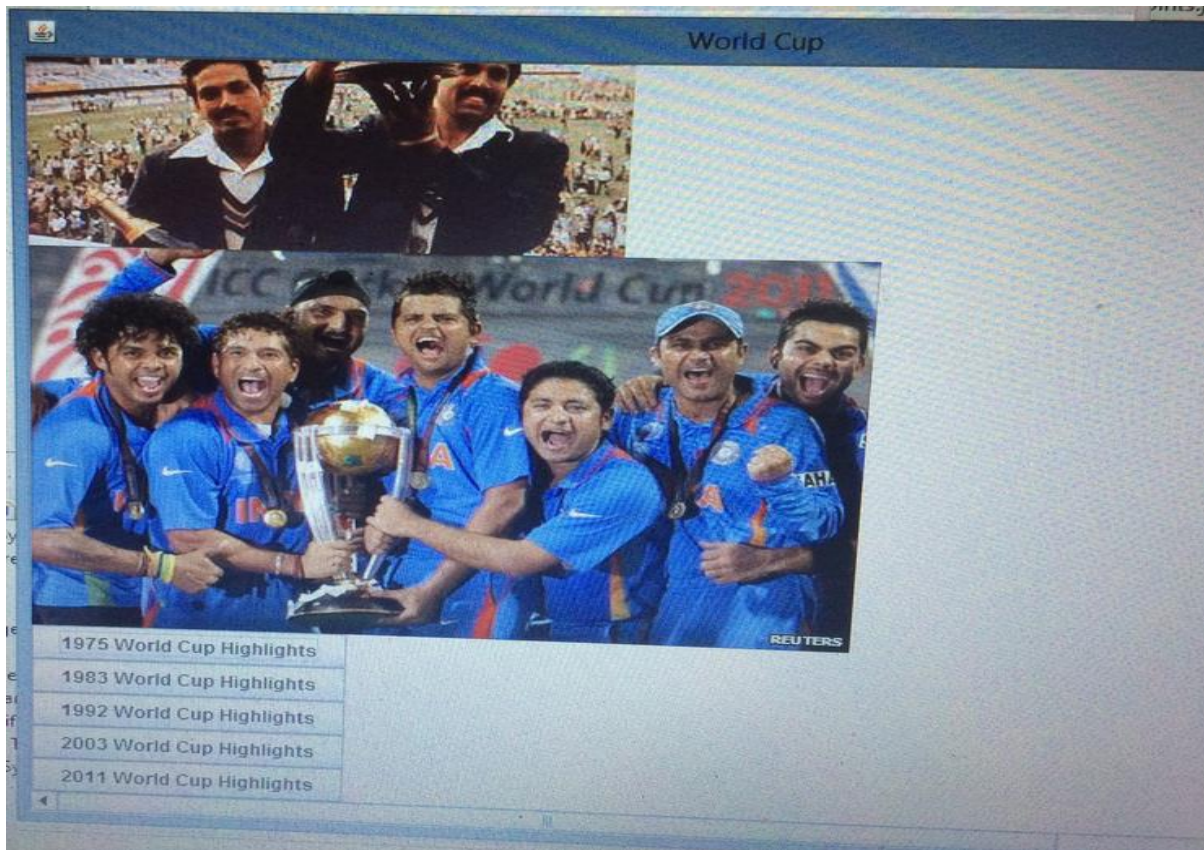


Figure 8.13. World Cup Menu(bottom half).

Figures 8.14 and 8.15 are the top and bottom views of the Twenty20 Window. Twenty20 is a limited over format with 20 overs per side. At the bottom of the window there are two buttons. The first button, when clicked opens a link to a video, which contains highlights of the first International Twenty20 played between Australia and New Zealand. The second button when clicked opens a link to a video that contains highlights of the World Twenty20 2007 final between India and Pakistan.

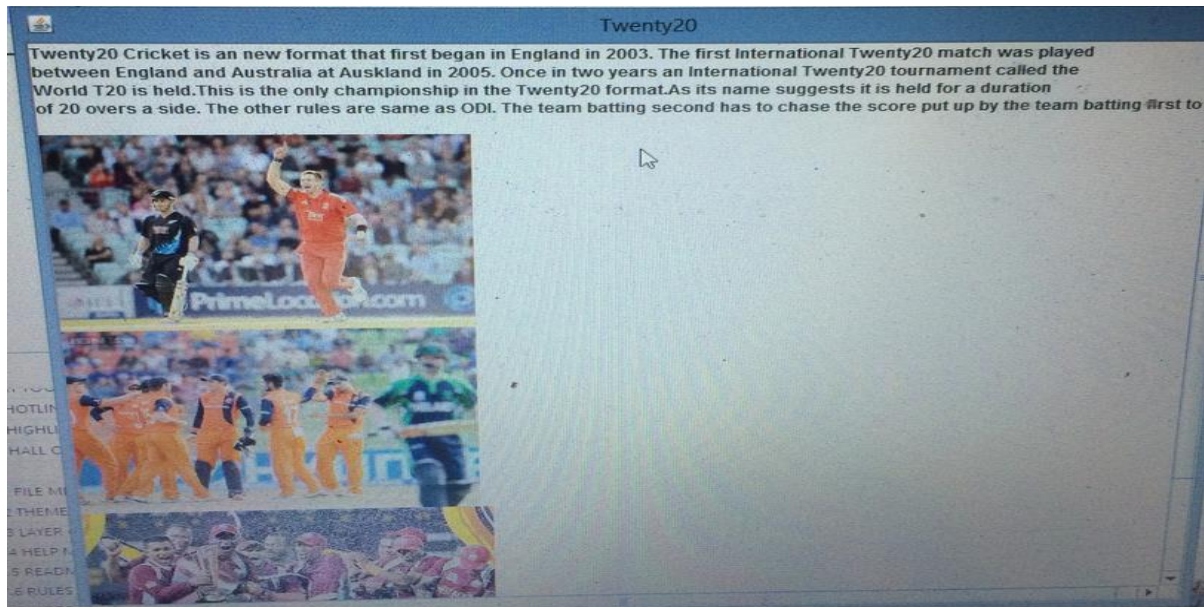


Figure 8.14. Twenty20 Window (Top half).

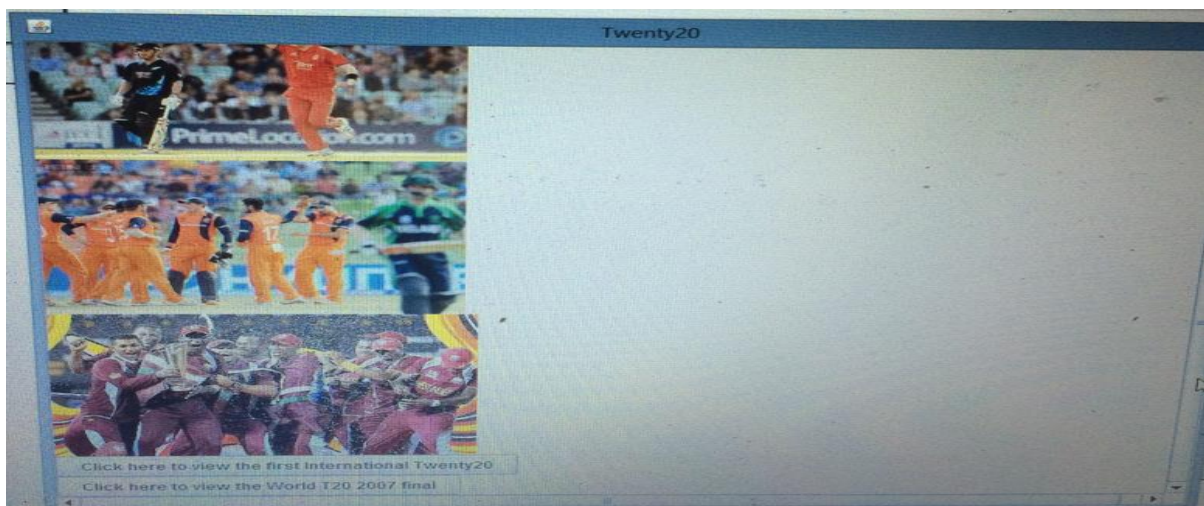


Figure 8.15. Twenty20 Window (bottom half).

The XY tool aids the user in adding a new layer to the Table of Contents with the help of CSV files. Each layer added using this tool, represents a timeline or a century in the history of cricket. All the locations of the major cricket related events are marked on the map, when the layer is added. When a particular point marked on the map, is clicked after selecting the hotlink tool, a window comes up.. This window contains the location of a particular event associated with that point, an image of the event, description of the event and a web link related to that event. The web link redirects the user to an existing webpage that

contains in depth information about the event. Figure 8.16 shows the window that is brought up when a location is clicked after selecting the hotlink tool.

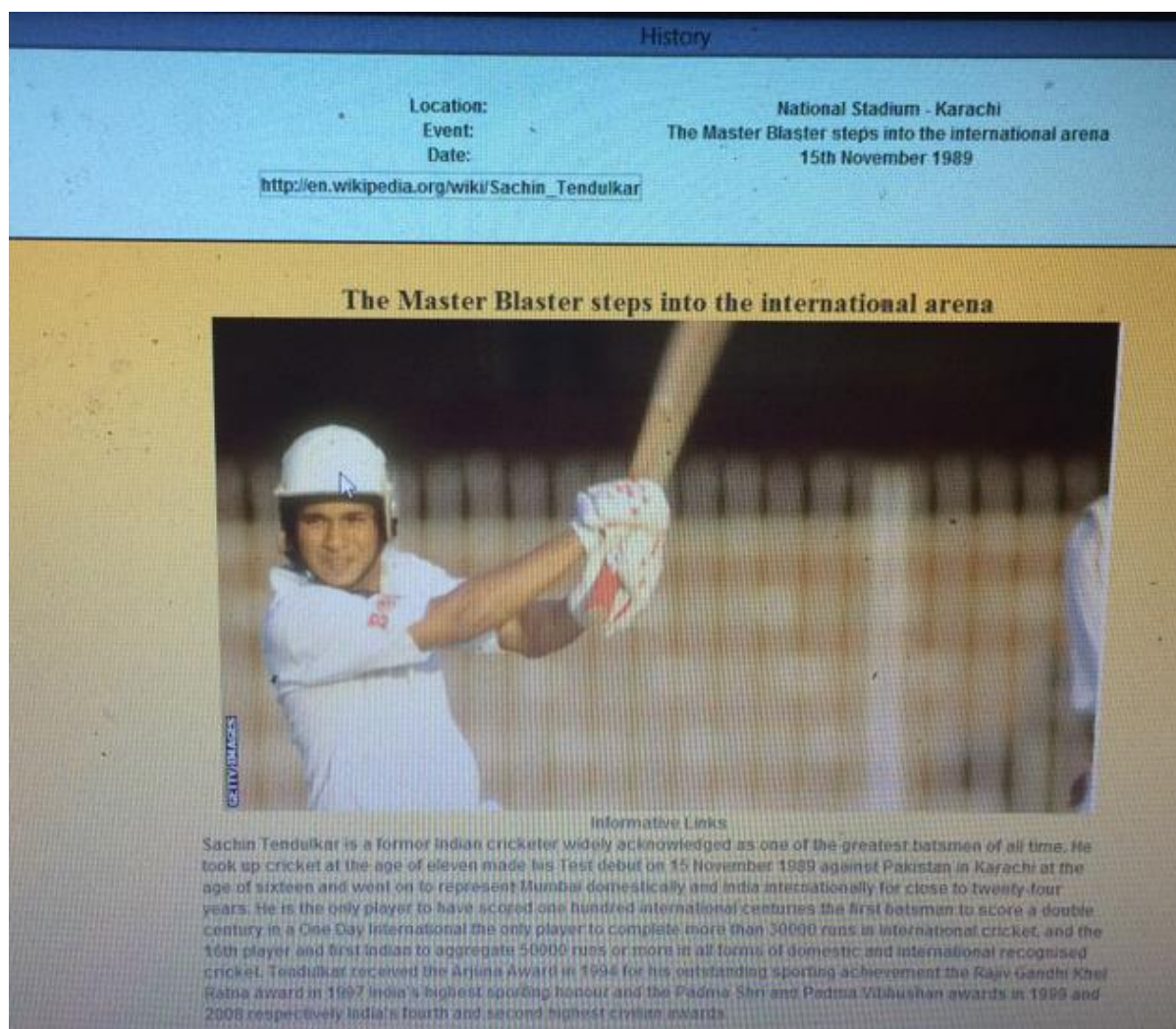


Figure 8.16. Event History Window.


When the highlights tool is clicked, various points are flashed on the map, and a new layer is added. The points correspond to locations where cricket began in various countries. When a point is clicked after selecting the hotlink tool, a window comes up. This window contains the highlights of the various cricket related events that took place in that particular country. Figure 8.17 shows the window that comes up when a location is clicked after selecting the hotlink tool.

Highlights

Location: Mumbai
 Events: Highlights of Indian Cricket
 Year: 1737

http://en.wikipedia.org/wiki/Cricket_in_India

Highlights of Indian Cricket



Timeline

- 1737 - First reference of cricket being played in India
- 1864 - First ever first-class match in India was played(Madras vs Calcutta)
- 1928 - Board for Cricket Control in India is founded
- 1932 - India's first international tour to England
- 1934 - India's first official first-class tournament(Ranji Trophy) was launched
- 1952 - India's first test series win against Pakistan
- 1983 - India won the world Cup for the first time in England
- 1985 - India won the World Championship of cricket
- 2007 - India won the inaugural World Twenty20 in South Africa
- 2011 - India won the World Cup after 28 years
- 2013 - India won the Champions Trophy in England

Figure 8.17. Highlights Window.


When the Hall of Fame tool is selected, certain points are flashed on the map, and a new layer is added. These points correspond to places of birth of cricketers who have been inducted to the ICC Hall of Fame. When a particular point is clicked, after selecting the hotlink tool, a window comes up. This window displays information about a cricketer whose birth place is the clicked location, and who has been inducted to the ICC Hall of Fame. The details include the date of induction, cricketer's profile, place of birth and a picture of the cricketer. Figure 8.18 shows the window that comes up when the flashing point is selected, after selecting the hotlink tool.

ICC Hall Of Fame

Name:	Sunil Gavaskar
Country:	India
Year of Induction:	2009

http://en.wikipedia.org/wiki/Sunil_Gavaskar

Sunil Gavaskar



Background

Sunil Gavaskar is a former cricketer who played during the 1970s and 1980s for the Bombay cricket team and India. Widely regarded as one of the greatest opening batsmen in cricket history, Gavaskar set world records during his career for the most Test runs and most Test centuries scored by any batsman. He held the record of 34 Test centuries for almost two decades before it was broken by Sachin Tendulkar in December 2005. Gavaskar was widely admired for his technique against fast bowling with a particularly high average of 65.45 against the West Indies who possessed a four-pronged fast bowling attack regarded as the most vicious in Test history. His captaincy of the Indian team however was less successful. There were incidents like crowd displeasure at Eden Gardens in Calcutta leading to multiple matches being disrupted in response to the poor performance of the Indian team. Turbulent performances of the team led to multiple exchanges of captaincy between Gavaskar and Kapil Dev with one of Gavaskar's scakings coming just six months before Kapil led India to victory at the 1983 Cricket World Cup. Born in Mumbai and growing up in the city young Sunil was named India's Best Schoolboy Cricketer of the year in 1966. He scored 246, 222 and 95 in school cricket in his final year of secondary education before striking a century against the touring London schoolboys. He made his first-class debut for Vazir Sultan Colts XI against an XI from Durgapur in 1966/67 but remained in Bombay's Ranji Trophy squad for two further years without playing a match. An alumnus of Bombay's renowned St. Xavier's College he made his debut in the 1968/69 season against Karnataka but made a duck and was the subject of derisive claims that his selection was due to the presence of his uncle Madhav Mantri a former Indian Test wicketkeeper on Bombay's selection committee. He

Figure 8.18. Hall of Fame Window.

The Identify tool, is used to view the features of the selected layer and pull information of particular row from the attribute table. The Figure 8.19 shows a row that is displayed, when identify tool is selected and a point on the map is clicked.

Identify Results

1 feature

0	Field	Value
	ID	0
	Location	Langebaanweg - ...
	WebLink	http://en.wikipedi...
	Event	Allan Lamb is born
	Date	20th June 1954

Layer: 20thCentury

Figure 8.19. Row from the attribute table.

The most crucial tool needed to understand the features of the application is the ReadMe tool. The Readme menu has a ReadMe document sub-menu, which when selected opens a window that provides information about the various toolbars and the menu. A textual description is provided along with an image that clearly points out the various tools available on the application window. The use of arrows in the image helps the user understand which tool is present where (see Figure 8.20).

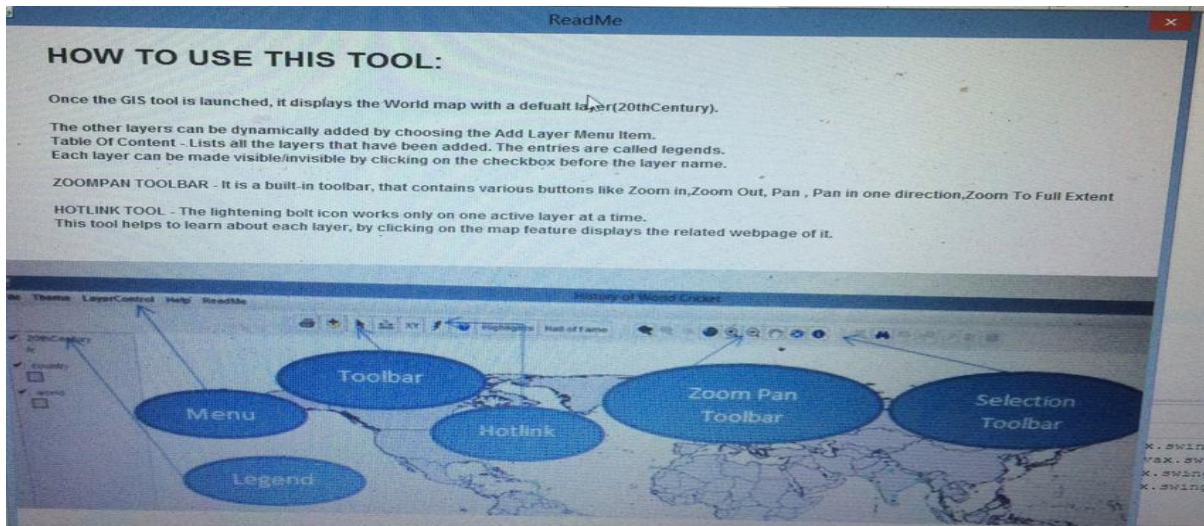


Figure 8.20. ReadMe Window.

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