

## **Evaluation of Statistical Analysis**

### 1. Introduction

This document will evaluate the functionality relating to the collecting and processing of statistics within this project. All analysis carried out by the system is done by the game analyser which relays any statistical events to the Stats class for storage and analysis. The Statistical information is trivially produced but it is the displaying of that information to the user that caused the greatest challenge.

### The Functions

There are four main functions within the statistical domain. These are Stats class, the GUI stats display, Ball distribution widget and Goal replay widget. I will give an overview of each and evaluate how I came about developing them and reflect on the final outcome and future developments.

#### 1.1 Overview of Stats Class

As described in more detail in the Quick Coding folder that stats class simply collects statistical data about the match in play and turns this into information that can be interpreted by the user and used by the commentator and graphical interfaces.

The stats class was simply mocked up initially as an interface and developed with the needs of the commentators before the development of and GUI displays therefore all the implementation was built progressively when the need of further information was needed. Information used for commentating was obtained through a number of getter calls. Information updated to GUIs was carried out through threading of a continuously running method that updates all relevant GUI components including the 2 widgets (ball distribution and goal display).

The information that we wanted to collect was identified using a number of sources such as the way the BBC reported statistics and how statistics is displayed in soccer games. Stats collected included shots, offsides, goals, possession and ball distribution.

#### 1.2 Overview of Ball Distribution Widget

The Ball distribution widget displays the latest cumulative ball distribution of the match ball during a match in play. The pitch is divided into thirds each showing a percentage of the ball time in that particular third. The data is tallied within the stats class and converted into percentages at every pass of the while loop in the run method. The percentages are then fed to the Ball Distribution Widgets to be printed onto the GUI.

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## 1.3 Overview of Goal Replay Widget

The ball distribution widget displayed each goal as a 2d line onto a jpeg of a pitch. The line shows the direction of the goal, starting and end positions, player number and distance. Information is simply passed from the Ball class that analyses each goal in terms of coordinate positions.

## 2.1 Evaluation of Stats Class

The aim of the stats class was to provide a well organised storage structure for all statistical information and provide the necessary access for GUI display and support commentary.

The actual implementation was relatively straightforward because the class is simply a set of setters and getters and involves some relatively trivial mathematics for obtaining percentages.

All stat related objects such as text labels are retrieved by the stats and updated every second using the setText methods.

The only challenges faced were due to some of the maths involved. When writing some of the mathematics, I constantly ran unit tests to make sure that the percentages were giving correct values when calculated. It was very much trial and error.

There is room for future developments in this field including more detailed stats such as time each player spent on the ball, average position of the team, pass success rates, etc, which tend to be used for detailed analysis on TV commentary.

## 2.2 Evaluation of Ball Distribution Widget

The aim of this widget was to give a clear way of presenting cumulative ball distribution to the viewer(s). The implementation provided just that with each percentage clearly displayed to the user giving an idea to where the ball has been on average for the match in play. The widget is robust and gives a good analysis to where the game is heading.

The main challenges rested on were on the placement of the digits on screen and the cycle of updates. Percentages were placed using trial and error techniques. The cycle of update had to be in-line with the updating carried out by the stats class. Initially we realised that the stats took too long to filter through to the GUI therefore we decided to bring the updates down to 1 second, which did not impact the performance as much as we anticipated.

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We implemented this widget with existing solutions in mind, such as the distribution provided in EAs Fifa 2005. I implemented a similar version fully therefore there is no specific future development for this particular type of widget.

### 2.3 Evaluation Goal Replay Widget

The aim of this widget was to give a graphical representation of each goal as a line placed according to the coordinates provided by the goaldetails class. Each line would give the direction, distance, player of the goal scored and allows the user to loop through each goal using a button.

The implementation provides all the above functions and represents each possible goal successfully. The button cycles through each goal sequentially.

I encountered a number of problems implementing this widget. Firstly with the structure of the classes. I came to realise that both the goal replay and ball distribution widget both had common functionality in terms of pitch loading and the redrawing of graphics to the panel, therefore a superclass was created to handle this functionality and each widget subclassed this class to handle the different functionality. Furthermore the line drawn to screen to display the goal kept disappearing as soon as the widget was either resized or moved. This was solved by providing my own implementation of the paintAll method.

The main problem encountered was due to the drawing of each 2dline representing each goal. The coordinates used by the soccer server did not map directly to the coordinate system of this widget. The conversion was not as straight forward because the coordinate system of the monitor considered the origin to be the centre point of the playing field. Thus the mathematical conversion used required us to use pencil and paper to come up with a robust formula to convert the 2 coordinate systems efficiently. However this only seemed to provide a partial solution because the goals were displayed at the opposite end of the pitch during the first half of the match but this error did not occur in the second half. We came to the conclusion that the monitor is to blame because it swaps the halves at half time causing this error. We therefore are accepting that this widget displays the information correctly apart from which end the goal was scored in the first half.

Another area for concern was to do with the display of the player number and yardage of the goal, as this information does tend to go off screen if the goal was scored particularly close to the edge of the widget. This problem is not fully fixed but has been adapted so that the yardage is displayed below the player number rather than on the same line. Also the font was changed to bold so that the display is clearer.

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Future developments would potentially include fixing the above problems relating to the position of the goal line being at the correct end of the pitch. This may be carried out by possibly reflecting the lines through the X and Y axes.

Other developments would include the introduction of a 3d representation of each goal using animation as used on the BBC Sport virtual replay<sup>1</sup>.

### 6. Overall Evaluation

The statistical analysis was initially a straightforward task to implement because of the simple storage needed for the stats data. The introduction of the stats processing introduced the complexity and challenges that led to some of the mathematical problems. The widgets also posed some of the toughest challenges including the problems faced with the lines disappearing and once they did appear, they failed to appear at the appropriate location.

Because the statistics, especially its widgets, was an extension introduced to this project, it was important to spend an appropriate amount of time producing a number of robust and useful widgets for the users therefore it was fair to allocate a lot of time to make sure these worked.

Generally we produced robust, useful and working widgets with some room for future development including a fix for the goal line location.

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<sup>1</sup> [http://news.bbc.co.uk/sport1/hi/football/fa\\_cup/virtual\\_replay/default.stm](http://news.bbc.co.uk/sport1/hi/football/fa_cup/virtual_replay/default.stm)