

Using Image Processing to Enhance Gameplay

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Introduction

Over the past decade, the professional and even the casual video game scene has become an increasingly competitive environment^[1]. Due to this, there has been a desire to improve players performance through data analytics, much like traditional sports.

Player positioning is a crucial mechanic in several multiplayer games and, as such, it is an important aspect to track in order to improve general skill level. The aim of this project is to be able to take a video input from the game and output processed data in a meaningful manner. The chosen game is popular MOBA League of Legends.

Using the MiniMap

The games primary method of tracking players is the minimap (Fig 1). Each character has a 2-dimensional sprite which moves around relative to their 3-dimensional location.



Fig 1. General minimap example

Identifying the Characters

There are a total of 150 different characters in the game, each one with a unique sprite. The designed algorithm will implement C++ with openCV to match a sprite and track its location on the minimap. The user must tell the program which characters are present in each particular video file.

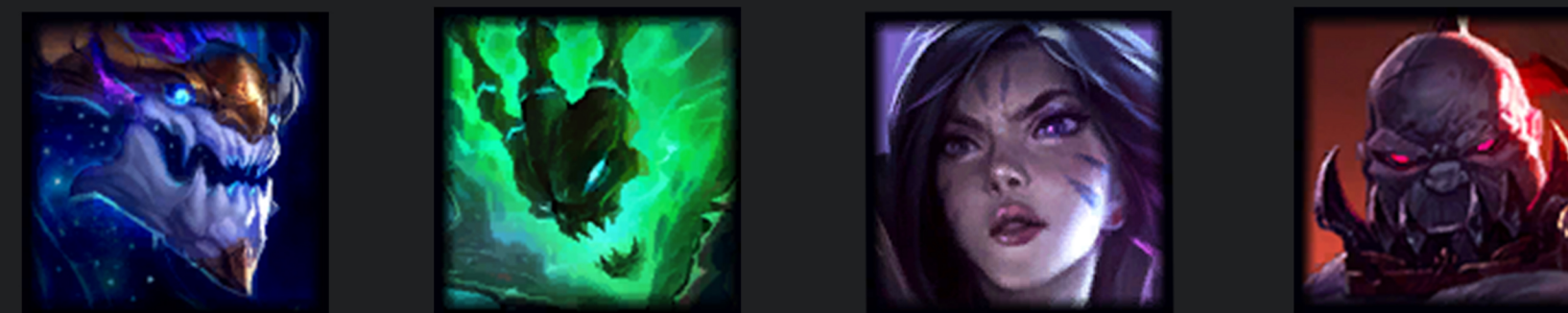


Fig 2. Example Sprites

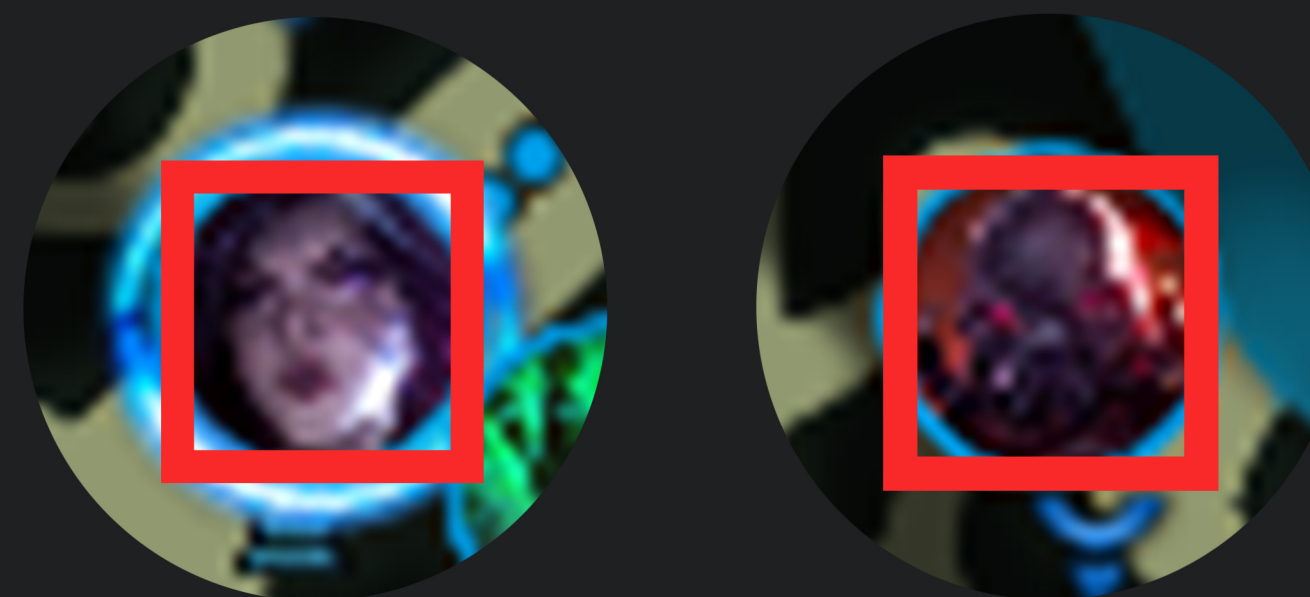


Fig 3. Identifying character after minimap enlargement

The program applies the tracking algorithm on each frame of the video and records the location of the character for later use. The crux of the algorithm is the `matchTemplate` function (Fig 4) which takes in both Fig 1 and Fig 2. The images are matched using one of six matching methods and the result are normalised.

```
//match icon to minimap and normalise results  
matchTemplate(croppedImage,imgMatch, result, TM_CCOEFF);  
normalize(result, result, 0, 1, NORM_MINMAX, -1, Mat());
```

Fig 4. `matchTemplate` function

Presenting the Data

Tracking the location of the characters is the first step, the next step is to present this data in a meaningful and helpful manner. We concluded that a heatmap would be the most appropriate graphical method to display the output, an example of which can be seen in Figure 5.

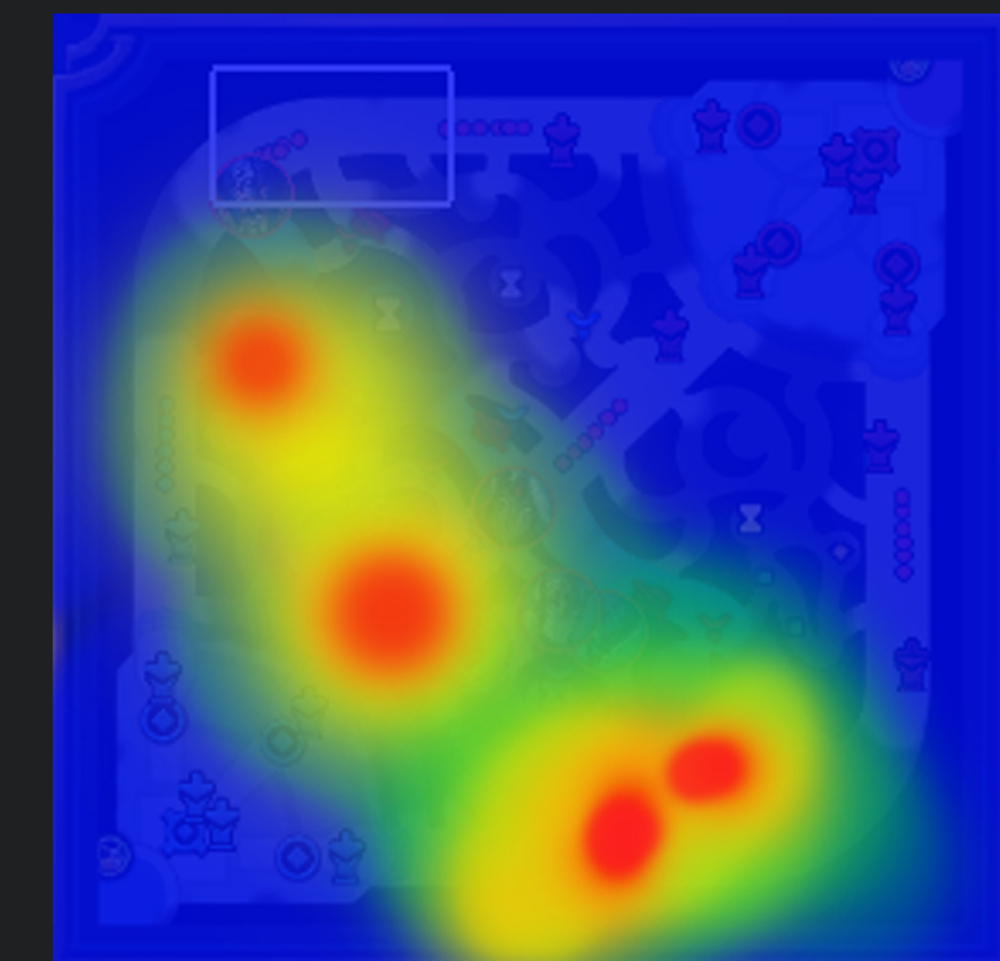


Fig 5. Heatmap Example - not final

The heatmap displays the position of a character or characters throughout the match. Spots of high activity will be highlighted red whilst spots of low activity will be highlighted blue.

Challenges Still to Address

- Player sprites may overlap each other on the minimap making them difficult to track
- Video replays for the game have an average length of 30 minutes^[2] meaning processing time could be an issue

References

- [1] Olsen, Anders, The Evolution of eSports, Sep. 2015
[2] <https://www.leagueofgraphs.com/rankings/game-durations>