Dota2 Team Performance Visualization

FOR CS573

PROPOSAL PREPARED FOR
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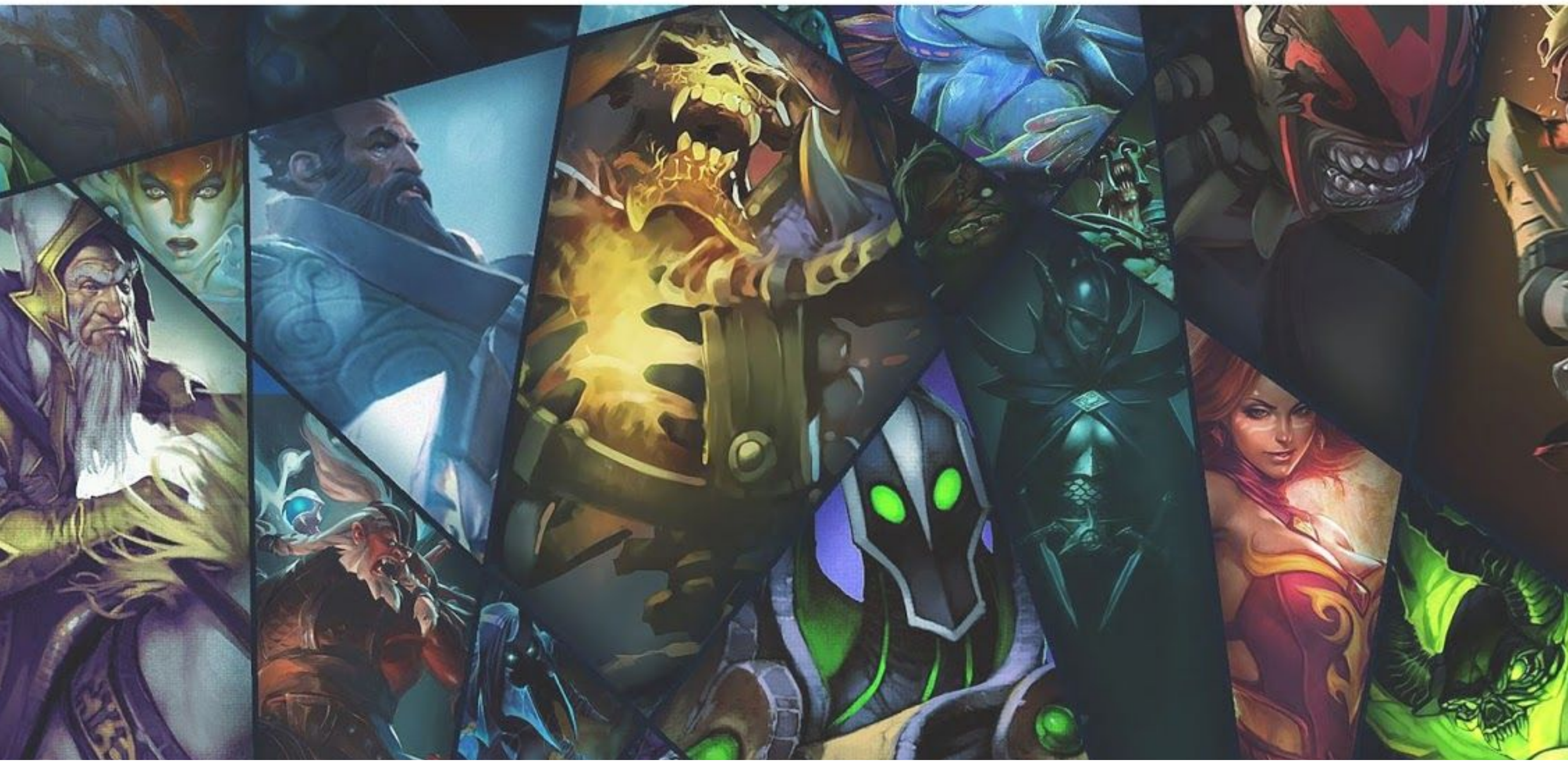

Basic Info.

The project title

Dota 2 Team Performance Visualization

Team Members

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GitHub ids

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Project Repository

https://github.com/xiongkuang/rua

A link to the project

https://ruadota.herokuapp.com/

Background and Motivation

Dota 2 is a free-to-play multiplayer online battle arena (MOBA) video game developed and published by Valve Corporation for Microsoft Windows, OS X, and Linux. The game is the stand-alone sequel to Defense of the Ancients (DotA), which was a community-created mod for Warcraft III: Reign of Chaos and its expansion pack, The Frozen Throne. Dota 2 is played in matches between two teams that consist of five players, with both teams occupying their own separate base on the map. Each of the ten players independently control a powerful character, known as a "hero", that all feature unique abilities and different styles of play. During a match, a player and their team collects experience points and items for their heroes in order to push through the opposing team's defenses. A team wins by being the first to destroy a large structure located in the opposing team's base, called the "Ancient".

Not only a game, Dota2 is one important part of Esports today. In total, professional Dota 2 tournaments had earned teams and players nearly $65 million in prize money by June 2016, which was more than twice the amount of League of Legends tournaments, making it the highest earning eSport game at the time. Here are over 100 professional Dota 2 teams around the world to fight for the championship of The International every year.

Today, more and more people realized the importance of big data analysis for sports. You can get more familiar with your opponents from the data and help you choose a better strategy to win the match. This is particular true for Esports because everything about Esports are running on computer and we can easily get the data which is useful for us. Today's Esports is not only a game of five person sitting together and fighting to win the match. It is also related to data. But when we get the data, how to visualise it becomes a good question. If we can do a better data visualization of the data, we can get more useful information and improve our performance in the game.

Based on the background mentioned, we want to design a website to make a good data visualization for Dota 2 players to evaluate and improve their performance in the game. This website should help players find out that if they played well during one match and how to do it better in the future.

Project Objectives

In final project we have three problems to solve:

- **How to properly evaluate the performance of the player in one match**
  Generally we use three values to judge if a player played well in one match. They are GPM(Gold Per Minute), Damage and KDA(Kills Deaths and Assists). If you get high values, it means that you did a good job in this match. But these three values are not enough. Since here are two kinds of heros in Dota 2: carry and support. Usually support cannot get a better data than carry. Thus we have to compare the data in this match with the average data of all players to evaluate if it is good.

- **How to help the player do better in the future**
  In order to do that, we should compare the performance in one match with the average performance of this player to help him get known how to improve it.

- **How to do a better teamwork**
  At most time, no matter how well you played, you cannot win the match if you picked the wrong hero. Our website should show the player which is the best teammates hero and best versus heros of the hero he wants to pick.

  And also we can help the player to understand which lane is the best choice for him.

Data

There are 2 main sources we can get our data: The Dota2 Web API and the Dota 2 replay parser.

There is a Web API for match history on Dota2. We can retrieve the match history and match details in JSON or XML format for use in our applications.
https://wiki.teamfortress.com/wiki/WebAPI#Dota_2

The Api provides us all necessary data in a match, including the players who participant this game, the hero they pick, the items they had, the gold and experience they got, the damage they give and other data that we need to understand a game.

We can also get a player's match history data through the API. Including the match ids, the players of that game, and game summary. We will use these data to analyse a player's play style.

In addition, there are many Dota 2 replay file parser libraries. Such as

1. Skadi written in Python https://github.com/onethirtyfive/skadi
2. Rapier written in JavaScript https://github.com/odota/rapier
3. Manta written in Go https://github.com/dotabuff/manta
4. Clarity 2 written in Java https://github.com/skadistats/clarity

With the parser, we can get access to:

- position of towers, creeps, and heroes
- item information
- graph data as given to the client (gold/experience)

Possible uses:

- pathing, heatmap, and skill usage images
- when, where, and why heroes succeed at their roles

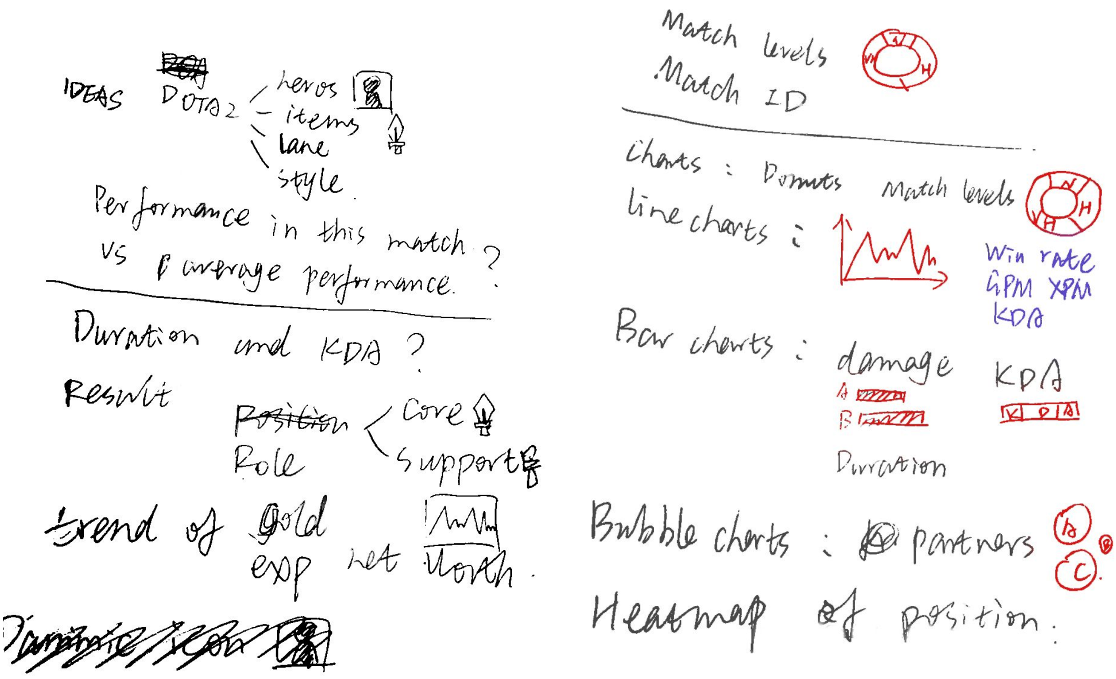
We will get the match history of one player and all match details of these matches(about 500 matches). Then we will use the replay parser to parse some special games such as the match the play got the highest GPM, the most kill and so on.

Data Processing

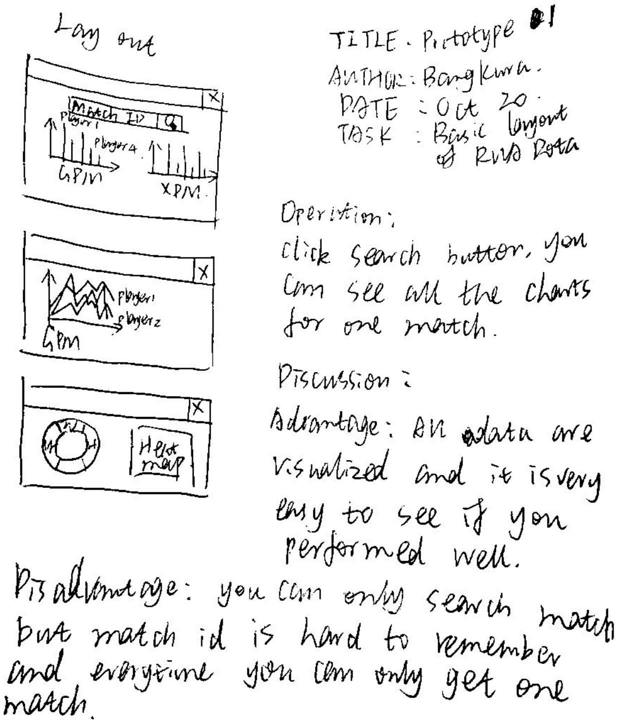
The Dota 2 API will return a JSON file representing the match detail or match history. The match detail data don't need much process. We can use the returned file directly for the match detail visualisation. For the match history data, we need to do some basic statistic job to extract the player's style. Also, we need to get the match detail of each game in the match history.

Visualization Design

Sheet 1: Brain storm



Sheet 2: Initial designs

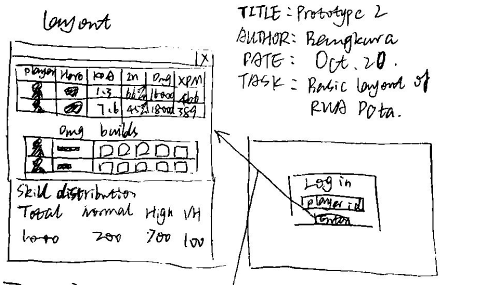


TITLE. Prototype #1
AUTHOR: Bangkura.
DATE: Oct 20.
TASK: Basic layout of RVA Dota

Operation:
click search button, you can see all the charts for one match.

Discussion:
Advantage: All data are visualized and it is very easy to see if you performed well.
Disadvantage: you can only search match but match id is hard to remember and everytime you can only get one match.

Sheet 3: Initial designs



Zoom in

~~No particular ~~Great~~ operation in the web page~~

Nothing.

Operation:

click enter to access data

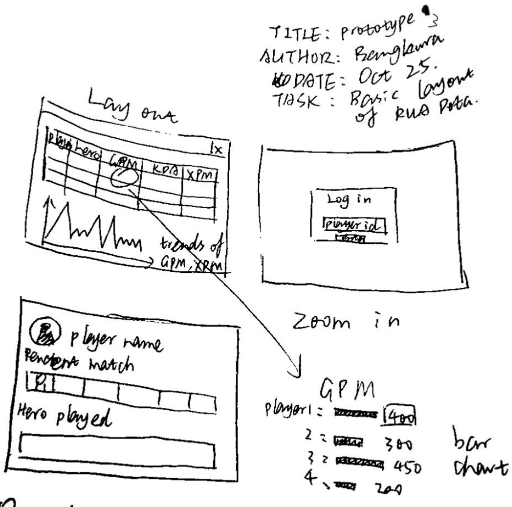
Advantage:

Very clear and all things are displayed in one page, no need for another link.

Disadvantage:

Here is no chart in this web page, which means we can not take advantage of d3.js.

Sheet 4: Initial designs



Operations.

when mouse moved on the bar, It shows a tag with the value.

Discussion.

Advantage: Can show as much information as impossible. but sometimes it will be too crowded.

Disadvantage.

A little bit crowded.

Have to develop another page for the player id.

~~How c~~ But if we did not have player id, what to display?

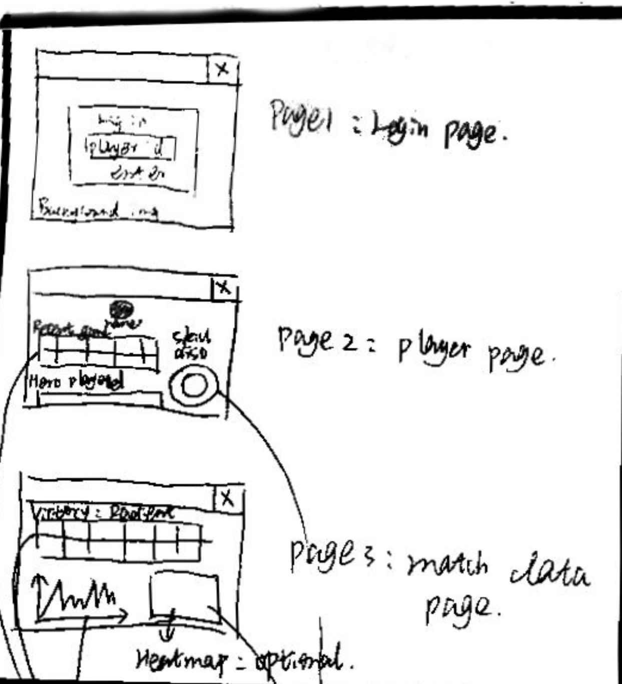
Sheet 5: Realization design

Author: Birong Kura

Date: Nov 1st.

Sheet: 5

Task: Layout of Riva Data

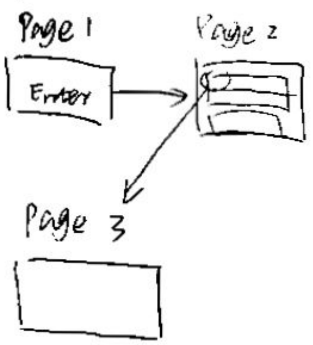


Page1 : Login page.

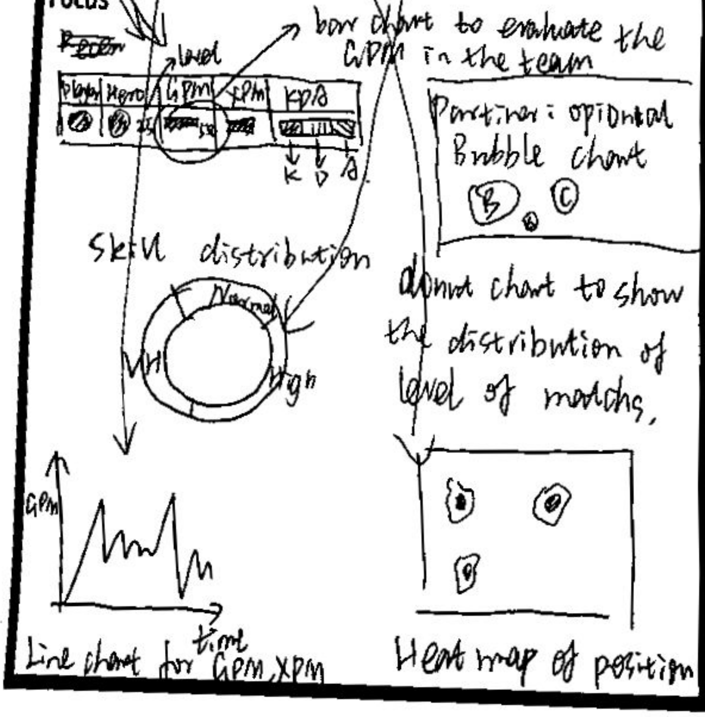
Page 2 : player page.

Page 3 : match data page.

Operations



Focus



bar chart to evaluate the GPM in the team

donut chart to show the distribution of level of matchs,

Detail

We will use five kinds of charts to visualize the data:

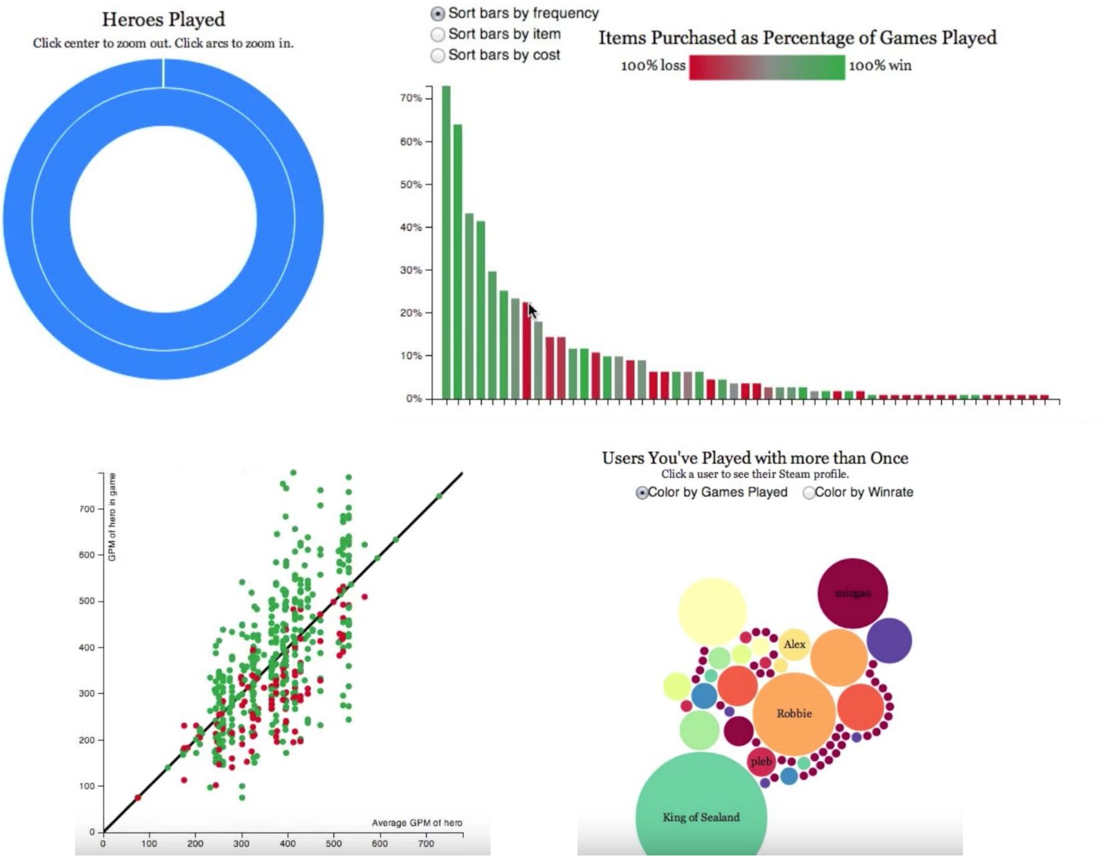
Donut chart for skill distribution:

Line chart of trend of GPM, XPM.

Bar chart for GPM, XPM, Damage for teamates.

Bubble chart for partner

Heat map for position,



Charts possibly will be used in this project

Must-Have Features

Match details visualisation:

charts to show the gold per minutes(GPM), damage, and KDA(Kill/Death/Assist) for every player in a specific match, including the average value of this player and the average value of all players of the game.

Play style visualisation:

Charts to show the play style of a specific player. Including the heros he/she played(treemap or donut chart), the items he/she purchased(histogram), the GPM/XPM/damage/KDA statistics(scatter or line chart), players he/she played with (bubble chart). Also, here should have charts to show the player’s records, win rate and other features to show the play style.

Optional Features

Dynamic icons for every hero, mark their position and laning.

Draft recommendation. Make suggestions on hero picking.

The chart to show the movement of each hero(heatmap, pathing)

Responsive web design for different kinds of device.

Bubble charts for the relationship of the partners

Project Schedule

TASK	TIME	TARGET DATE
Implement the basic framework of the website, prepare the data.	7 days	November 7
Finish the match detail module.	7 days	November 14
Finish the play style visualisations.	7days	November 21
Optional features implementation.	7 days	November 28
Fix bugs, test website, deploy the website and documentation.	14 days	December 10