Dota2 visualization final write up

URL to Online System:http://guanyif.com/websiteproject/49-final/
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Introduction of Dota2

Dota 2 is a competitive game of action and strategy, played both professionally and casually by millions of passionate fans worldwide. Players pick from a pool of over a hundred heroes, forming two teams of five players. The game is a multiplayer online battle arena game and the stand-alone sequel to the Dota (Defense of the Ancients) mod.

The game consists of 2 teams, located on opposite side of the map, fighting to destroy the enemy's ancients or main building. The green team located on the bottom left to the map is called the Radiant, while the red team is called the Dire. Each team has 5 players, has each player controls a hero character and focuses on leveling up, and fighting against the other team to achieve victory during each match.

The questions we are aiming at

In a professional Dota2 match, each team will ban and pick heroes and composition of team's heroes have a large influence on whether this game will win or not. Although the match's victory is also depending on the strategy the team use, how good the cooperation is among team member, and the players personal skills and experiences, but the hero character's performance is directly determines the match result.

Currently, there are no information visualization for the players to know which hero dominates in win rate or banpick in a certain range of time, also it's always a bias that high ban/pick will lead to high win rate.

So our goal for this project is to help the Professional Dota2 Player to choose a good hero make-up to increase professional match win. In other words, we want to use the data retrieved from dota2 API and figure out how to provide the professional dota player a direct way to track hero's popularity trend and win rate trend which are the factors directly affect the match results.

The ban pick rate is a direct reflection of how popular a hero is among the hero pool. And the win rate can be calculated by how many matches the specific hero attended and how good his performance is among all the matches. A customised time period is also necessary to be provided for the professional players to analysis in a further step. So popularity trend and the accordingly win rate trend in a customized time period determines the hero pick strategy.

Our goal is more clear after the above analysis, we want to provide user a easy way to know which hero has high ban/pick and win rate in a certain time period since that helps the professional dota players to get a good ban/pick strategy. We also show the trend of different

aspect of the specific hero including win rate, ban/pick, KDA, etc so that user can see whether a certain hero has the potential in a professional match.
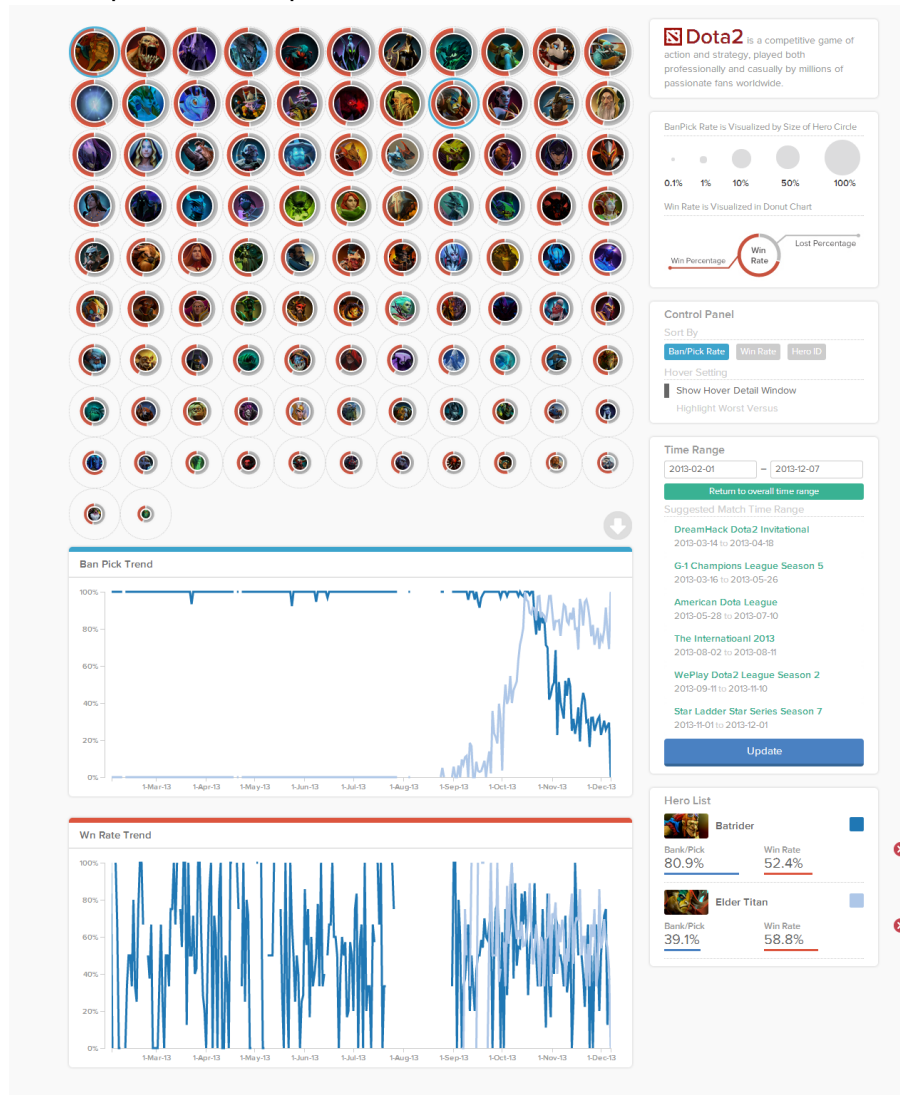

Figure 1 Overview of our Visualization System

The design rationale

Recall the overview design interface of our visualization.Our general interface can be divided into four main panels as selection panel for heros on the top, control panel for selection display method, time range panel for result display on the right and the finally the result display panel contains two line charts on the bottom.

Figure 2 Selection panel

Our visualization is for revealing ban/pick and win rate information for each hero or their combinations. So we provide the hero list for user to select. Hero icon were used here which provides a more rapidly recognition compared to regular text list. There are at most 107 heros for use to select, we observed that if a user start from no information about the ban/pick rate or win rate of the heros, it will become very difficult for him to start the selections. So we provide a certain amount of pre information combined with selection list. From the panel we could see that the hero icon vary in size and is rounded by a circle. Size and circle percentages are two features that we used for the two aspects(win rate, ban/pick rate) information representation.
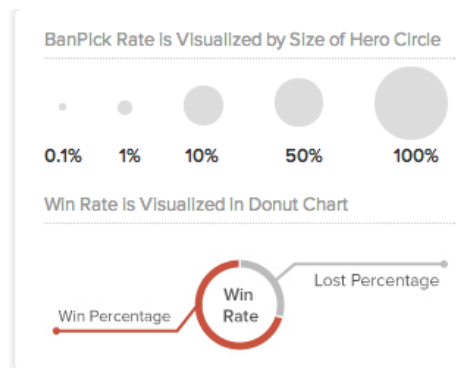

Figure 3 Legend for single hero circle design

Bigger size comes up with greater ban/pick rate and larger amount of red color percentage comes up with greater win rate. We also provided sort function for sorting the selection icons in the two rates.

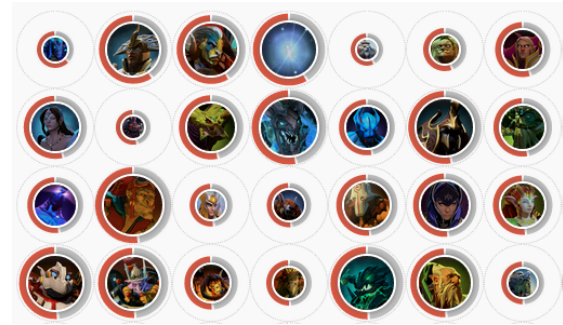**Figure 4 Selection sorted in ban/pick rate**

Figure 5 Selection sorted in win rate

With this pre information provided, our selection panel design solved the question for users selecting from top/bottom ban/pick rate or win rate or the heros that the users are interested in.
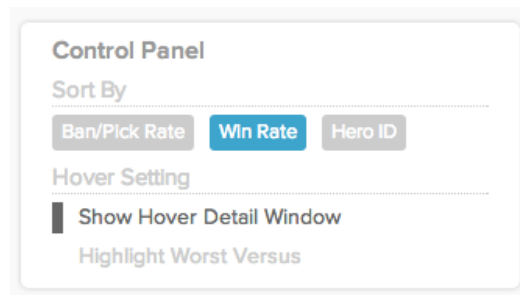

Figure 6 Control Panel

The panel provided two options as sort by function and hover display method function for modifying selection appearance. The sort function implemented the selection panel layout function mentioned above and the hover setting function will change the hover style which will be detailed described in the following interaction design rationale part.
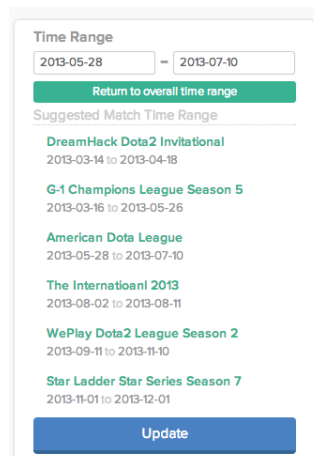

Figure 7 Time range panel

The ban/pick rate and win rate data for heros are in continuous type corresponding with time period. So we provided users with time range selection panel which helped users to observe

data in certain time range. At the same time we listed several signification time range when large tournament matches happened. These tournaments have very important and valuable matches for DOTA2 and thus will provide significant information.
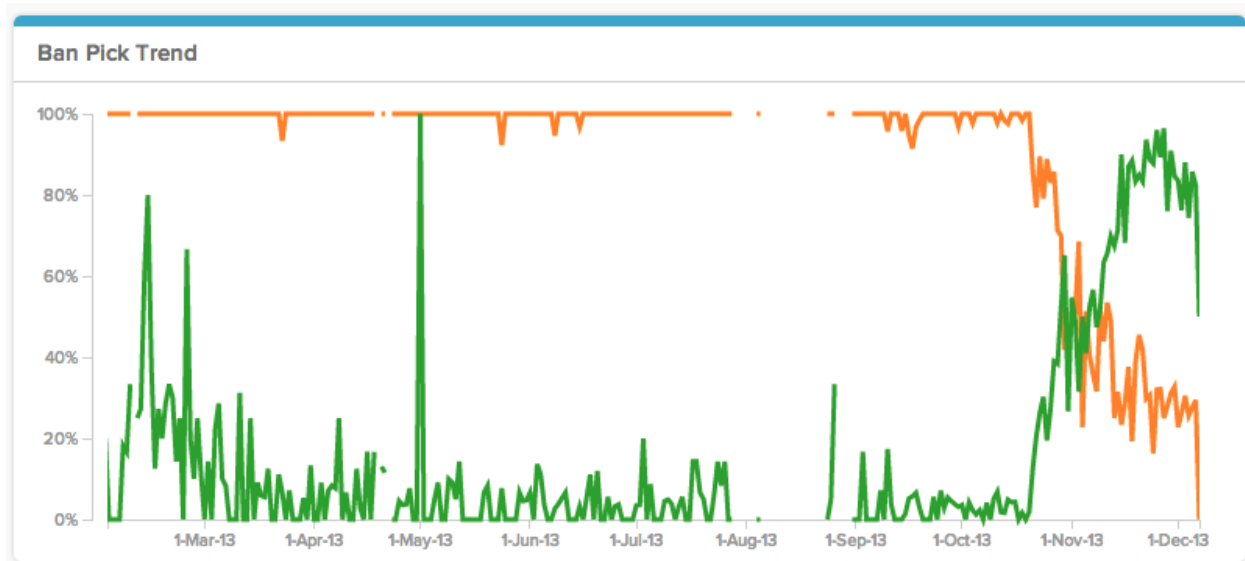

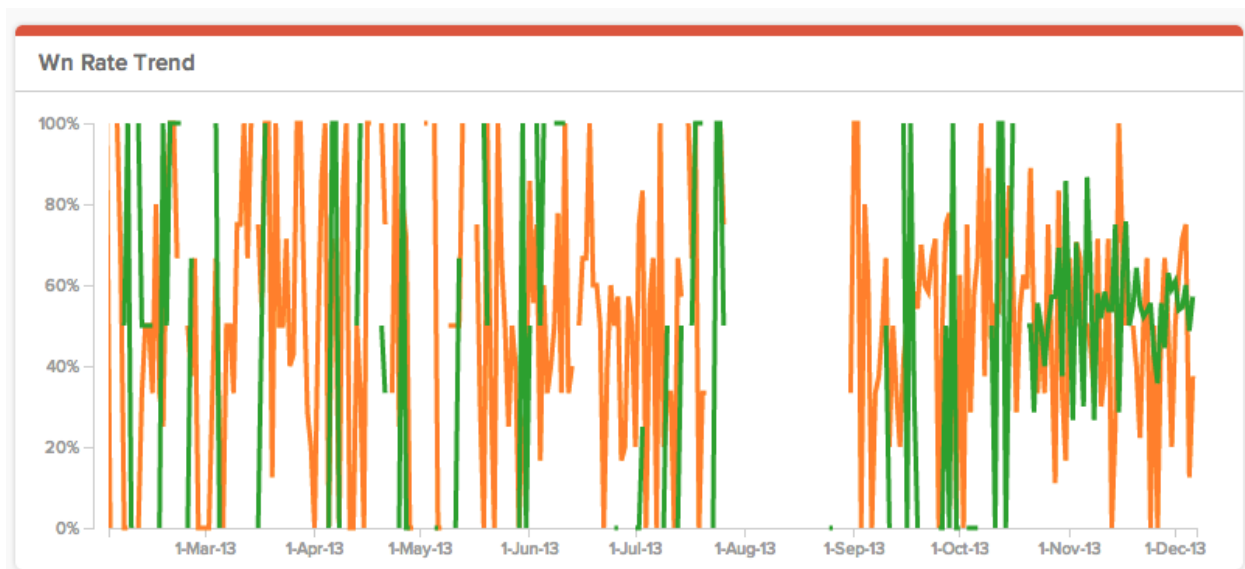**Figure 8 Ban/Pick rate result panel**

Figure 9 Win rate result panel

As our rate data are both in continuous type, line charts are the most suitable representation method for them. From the line charts, users can observe certain patterns from the trend according to time. Notice that the lines are not continuous because there are no match in certain days and draw line across these time period won't make sense. We remained blank during these days which help users understand this information. From the example in ban/pick rate result panel we see a hero's rate dropped down after a time point and the other one's rate raised up a lot. This happened because of the version change for dota2 at that time point and we could

understand that professional teams changed their ban/pick strategy according to the version change. However, from the win rate panel we can't often observe an obvious pattern. Dota2 is a balanced competition game thus we can't say that certain side will win if they selected certain heros.

After generate the overview part and time-serie line chart, then we come back to our use case to consider what other information or interaction the user may need. Since our system is designed for professional dota2 player who plays match for their profession, so they may need some more detailed information and we come up with the hover over window to let user have the ability to see more detailed information including ban/pick rate, win rate. average game duration, average first blood time, KDA. All theses information can be all considered as continuous and we visualize those information into width of the bar below the number. According to Bertin's "Levels of Organization", we get to know that size is always good to interpret continuous data. Also here since ban pick and win rate is our focus, we also emphasis this two data by the size of the number there.
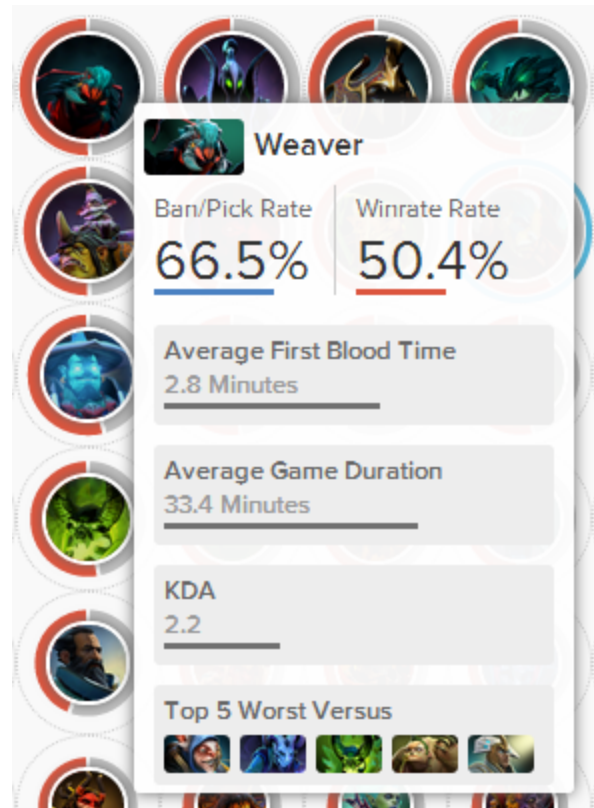

Figure 10 Hover Window to show detail information

Another thing we think our users may need is to check the worst versus against a certain hero, think about this scenario, if your opponent team has chose a certain hero, you will need to consider a hero that has the highest effect to against it. So here we provide information for user to know in a certain range of time, each hero's top 5 worst versus (5 Heroes is displayed by the win rate against this particular in descending order, so the first heroes in this list means it has

the highest win rate against this one), I put this information in the hover over window, take figure 10 as example, you will see that the top 5 heroes.

However, we think this function is actually very important, but only showing a list of hero in the hover over is not so efficient to let user locate that hero. If you look at the side control panel, you will find you can enable a option which is called 'Highlight Worst Versus'.

As long as you enable this option, we highlight the worst versus heroes in the hero table when you hover a certain hero. See figure 11 to get a idea of how it looks like. Here I use opacity to hide all other heroes and keep the top 5 worst versus hero the same opacity as before so that these heroes are standing out. The reason we want to include these function is that since we already has this hero table, it makes sense to highlight those worst versus hero es and then user can drill in to see those hero's information or just simply know if it's easy to find a efficient against a hero if their opponent has picked that one. Onething need to notice here is that sometime the hover over window may overlay the highlighted hero, so our solution for this one is we provide the hover over setting for user to turn on or off the hover over window or highlight function so that they can use either one of them at a time or both of them if they want. The option 'show hover detail window' and 'highlight worst versus' option in figure 6 is switchable which means you can turn either of them on and off.
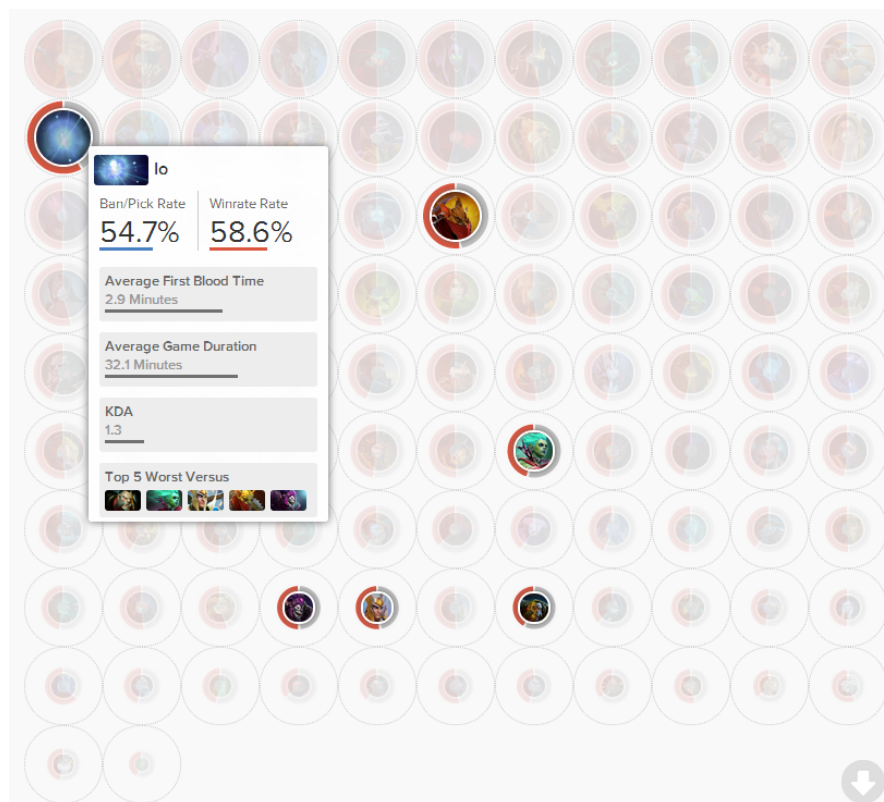

Figure 11 HighLight top 5 worst versus heroes in table

When considering user may have need of making comparison between different hero, you include the hero list in the side bar. As long as user click hero circle, the certain hero's ban pick and win rate trend will be added to the below line chart also this hero's information will be added

to the hero list. You can see figure 12 that I have added 4 heroes, and you can compare their winrate and banpick rate by the bar chart or the number.Similar hero list will be also shown when you mouse over the trend chart, the only difference is in the trend chart, this list is dynamic changing according to which date your mouse hover on.
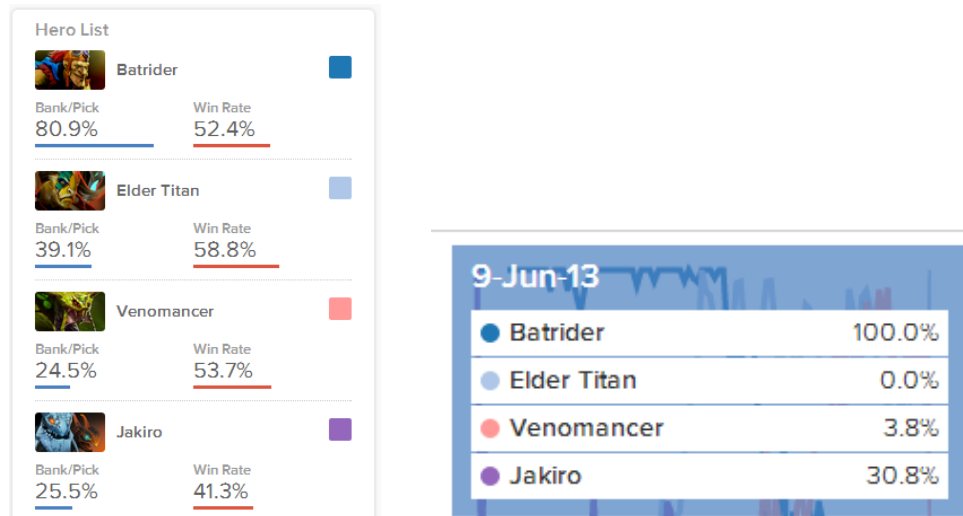

Figure 12 Hero List to make Comparison

Implementation details

We got the data through Valve API using python. We only took the league matches for Dota2 because these matches were played by professional players who are the main target that our design questions address. We initially got 11612 matches, but we filtered out the matches that don't bans and picks since this is an important factor we use to show the popularity of the heroes. Finally, we ended up using 7450 matches to be used in our visualization design. The data are processed and manipulated in JS, and we used D3 to implement all our function and our line chart design has refered a D3 sample http://dataaddict.fr/prenoms/. However, we didn't use any code of it.

Evaluation for our system

Our visualization design evaluation was done in the middle of our implementation process, while we almost finished with our demo. It was done by introducing our design motivation and going through our design demo to three groups of HCI specialists. Many of the people did not know Dota2 very well at the time, so the concept of bans and picks indicating popularity was a little bit hard for them to understand. Fortunately, we had two people in a group were familiar with the game, and they were excited when they first looked at it. They thought our visualization design was very interesting and our intention of displaying bans and picks rate and win rate over time were sufficient to answer our design questions. The rest of people took it as a new thing

and thought rationally on our design. They pointed out three usability issues in our design which we have upgraded in our final demo.

  Some of the people thought they had hard time to think of the meaning of the circles around the icons and the sizes of them, and they suggested that it would be better to put a legend on the side to indicate the meaning of them, which we later added on because our design does not have a clear quantitative rationale for first time users, such as barplot and pie chart, and it is good to put a legend on the side to show them. Especially, we want to indicate that the red part of the circle indicate the percentage of win rate. At the time we did not sort all the heroes icons. We only listed them by names in alphabetic order. Some people pointed out that it would be nicer to sort them so that it would be clear for them to see the most popular hero at the beginning because comparing the areas of circles is not very intuitive. In addition, at the time, we did not have a hover table to show the detail about each hero, some people found it was hard for them to see the icon of the hero when the circle was very small (the hero was not popular). We had fixed all the issues pointed out above in our final demo. However, some people suggested that we could use transparency to show the win rate of a hero. We tried it and the result was not very good because we did not have a interval to project the win rate, and it would be hard to distinguish the quantity on transparency.

The overall feedback on our visualization design was positive. We appreciated that some HCI specialists involved in our design evaluation pointed out some critical issue, and we had fixed them in our final demo. It is fully functional, and we are seeking more people to participate into a second round of evaluation on our design.

Our future work

  All the design we currently come up with has been realized and it's all fully functionally, but there is still some future work that our group can work on to make our visualization more easy for our targeted user, dota2 professional player to use our system.

  Firstly, position information can be included in the hero data and also add filter function according to position of hero. Actually position information (1-5) is very important for dota2 player but currently there is not official data to categorize all heroes into this 5 position, one solution maybe we can come up with is manually adding this position information according to our dota2 knowledge but that has some subjective factor, or we can depend or performance of each hero and put some algorithm to tell usually what position this hero is.

  Another future work we think it's quite interesting is considering combination winrate or banpick rate, because dota is actually a 5 to 5 games which means there is no single hero which can determine whether a game or win or not. There is the situation that a single hero may has a low win rate but it has extremely high win rate if it is picked together with another hero. This function may need more round of query so that's the reason why we didn't put it into our current system.