NHLSlapShot:

A Visualization Tool to Analyze the Value of NHL Players

CSC485D Project Proposal

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Introduction

The following proposal is for *NHLSlapShot*: a visualization tool to analyze Hockey salary caps. The goal of *NHLSlapShot* is to help create a "value" of a given player based on their NHL stats. For the purpose of this visualization a players "value" will be defined as NHL SAT formula divided by the players salary. This newly discovered "value" for a given player could be used to help NHL analysis shows such as TSN and Sportsnet. Furthermore, an accurate "value" of a player could help fantasy hockey enthusiasts, NHL General Managers, and scouts make more informed decisions when picking players. Currently, NHL stats are visualized as a simple table, which makes discovery actions and finding correlations and outliers hard to accomplish. Note that *NHLSlapShot* is designed for people with domain knowledge and who already have an idea of what they are looking for in the data. *NHLSlapShot* will support the following actions: discovery and presentation. The discovery actions for this visualization are when a user is following a hunch about a given player and wants to discover the validity of that hunch. In addition, presentation actions are accomplished when the user wants to show a third party about a given player's value. This makes our proposed visualization relevant to many people, from business professionals to sports fans. These user groups also share the target goal of finding correlations and outliers (players to trade and players to offer extended contracts), which *NHLSlapShot* will offer as a solution. There has been similar work trying to analyze NHL players, however, none have tried to correlate player statistics and salary. The hockey impact analysis done by Dark Horse Analytics [1] has a similar goal, however, they treat each team as a single entity. In our research we would like to dig deeper into the team's success and figure out the value of all players involved in a championship team.

Proposed Interface

The goal of the proposed solution is to make an easy visualization for determining a player's "value". The proposed visualization will consist of three sections, a hierarchical bi-level partition graph, selectable checkboxes, and a scatterplot. The hierarchical bi-level partition graph will be used as a selector to navigate from the NHL conferences (top level) all the way down to the individual team. We chose this style of navigation based on the following concepts presented in the textbook *Visualization Analysis & Design* written by Tamara Munzner.

- Grouping: Teams are naturally grouped by conferences and divisions.
- Pop out: The selected item will change colour.

- Colour will be used to distinguish teams this was chosen because colour is one of the highest identity channels.
- A 3-Dimensional view is not used for reasons outlined in chapter 6 of the aforementioned textbook.
- Hierarchical bi-level partition graph allows for Shneiderman's mantra of overview, zoom, and details.
- A navigation title at the top of the visualization shows users where they are; this is the eyes beat memory concept.

Furthermore, users can select the comparison metrics that will be needed in the analysis; this will update the scatter plot visualization with the required data. The scatter plot will then show the calculated "value" of each player on the team and compare that value to any user selected metrics; these values are then displayed as a line superimposed onto the scatterplot. This style of filtering was chosen based on the following concepts presented in the textbook mentioned above.

- Checkboxes have a low learning curve.
- Simplicity.
- Title and legend bars help users understand context without need of memory.

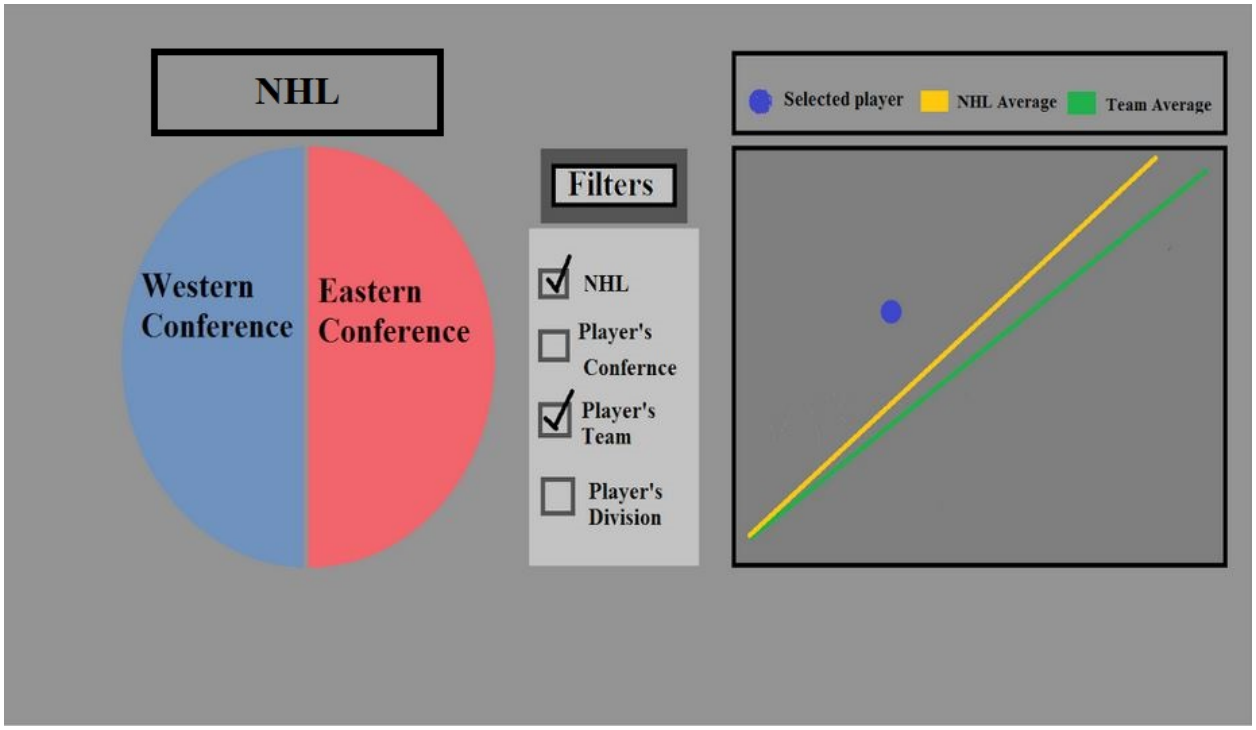

Figure 1

Figure 1 shows an overview of the visualization with all three parts displaying some data. The goal of the bi-level partition graph and it's title is to increase the level of context and understanding of their current depth in the NHL hierarchy. Furthermore, the filter list supplements this by allowing users to remember the state and chosen metrics for the scatter plot graph. Finally, the scatter plot graph will render the data allowing for easy visualization and analyzation.

User Interactions

Users can interact with the visualization by selecting any one of the two sections; the bi-level partition graph or the checkboxes). For example, a user can simply change conference, teams or players by clicking on the desired section from the bi-level partition graph. In the following example Eastern Conference has been selected causing the resulting display.

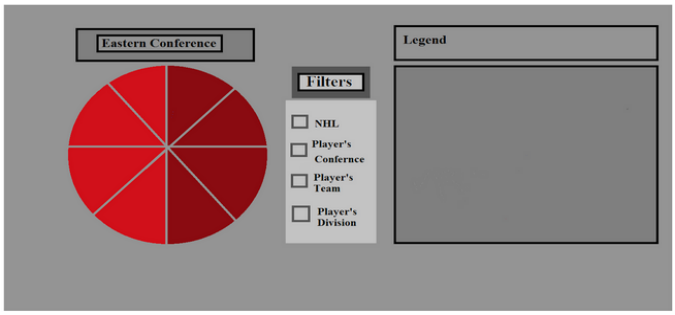

Figure 2

Users can then use the same selection interaction to go deeper into the bi level graph. This consistent navigation allows users to easily learn and find the data that they are looking to analyze. After the desired data has been selected, in this case Boston, comparison metrics can be selected from the filter checkboxes, in this case NHL. This allows users to easily selected the data that they are interested in displaying. The steps described above causes the scatterplot graph to appear with all the relevant data being displayed resulting in visualization shown in Figure 3.

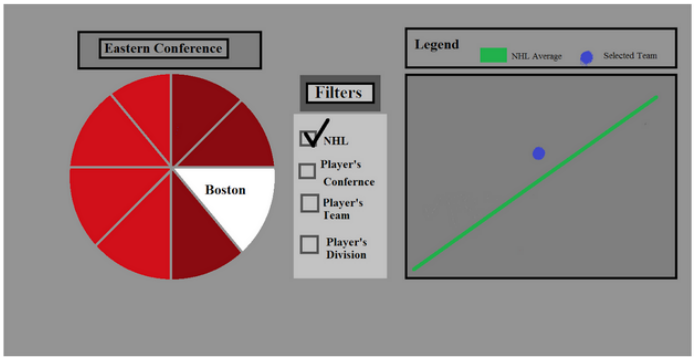

Figure 3

Visualization Use Case and WalkThrough

User interaction with *NHLSlapShot* would be trying to gather the "value" of a given player. This means the interactions with *NHLSlapShot* will be either discovery actions (to following a hunch about a given player) or presentation actions (to show a third party about a given player's value). In the following example a user would like to know if Alexandre Burrows was a player worth keeping at the upcoming trade deadline.

1) Select a Team

a) Select the Western Conference from the top level of the bi-level partition graph.

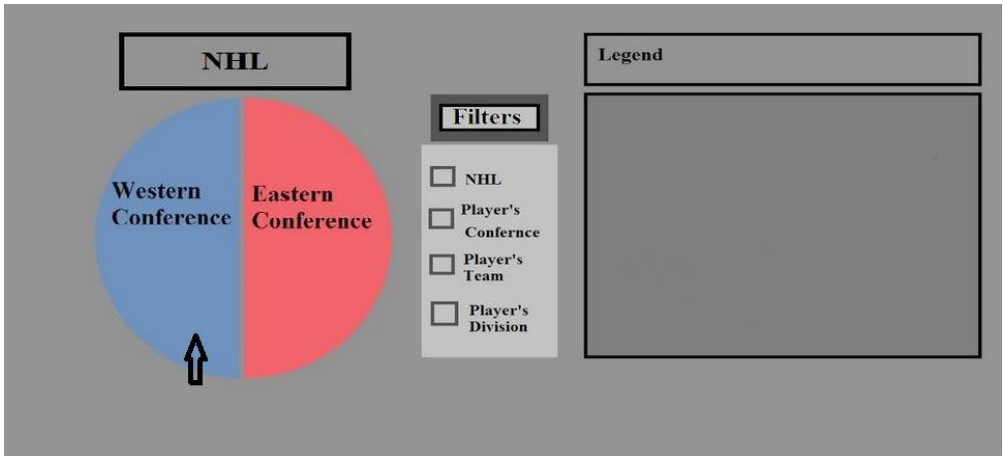

Figure 4

b) Select the Pacific Division from the next level of the bi-level partition graph.

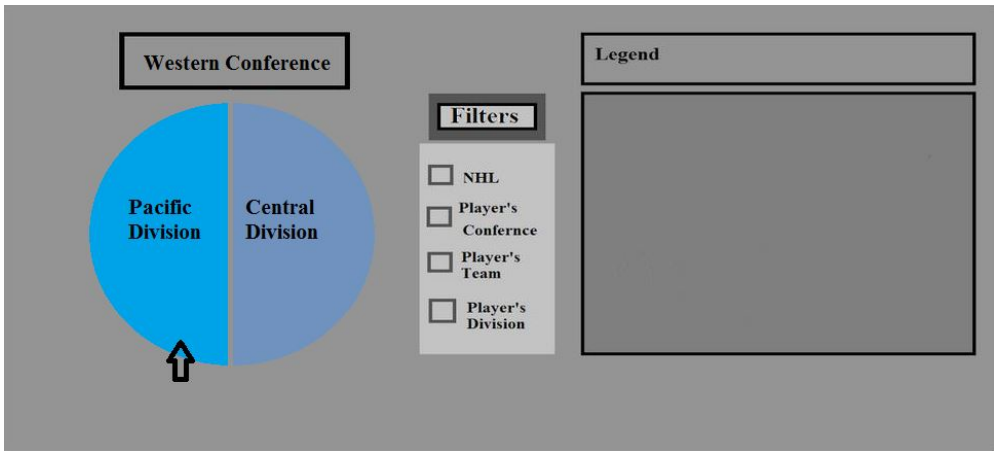

Figure 5

c) Select Vancouver from the next level of the bi-level partition graph.

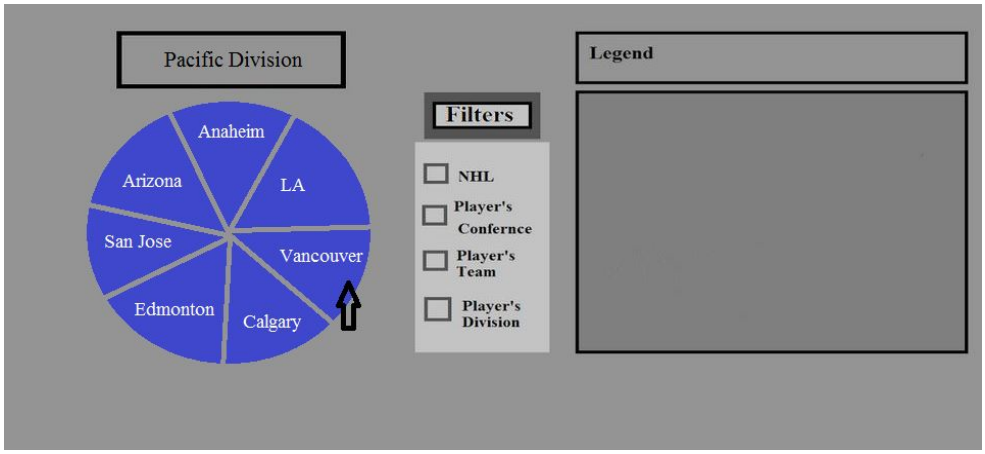

Figure 6

d) Select Burrows from the last level of the bi-level partition graph.

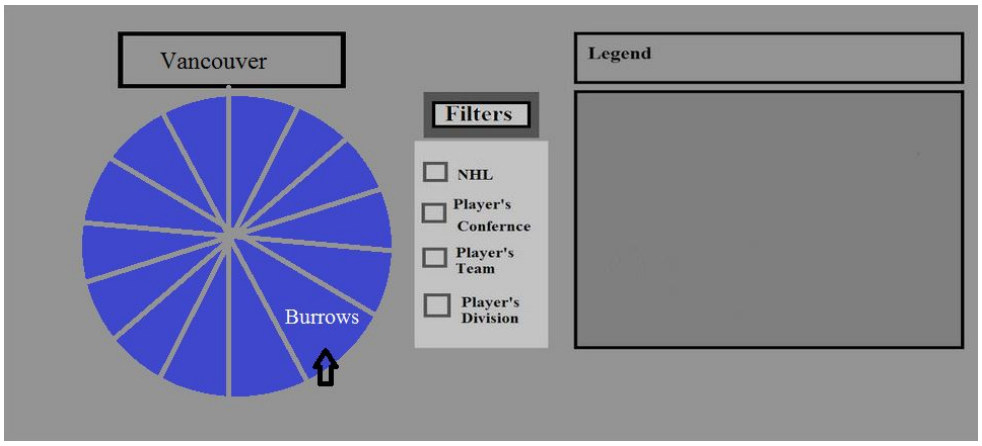

Figure 7

2) Select desired the comparison metrics from the filters list.

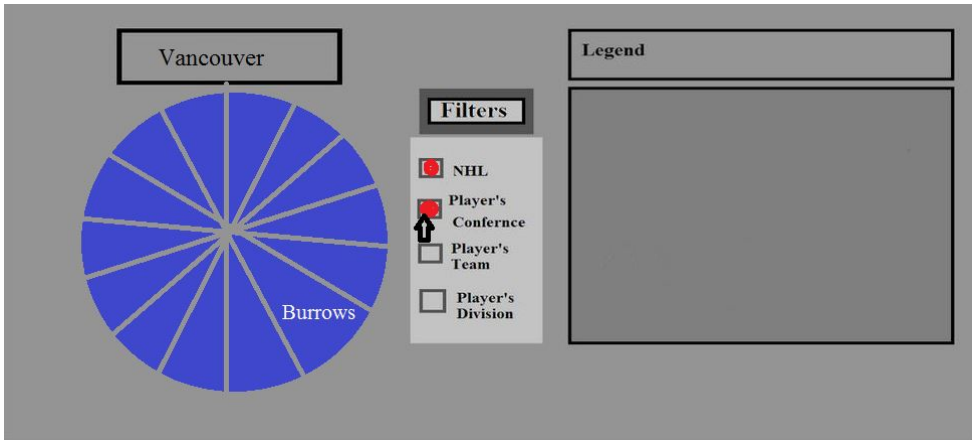

Figure 8

3) The Scatter Plot graph will render with player data and superimposed filter lines . This allows users to look at the graph to analyze the data.

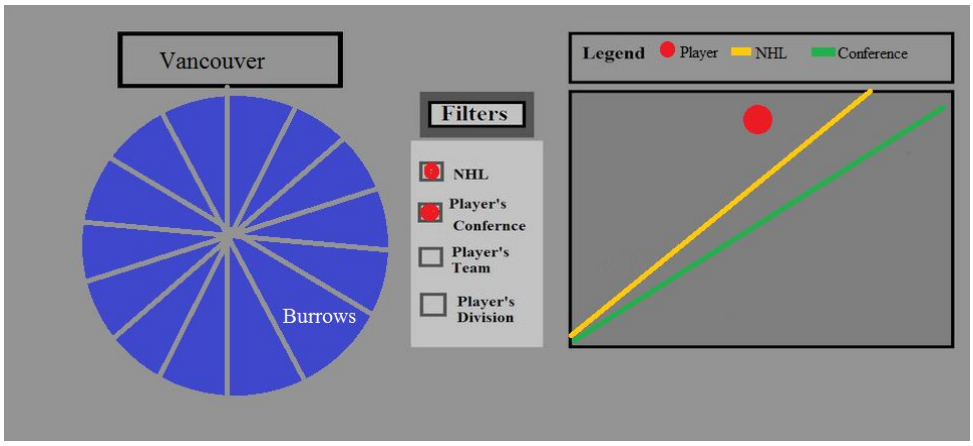

Figure 9

Implementation Details

NHLSlapShot will be implemented using a web based application based on the D3.js library. Python is a great tool to parse very large datasets and therefore will be used to parse through the .xls files to gather the required data for our analysis. These design choices were made based on recommendations from other Visualization experts (CSC 485D students) and prior knowledge of the uses for Python.

Milestones and Tasks

The following chart outlines the milestones and responsibilities of each team member.

Kyle	Brent	Brad	Jordan
Written Proposal - Introduction, proposed Interface, User Interaction (Feb 25 - March 2nd)	Use Python to get .XLS data into useable format (Feb 25 -March 6th)	Written Proposal - Visualization and Use Cases (Feb 25 - March 2nd)	Written Proposal - Edit (Feb 27th - March 2nd). Create Visualization general outline [placement of all three sections and limited/testable functionality] Feb 25 - March 11)
Visualization modules[make sections more complete (no longer limited for testing)] (March 2nd- 13th)	Integrate data into Visualization (March 6th - March 13th)	Getting graph to render data correctly (March 2nd - March 13th)	Fine tune Visualization [make the section visually appealing] (March 11- March 13)
Final Testing Visualization (March 13 -March) 15th)	Work on Report [related work, results] (March 13th- April) TBA)	Work on Report [discussion](March 13th- April) TBA)	Work on Report[implementation](March 13th -April) TBA)
Work on Report [introduction, approach] and Presentation (March 15th - April15th)	Work on Presentation (April 13th - April 15th)	Work on Presentation (April 13th -April 15th)	Work on Presentation (April 13th-April 15th)

References

[1] http://hockeyimpact.darkhorseanalytics.com/
[2]http://www.habseyesontheprize.com/2014/12/11/7359823/2015-16-canadiens-habs-cap-situation-contract-visualization--projected-73-million-salary-cap-hit