Design Critique 7 Lino Miltenburg

Introduction
In this paper I will evaluate and discuss a data visualization, called Track National Unemployment, Job Gains and Job Losses. The subject I will discuss are Tufte's principles of graphical integrity, Robin William's C.R.A.P analyses, the choice of color, aesthetics and improvements I would recommend.

First of all, I will briefly talk about what is visualized and about the tasks which can be achieved with it. As the title already reveals, is this visualization dashboard about unemployment in the United States. In the first graph are the job gains and losses shown for each sector per month in a period between 2007 till 2015. The gain and loss are relative to the previous month. The data over the whole period of the selected sector will be shown by hovering over the dots.
Below the graph is a kind of table visualized for a more detailed view with values of each sectors. This table is interactively linked with the graph on top of the page. By clicking in one of the two visualization, the other one will change to the selected data.
At the bottom of the page are two last visualization shown, who are both linked as well. In the first one is the overall unemployment rate shown from 1948 till 2015. The last visualization is a line graph drawn which shows the same unemployment rate. With the rate on the y-axis and the years on the x-axis. By hovering over one of those graphs, there appears an indicator in the other graph for the selected date. At last, there is a possibility to select the data of a specific population group.

There are a couple of tasks which can be accomplished with this visualization dashboard. First of all it is possible to get an overview of the years of rising sectors and sectors failing. While hovering over a specific year one can select a sector and see how the job gains and losses have been in the passed years. By clicking on one of the years, one can see a more extensive overview with a lot of information in the table beneath the graph.
The visualizations at bottom half of the page are very useful to achieve information about a specific population group. This can be done by filtering at the bottom of the page.

Tufte's principles of graphical integrity
"Clutter and confusion are not attributes of information, they are failures of design" (Pfister, 2014). This is a quote made by Edward Tufte. He invented the concept of Chart Junk and he is one of the greatest scientist in data visualization. Tufte's principles of graphical integrity will be examined in this paragraph for the data visualization. First of all the scales. In the first graph the x-axis represents the year and the y-axis represents the rank of each sector's gains and losses. Usually the x-axis is drawn at the bottom. In this graph the x-axis is on top. It does not make the visualization less clear but actually one puts the x-axis usually at the bottom of the graph in stead of on top. The creator put the x-axis correctly at the bottom in the third and fourth graph. In none of the graphs there is scale distortion. The units at the y-axis are drawn incorrect. There are some negative values displayed 'sectors falling'. But these units represent the rank of the falling sectors, so they actually should have been represented as positive integers.
Tufte describes his own Lie Factor as follows: "The representation of numbers, as physically measured on the surface of the graphic itself, should be directly proportional to the quantities represented." (Tufte, 1982). On the whole page dashboard there is only used size to visualize data in the second visualization. Nevertheless, are these columns drawn in proportion to the data they represent so there is no Lie Factor in this visualization dashboard.

Robin William's C.R.A.P analyses
Robin Williams wrote in his book About Principles for Effective Presentation Design about the C.R.A.P. analyses. In this analyses one examines a visualization on four criteria. Contrast, repetition, alignment and proximity.
Contrast should express difference between data if there is a difference. In the first visualization, the creators use contrast very clever to attract the attention to the area of recession between 2008 and 2009. They want to make a connection between the falling of a lot of sectors and the recession in that period.

In the table beneath the first graph one makes a difference in importance of the data by using bold font type for the column of “Monthly change (total jobs)”. The creators want to make a link between the period of recession and the data at that specific moment. When seeing the table at first sight, there is a bigger chance to see the bold column before seeing the two last columns, which are represented in ordinary fond type.
In the fourth visualization at the bottom of the page, one is able to select some specific populations. The resulting line graph is visualized with a blue line for the selected data and a black line for the overall data. Besides that, the selected line is thicker than the other line. This difference in color and thickness is a way to distinguish the data. However, there was no good choice of color use in this line graph. There is no big contrast between dark blue and black. So, the creators should have used a more contrasting color. I will discuss the choice of color later on in this paper.
Repetition is a principle that defines the way of repeating elements throughout the whole visualization (Pfister, 2014). The only repeating element in this visualization is the use of color. In both the first and third graph, one makes use of a color palette from green/blue to red. However the colors in the one graph mean something different from the other, the green color indicates something ‘good’ in both graphs as red does for something ‘bad’. Both the first and the second visualization use the same color palet (except from the blue color), which is a good example of repetition.
Alignment is the concept of how the whole page is structured. Every item should have a visual connection with something else (Pfister, 2014). As previously mentioned, the first and second visualization and the third and fourth do have an interaction. In both of the interactions the visualizations are placed below each other. In the third and fourth visualization this is no problem. After selecting something in the bottom visualization, one is still able to see the reaction of the graph on top. On the other hand is the alignment in the upper less good. The two pages can’t be seen at the same moment. This detracts the interaction between both visualizations. The creators should make both visualizations on one page, so they can be both viewable at the same time. Another improvement would be a sustainable click event. Once one clicks in the second visualization, the black dots in the upper graph should stay until a new click is made.
The principle of proximity, where group related items are placed close to each other, is not used in these visualizations.

Choice of color
In this section I will discuss het colors used in the visualization. Using different colors is a very useful tool to declare contrast and show difference in data. in the first graph the creators choose a part of the rainbow color palette from blue to red. In the world of data visualization, the rainbow color palette is known as a bad color spectrum to represent difference in the data. The rainbow color map hinders this task by confusing, obscuring, and actively misleading (Borland and Taylor, 2007). But in my opinion this use of a part of the rainbow spectrum is not a problem. The difference between red(highest falling) and blue(highest rising) is not confusing. If the colour of the highest rising would have been purple, this would lead to confusion. Because the purple color can also be seen as the color next to the red colour in order. In short, I do not find that the choice of colour is confusing.

Aesthetics
The creators have used a several different encodings to represent their data. In the first graph they used dots, which represents a sector in a specific month. The table below this graph is a very good addition so one can see the data in another visualization. Besides that, the first graph can be alternated by the table trough interaction. The interaction improves the playfulness. Besides that, the vividness of the graph is very high. By hovering the dots, the black dots, which will give a clear overview, will pop up and a label indicates which sector you ar selecting and what the value of loss/rise is.
Also the visualizations at the bottom are carefully visualized. Every block indicates a month and a label pops up with the data of the hovered month. Once hovered the block gets a black border which enriches the vividness of the visualization. Besides that, there appears a crosshair in the line graph beneath the visualization. A con of representing the months at the y-axis and the year at the x-axis, is that it takes a little while to find a specific month. Nevertheless, this is not the goal of the

creators. They probably want to give a certain kind of message, also called narrative visualization. They want to show the sector specific rise and loss during a period of recession and a period of non recession. And in my opinion this goal is achieved. The graphs show very clearly the periods with extensive rising and falling compared to the periods of recession. This gives the user the opportunity to see which sectors suffered most in periods of recession. Besides that, one can get a very clear view on the unemployment rate from over 60 years. Additionally, there is a opportunity to select specific population groups.

Improvements

There are a few things I would have done differently in this visualization. First of all, I would have put the x-axis in the first visualization at the bottom of the graph. It does not make the visualization less clear but one usually puts the x-axis at the bottom of the graph in stead of on top. There is another thing I would improve to the first visualization. I would change the negative units at the y-axis into positive ones, because a rank can not be displayed as a negative number. Besides that, I would draw a line trough the black dots, which give an overview of the specific sector over time. In this current visualization it is sometimes hard to see a trend in the dots. A line between the dots would give a much better overview of the changes in data over time. Besides that, it would be handy if the dots would stay after clicking the specific sector. In the current edition the dots disappear right after moving away the cursor.

The interaction between the linked graphs is not optimized. As previously mentioned, both visualizations are placed below each other. The creators should make both visualizations on one page, so they can be both viewable at the same time. Another improvement would be a sustainable click event, so one is able to make a selection in the second visualization and thereafter scroll back to see the changes in the first visualization.

At last, I would change the colors used in the line graph at the bottom of the page. As previously mentioned, the lines do not differ clearly after selecting a specific population group. The colors used are dark blue and black. These are not very contrasting colors. That is why I would choose colors that ar better distinguishable like red and blue for example.

Unless some improvements I suggested, I think overall this visualization is good. The graphs do make a point and give a lot of information. Besides that, the vividness and playfulness where high in this visualization dashboard.

Reference list

1. Pfister, H. (2014). CS 171: Visualization [PowerPoint slides]. Retrieved from https://cdn.mprog.nl/dataviz/slides/02-Design.pdf
2. Tufte, E. (1982). The Visual Display of Quantitative Information
3. Borland, D. and Taylor II, R. M. (2007). Rainbow Color Map (Still) Considered Harmful