Design Critique week 7

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Introduction

The visualization at [1] will be critiqued in this paper. The global goal of the visualization is to show a detailed view of the change in the amount of jobs per working sector, in America, in recent years. And to show a less detailed view for the most of the previous century until now, of the unemployment rate in different groups of the population. There are four graphics present in the whole visualization. Each separate graphic will be called a visualization and will be critiqued in a separate section. For each, first the goal is stated and then paragraphs follow which address separate topics. The paper ends with a conclusion summing up the most important points that were made.

The first visualization: Winners and Losers: Job Gains and Losses

This visualization has as goal to compare the rise or decline of jobs in all working sectors in America over the period from 2006 until now.

The label of the y axis is correct, "sectors rising" or "sectors failing" since the number on the y axis is the number of sectors. However this is a bit confusing since one would normally expect the y position of a data point to encode something about the data, however now it is possible to have a data point with a higher percentage rise in a sector to have a lower y position than a lower percentage rise data point. It would be better to have the label say: "Number of Sectors rising". The percentage change is actually encoded by the colour of a data point. This is 3 dimensional data, one dimension is the time, another is the number sectors rising or declining and the third is the percentage change per month. Although the point I made about the y position can be confusing I believe this is a good way to show this multi-dimensional data.

The colouring of this visualization is done in a understandable way, however this is not colour-blind friendly as stated in [2]

The data to ink ratio is well done here I believe. The data points are small enough to show allot of data but not too small to distinct between them. This is made possible by the good use of contrast. The dots have to have enough surface to allow the colour encoding to work but using this way of rounded of squares makes it possible to use the white background for clear contrast. There is clear contrast between the colours used themselves but having the majority of the data points being coloured in low brightness makes the extremes pop out. When hovering a data point contrast is very effectively used to show the points of the same sector in all other months. This is done with two encodings, a different shape, rounded square to circle and a different colour, black as mentioned in [3] this is very effective.

The alignment is done well except for one thing. The data points with a value of 0% change are outside the graph as a whole. On the axis there is a clear 0 shown, however the zero value data points are not shown there. It takes the reader a considerate amount of time to find out what the

grey data points mean. This could have been done differently by having a middle row with 0% data points, and when there is no such point for that month, just keep the space empty. In this way the alignment of the rising sectors and the declining ones, would not change.

An element of storytelling as in [4] is that the addition of a region marked as the "Recession" it is very clear to see a pattern in the data that matches the recession period. But It also shows this period in context to the period before and after which makes it possible to see that after the recession still the jobs were declining for about a year. This element is also present in the other visualizations and will not be discussed again there.

A big plus for this visualization are the aesthetics. The transitions of showing the black dots is done nicely.

Second visualization: Detailed View: Job Gains and Losses for November 2015

The goal of this graphic is to show extra information for an individual month so that the sectors can be compared per month.
The visualization allows sorting on all columns, this is helpful for finding patterns in the data. Contrast is well used to show the column that is currently being sorted on. This is done by making the title black and fading the others to grey. A point where contrast lacks is where numbers are put in the low brightness bar chart bars. Here the numbers are in white, which has almost no contrast with the very lightly coloured bars.

A strong error I found was that the title always claims that the data shown is about November 2015, this is not the case , the data that is shown can actually be of all months from 2006 until 2015. I know this because the data changes according to a click on a month in the first visualization. A thing that makes this worse, is that after clicking a month in the first visualization the user has to scroll down, so that the first visualization is out of view, then during the entire them the user inspects the second visualization the month that was clicked will be out of the visual working memory as elaborated on in [5].

The data ink ratio was not maximized here because the number for monthly change is embedded in a colour square thing. This is not necessary however I do believe this provides useful repetition with the a nice link to the coloured similarly shaped dots that were used to encode the same variable in the first visualization.

Repetition is found in multiple things. One was mentioned earlier about the monthly change coloured squares. Another is that the same colour encoding is used to encode the bar charts which helps to link to the first visualization. Something that brought me confusion was that when ordering on a column, the rising sectors are ordered from high to low values and the declining sectors were ordered the other way around. A better way would be to use repetition and do it the same way. Alignment is used well.

Third visualization: National unemployment
This visualization has as goal to show the absolute percentage unemployment of a certain group of the population per month, for all months in an almost 70 year period.

A large lack of the third visualization is that it does not encode the full range of unemployment in colours. The top of the range is "above 11 %" while the unemployment figures can go as high as 22 % when looking at the filter for black people. Everything above 11 % has the same red colour so no information can be retrieved from this, which is a shame. Another example are young people from 16-24 years old, no patters can be seen in the big block of red coloured rectangles. Because of this the goal of the visualization is not achieved for certain groups of the population. This also means there is a lie factor because based on the colouring one would assume that when there is no change the colour remains the same but now it is possible that with no change in colour the unemployment changes from 11 to 22%.

The labels are done correctly and clear. However the chronological reading order is expected to be from left to right, however here it is from top to bottom, than to the right and then again from top to bottom etc. This break between what is expected and what is used leads to confusion. It took me some time to realize that when "show recessions" is clicked, the start and end of the recession is found by this top to bottom way of reading.

This grid style of showing the data per month does have the advantage that differences between months can be shown very space efficiently. It is now possible to show all months in about 70 years very compact. However I do not see the benefit or the use of wanting to see the month level when looking at the whole 70 years. I believe it would be better to use zooming to only look at the month level for example two years at a time. The grid visualization could be replaced by a line graph of this two year period which could adapt the years that are shown by clicking on the 70 year overview line graph. This would solve the "running out of colours issue" and the confusing top to bottom way of reading.

Contrast is used in the colour encoding the same as the previous ones. But when a month is selected the indicators on the axis become thick black, while others are grey. This is a subtle but effective way.

Considering repetition in the design it might be a good choice to use the same colours for all visualizations. [3]. However it is confusing that in the first and second visualization the colour encoding with the same colours is used to encode percentage change per month and that in the third visualization instead of change per month, the absolute percentage is used. When something like this is done it would help to put extra emphasis on this in the text.

This visualization has large aesthetic value in my opinion.

The fourth visualization: Unemployment rate, overall

When hovering the visualization, an indicator is present to show the data values at that time, this is a good addition so that the source data is easily accessible in detail. However this tooltip is so large that it blocks out more than 10 years of data. Now when hovering a value the tooltip hides the context of the data point which is a disadvantage in the scope of pattern finding.
An improvement would be to show the tooltip outside of the graph.

Contrast is used to show the current filtering selection. This works well due to the consistency of always highlighting the filtered data in blue. The times of recession are shown with the same colour grey as in the first visualization. However a light colour works for a large surface but for a small one, it is hardly visible as stated in [6].

That filters are present to filter the data is a very helpful addition to explore the data. However it is unfortunate that it is not possible to stack filters. It would be interesting for example how the figures are for black youth or for example the difference between Hispanic and white bachelor students. This data must have been present in the source data but now these patterns cannot be explored.

Conclusion

The overall aesthetics were very much to my liking. This visualization can be used to explore many patterns and insights from the data. Contrast was used mostly effectively. Many examples of the use of repetition were present but not always clear to the reader. Alignment was always present except for the zero value points in the first visualization.

The most severe flaws in my opinion were the following. The error of not changing the month in the second visualization. Not making it possible to combine filters. Having the tooltip in the 4th visualization hide 10 years of the context data. Also the lie-factor in the third visualization as mentioned before. These flaws can be easily solved, except for the last one. I believe the third visualization does not serve a purpose and could better be replaced by a zoomed in line graph.

Sources

[1] Edward Segel, Jeffrey Heer, "Narrative Visualization: Telling Stories with Data", IEEE Trans. Visualization & Comp. Graphics (Proc. InfoVis), 2010

[2] D. Borland and R. M. Taylor II, "Rainbow Color Map (Still) Considered Harmful", IEEE Computer Graphics and Applications, vol. 27, no. 2, pp. 14–17, 2007.

[3] S. Carpendale, "Considering Visual Variables as a Basis for Information Visualisation".

[4] Edward Segel, Jeffrey Heer, "Narrative Visualization: Telling Stories with Data", IEEE Trans. Visualization & Comp. Graphics (Proc. InfoVis), 2010

[5] Ware, Colin (2008): Visual Thinking: for Design, Morgan Kaufmann, page 11

[6] Ware, Colin (2008): Visual Thinking: for Design, Morgan Kaufmann, page 71