Design Critique

Track National Unemployment, Job Gains and Job Losses

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Winners and Losers: Job Gains and Losses Jump to National Unemployment

Track the number of sectors gaining or losing jobs each month. Boxes are shaded based on percentage change from the previous month in each sector's payrolls.

source: http://graphics.wsj.com/job-market-tracker/
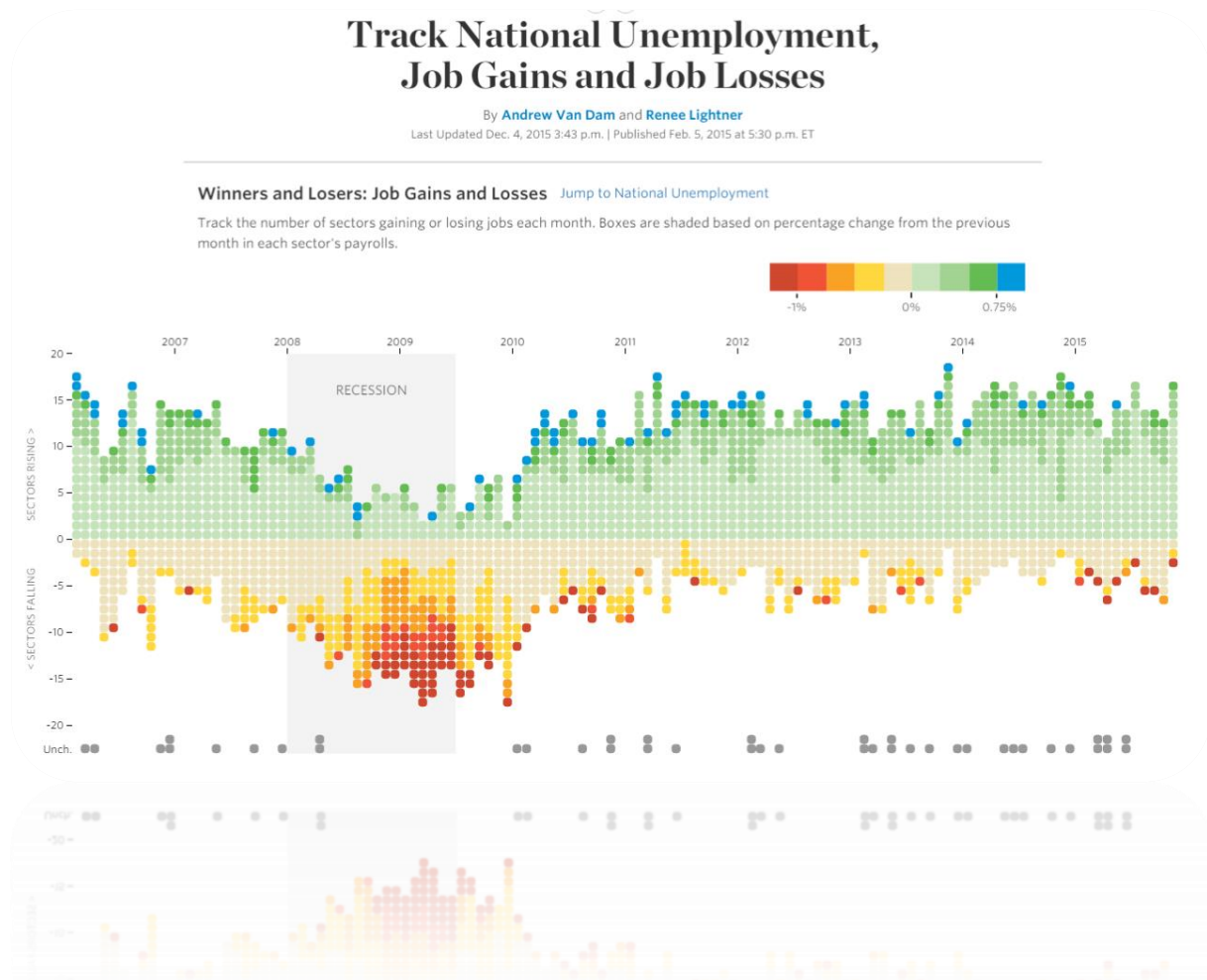
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Context and Problem Domain

This subject of this critique is the design of the visualisation dashboard made by Van Dam and Lightner entitled: "Track National Unemployment, Job Gains and Job Losses" which is last updated on the 4th of December 2015. This dashboard contains a total of four visualisations, of which the first can be seen on the cover of this paper. This visualisation shows the job gains and job losses per sector over time in light of the recession in 2008 to 2009. Furthermore, it shows the amount of sectors with job losses and gains over time in percentage compared to the previous month.

The second visualisation is a table and is linked to the first. It provides more detailed information on the sectors of a specific month that can be selected in the first visualisation; with sector size, the monthly job change and the number of months the sector is rising or falling. The latter is also shown in the first visualisation, but in a different manner. The third and fourth visualisation on the dashboard are very much alike. They both show the overall unemployment rate over time (1948 - 2015). The first of these using a matrix of years and months colour coded on a scale of unemployment rate (2% - 11%). The second being a line graph showing the same variable. Both of these visualisations can be filtered by gender, age, race or education. The line graph also shows the difference between the selected filter and the overall unemployment rate.

According to Munzner's proposed process model of visualisation design, the first step in designing a visualisation is to characterise the task and the data within the area of the domain (Munzner, 2009) in order to relate the design to the target group. In general, for a visualisation to be user-centred is that the problems of the target audience need to be well understood by the designer. In this case the audience seems to be anyone interested in the effect of recessions on the amount of job losses. This could be people who lost their jobs themselves, people who are looking for a job or are interested which sectors do well or politicians involved in decision making about subsidising certain areas or other things. The related goal of the visualisation is probably to provide insight into the relation between the occurrence of recessions and the unemployment rates over different sectors. Whether this goal is reached depends on the design process and the specific choices made in this process. Therefore I will now go into some more detail on the design choices made by Van Dam and Lightner in the following sections.

Tasks and Graphical Integrity

Cairo (2012) explains in Chapter 1 of his book "The Functional Art: An introduction to information graphics and visualization" that the aim of all visualisations is to be a tool for the eyes and brain of the user to be able to perceive what lies beyond their normal reach. He continues that visualisations should therefore have several characteristics, i.e.: present several variables, allow comparisons, help organise data and make correlations evident. These characteristics relate to the perceptual tasks that require more or less effort by the user and can therefore be arranged on a scale from most to least accurate as described by Cleveland and McGill (1984). Tufte's principles of graphical integrity are also related, as they too are focused on the ability of the user to interpret the data shown in the visualisation.

The user tasks present in the visualisations dashboard by Van Dam and Lightner are for the first visualisation: to see patterns in time of the number of sectors with gains or losses which is indicated in the number of circles, and the percentage of losses, indicated by the color of the circles. As can be seen, more red and more circles of job losses are present in the graph within and directly after the grey area indicating the recession. Also circles of the same sector light up when you hover allowing for a view of the pattern per sector. However, due to the exclusion of sectors that are unchanged, these are placed underneath the graph, the comparisons of these patterns gets a bit more unclear. Also the colour scale seems off, with jobs losses indicated in more different colours than the gains. However, this does allow for a more detailed view of the data represented here. The obtrusive red colour also seems to visually distort the lie factor described by Tufte, although in his description it

only involves the size of the effect shown in the graphic and the size of the effect shown in the data and therefore does not apply to this subjective observation.

In the second visualisation the user can perceive the size of the sector, the number of months in which it rises and the amount of months in which this sector falls by reading the numbers from the table which doesn't allow for a direct comparison between the sectors which is supposed to be key in visualisations as stated by Cairo (2012). The third visualisation allows the user to see patterns in time of the overall unemployment rate using a divergent colour scale. As noted by Cleveland and McGill (1984), colour hue is a problematic design choice as there is no: "unambiguous single method of ordering from small to large and thus [it] might be regarded better for encoding categories rather than real variables". Furthermore, the division of the scale is difficult to interpret as it ranges from 2 to 11% in nine categories without other legend labels and a divergent scale whilst all categories seem to stand for a positive value of just one variable being the unemployment rate. I feel that perhaps the line graph provides a better overview of the overall unemployment rate over time as that allows for a better comparison over time and is easier to interpret. However, the y-axis of the line graph has no label or title and the zooming in on the same axis distorts the interpretation of the data; this graph would look entirely different when it would have been scaled to 100 percent.

Design

Based on the tasks a user should be able to perform with a visualisation, a designer makes choices that enable these tasks, or as stated by Cairo (2012): form follows function, or actually function constraints form. The design choices that were made concerning these tasks and the integrity of the visualisations have been discussed in the previous section. Here, the focus will be on the more general design principles as described by Tufte and adhered to in graphic design.

Tufte's visualisation design principles entail the data to ink ratio and the minimisation of (unneeded) additions to the visualisation, also called 'chart junk'. More general graphic design principles include the use of contrast, repetition, alignment and proximity which are also described in detail by Ware (2010) in conjunction with his explanation of how we process visual information.

Overall, these principles are well adhered to. A very large amount of data is visualised in the first visualisation, i.e. the job gains and job losses per sector over time, the amount of sectors with job losses and gains in percentage compared to the previous month, the patterns in these percentages and the relatedness of all these variables to the recession. I found this amount of data density a tad confusing at first, but after persisting and spending some more time I learned to appreciate it some more. The other visualisations are much less layered an I feel that the third and fourth visualisations are almost duplicates as they show the same variable but just in different ways. This seems quite unnecessary.

The graphic design principle of contrast is used throughout all four visualisations but most attention goes to the first three due to the use of colour. For example, in the first visualisation contrast is used to highlight the story: especially the difference in colour used for the job losses and job gains is very effective. The rest of the graph is more timid with a white background, labels in grey tones instead of black and an understated single grey area indicating the recession period. In the second visualisation the colours do help to mentally link the two visualisations together, but the contrast of the lighter colours with white text on them can be better.

Repetition is used quite a bit with the use of colours throughout the dashboard and the high amount of circles used in the first visualisation, each one indicating a job sector per month. These sectors are aligned around a non-existent scale of no job losses/gains so that the distance to this axis indicates an amount of sectors changed. The actual sectors that are unchanged and should be on this axis are placed under the graph entirely in order to not influence the visual interpretation of number of sectors with job gains or losses. Circles close together horizontally are close together in time and circles close together vertically are close together in value; percentage of job gains or losses.

Conclusions

It seems that the visualisation dashboard of Van Dam and Lightner is intended for people who are interested in the effect of recessions on the amount of job losses. Some of the design choices that are made in the process of developing these visualisations are very successful. However, there is still some room for improvement.

Personally, I would decrease the data density of the first visualisation so that people can more intuitively read and interpret the data. The way it is now, the user should really put effort into understanding the basic idea and structure of the visualisation, before he or she can start interpreting the data. Also, I would put the unchanged sectors in the middle of the graph so you don't distort the pattern that highlights on hovering over the different sectors.

For the third visualisation it is important to be able to instantly see what the colours in the colour matrix mean. Therefore it is important to show how much percent each colour stands for and use an actual neutral colour for 0%. Furthermore, it might be an idea to use different colours altogether as this scale is much different from the one in the first visualisation, or maybe that is a wrong interpretation on my account, but that shouldn't be allowed to happen.

As stated before, the third and fourth visualisation are very much alike in the data used and the message they aim to convey. It is a good idea to just pick one of them. However, the line graph needs some improvements on its own account: right now it is unclear when the recessions are as it seems now that the word recession is not a label but the actual title of the graph. Furthermore, the y-axis misses an indication of what is plotted and it would be nice to allow a layering of the filters from a user's perspective and to adhere to Cairo's perspective that visualisations are tools that should allow comparisons and make correlations evident.

Literature

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