



The 12 Rules of Data Visualization



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by: Elif Nur Akyıldırım and Stijn Zanders

Data visualization is part art and part science. The challenge is to get the art right without getting the science wrong, and vice versa. Data visualization first and foremost has to accurately convey the data. It must not mislead or distort. If one number is twice as large as another, but in the visualization, they look to be about the same, then the visualization is wrong. At the same time, data visualization should be aesthetically pleasing. Good visual presentations tend to enhance the message of the visualization. If a figure contains jarring colors, imbalanced visual elements, or other features that distract, then the viewer will find it harder to inspect the figure and interpret it correctly.

In the Analysis Committee, we create dashboards to show our data with a perfect view to ESTIEMers. But what is a Dashboard for you?

Stephen Few coined a very good definition for it:

“A dashboard is a visual display of the most important information needed to achieve one or more objectives, consolidated and arranged in a single screen so the information can be monitored at a glance.”

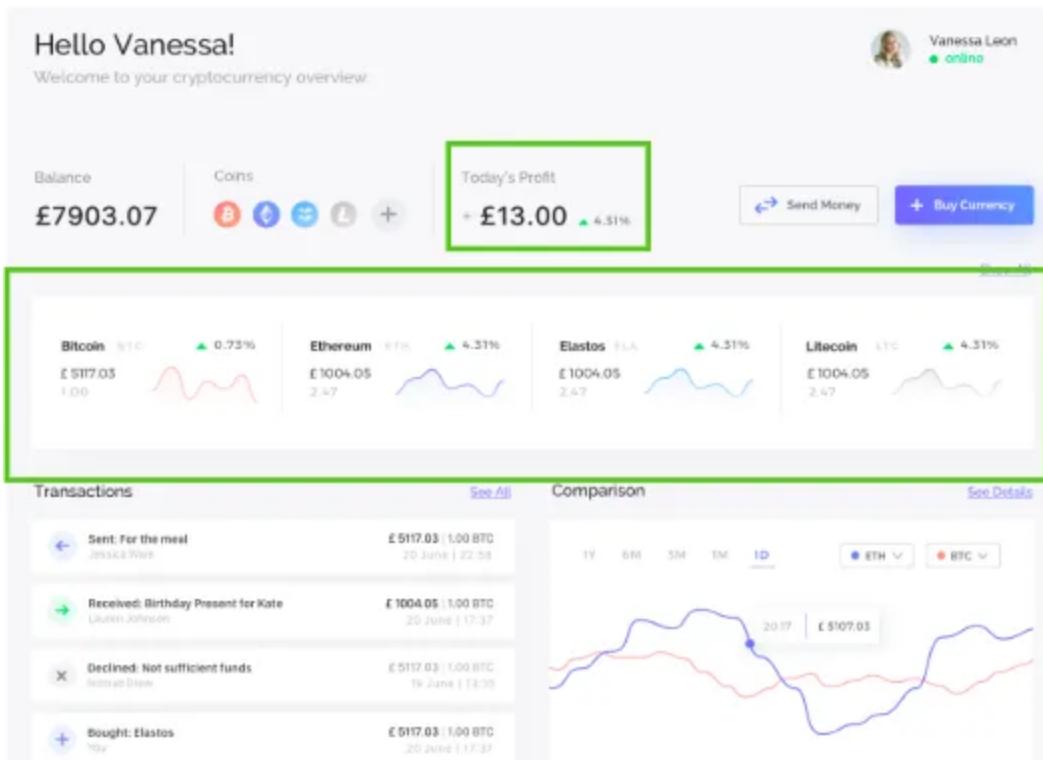
It means that when you are designing a dashboard you have to follow the rules. In the following part of this article, you will see the rules which are mentioned and

examples of these rules.



Show the Context

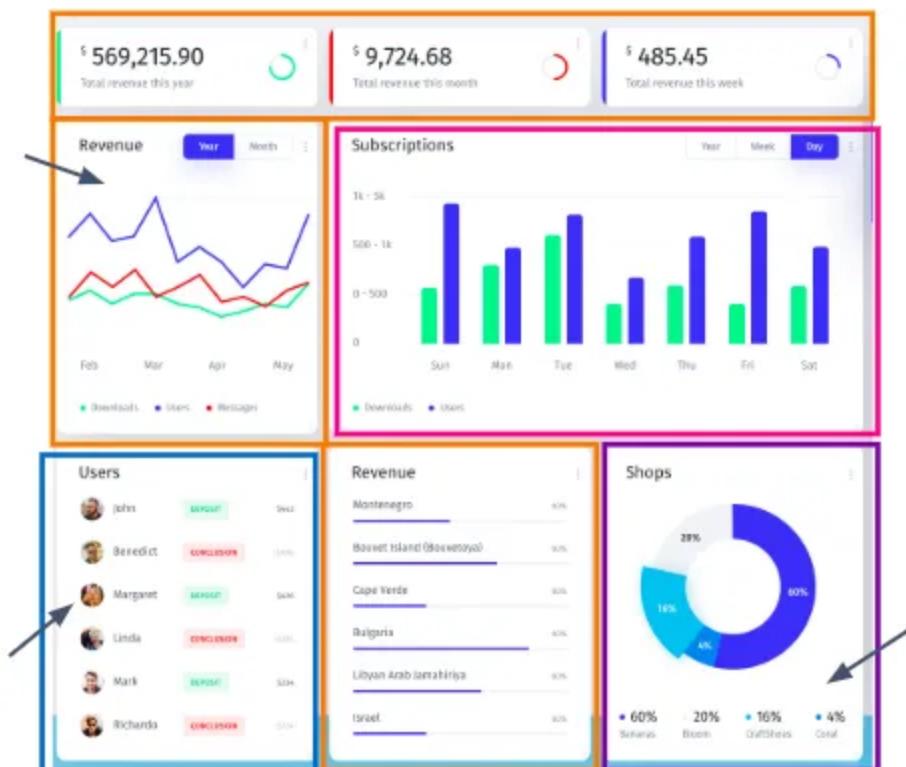
Showing a number is useful but showing it in context is more informative. When you display a measure, reserve some space to show its value from the previous year, a target, or its trend to date. It is also possible to use color to indicate the context of a number.



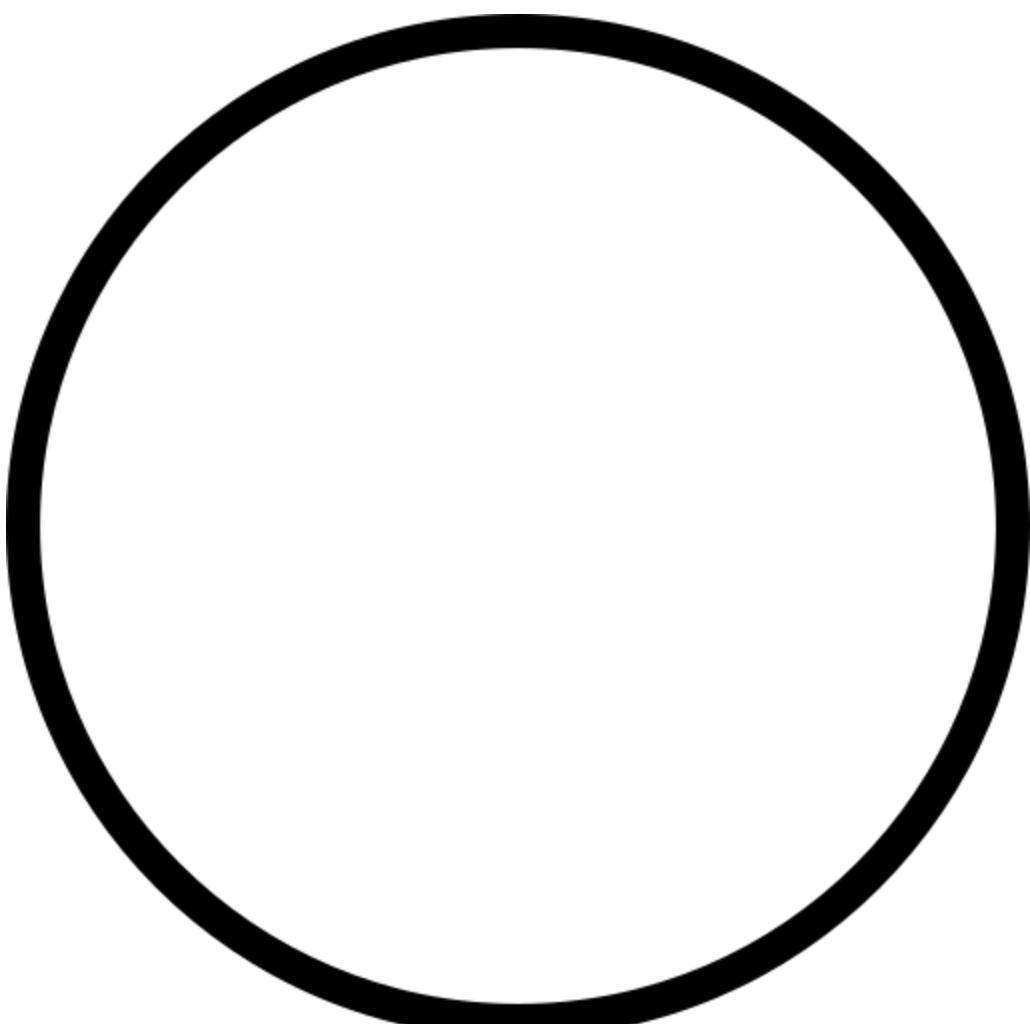


Know your Audience!

A good dashboard does not cover everything. You cannot use it to monitor your storage spaces for the infrastructure department, check your goods in stock for the logistics department, and review your employees' vacation at the same time. It is important to make a dashboard just for one target person, group, or specific goal.

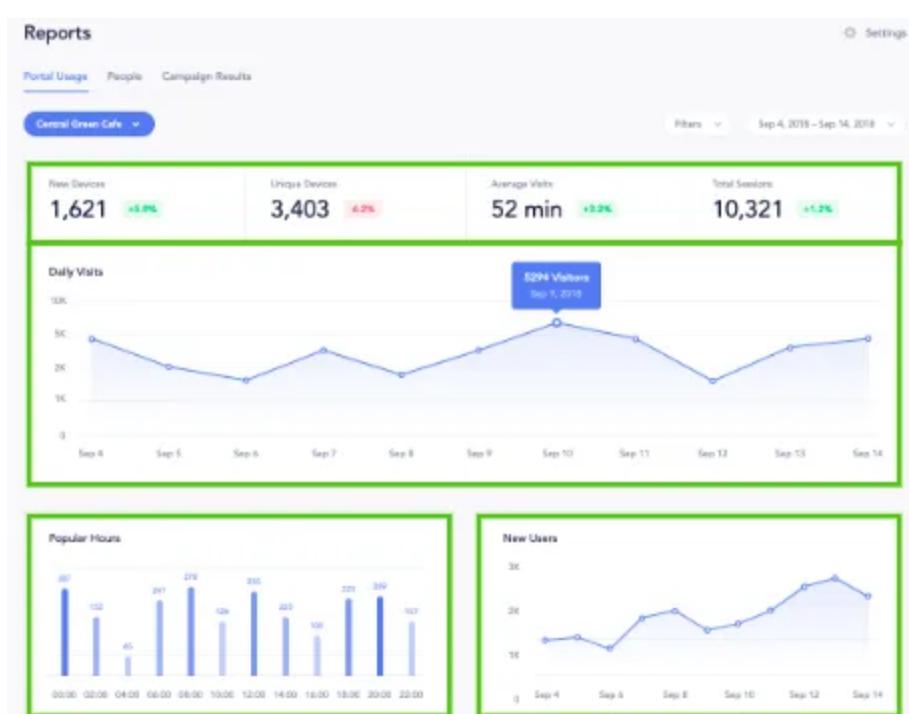


No connection between the visualizations.

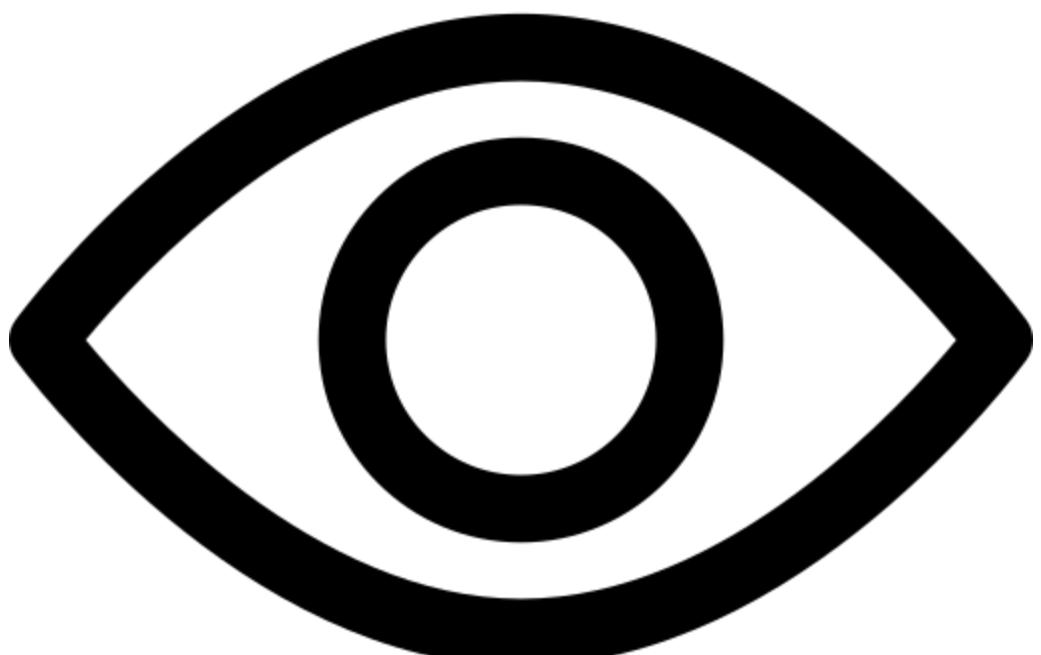


Keep it Simple

The foundation of good design is simplicity. Eliminate distractions such as pictures, colors, text. Only have there what needs to be there.



Avoid unnecessary decoration, remove pointless graphics, all art is quite useless.



Keep everything at a Glance

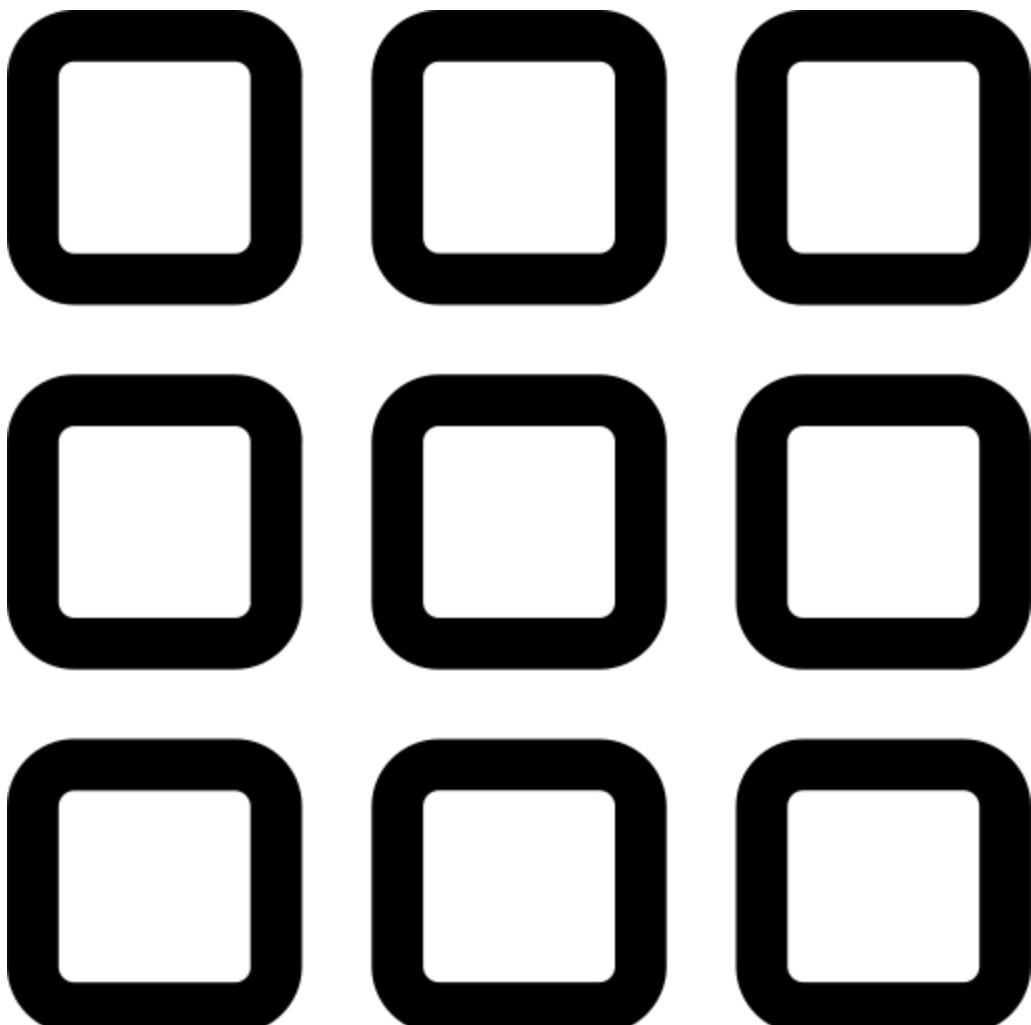
People may look at a dashboard every day, whether to make a decision or to simply stay aware of a situation. A good dashboard must not require any effort by its target user and must present all the information in a single(not scrollable) screen. Space is limited, so do not waste it.



Align Elements

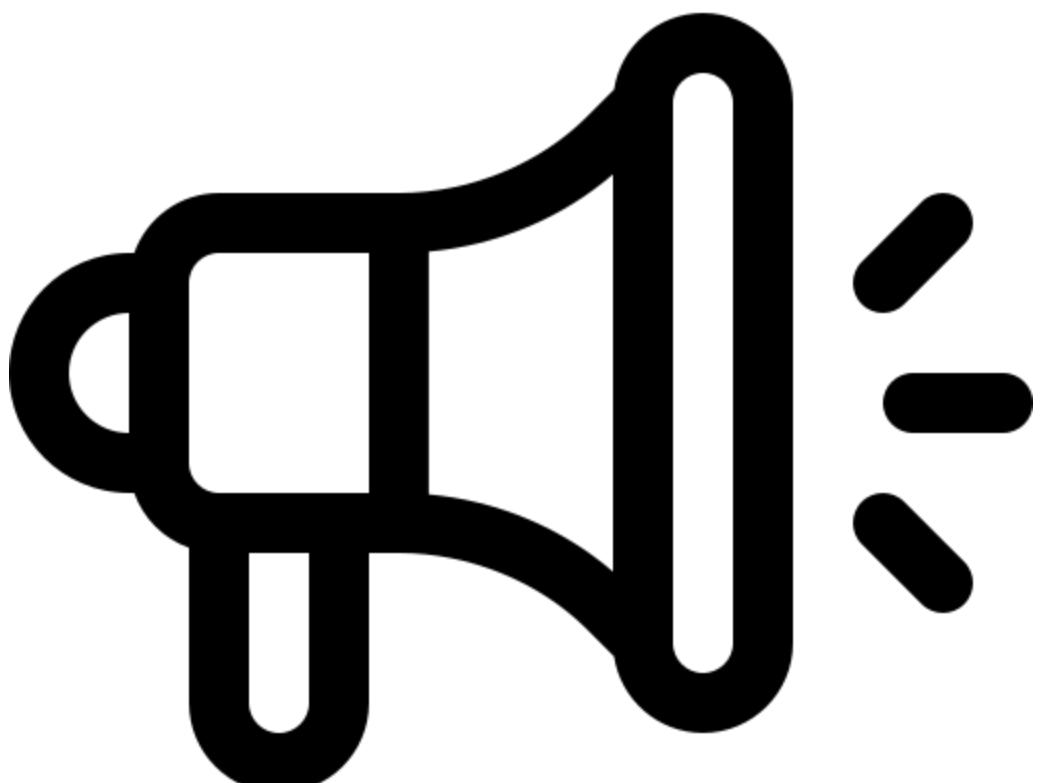


There is no harmony between the positioning, a much better alignment of all of the visualizations. It is very difficult for elements to understand the dashboard because of this.



Be Consistent

Before using different chart types, colors or conventions, ask yourself if you are doing it to make the chart easier to understand or because it is fun. Using patterns is the most effective way to convey a message.



Highlighting the most Relevant Information

Know that a good dashboard contains only the information that is relevant to its scope. But do not forget, some parts of the information are more meaningful than others, so you should highlight them.



Be Clear

Show legends, use simple terminology, and present carefully chosen chart titles. Therefore your audience can contribute that what do you want to show.



Choose the Right Colours!

Different ways of using colours

Sequential

Colour is ordered from low to high



Diverging

Two sequential colours with a neutral midpoint



Categorical

Contrasting colours for individual comparisons



Highlight

Colour used to highlight something



Alert

Colour used to alert or warn reader



Normal vision		#FC291C #399599
Tritanopia		✓
Protanopia		✗
Deuteranopia		✗
Protanomaly		✓
Deuteranomaly		✓
Tritanomaly		✓

Keep an eye on the colours used in your visualizations with regard to colour blindness illnesses.

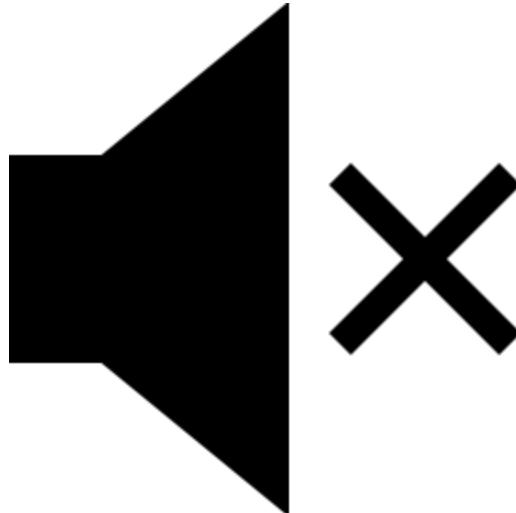
If you do use colours that might not be able to be distinguished by colour blind people, make sure there are other ways for them to see the differences:

In the case of green and red, use ▲ and ▼ signs for example



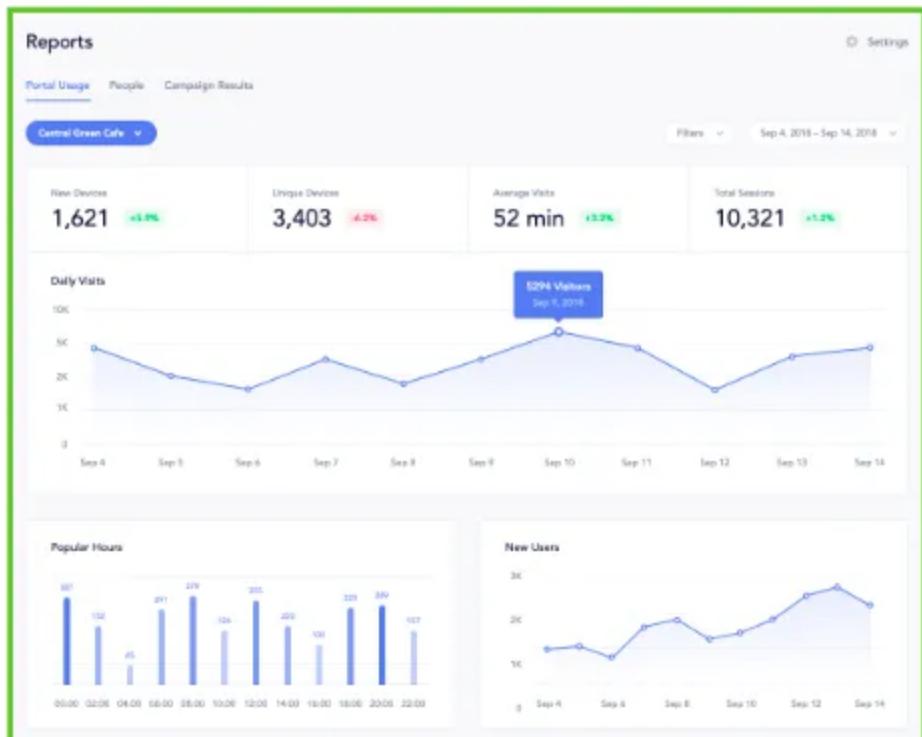
Design Dashboards, not Reports

A report is a detailed presentation of data that makes heavy use of tables. A good dashboard provides an overview to monitor a situation. A number in a dashboard should not give you a solution but instead, drive you to deeper data in a separate report. Do not use a lot of tables in your dashboard. Use charts that can convey information efficiently.

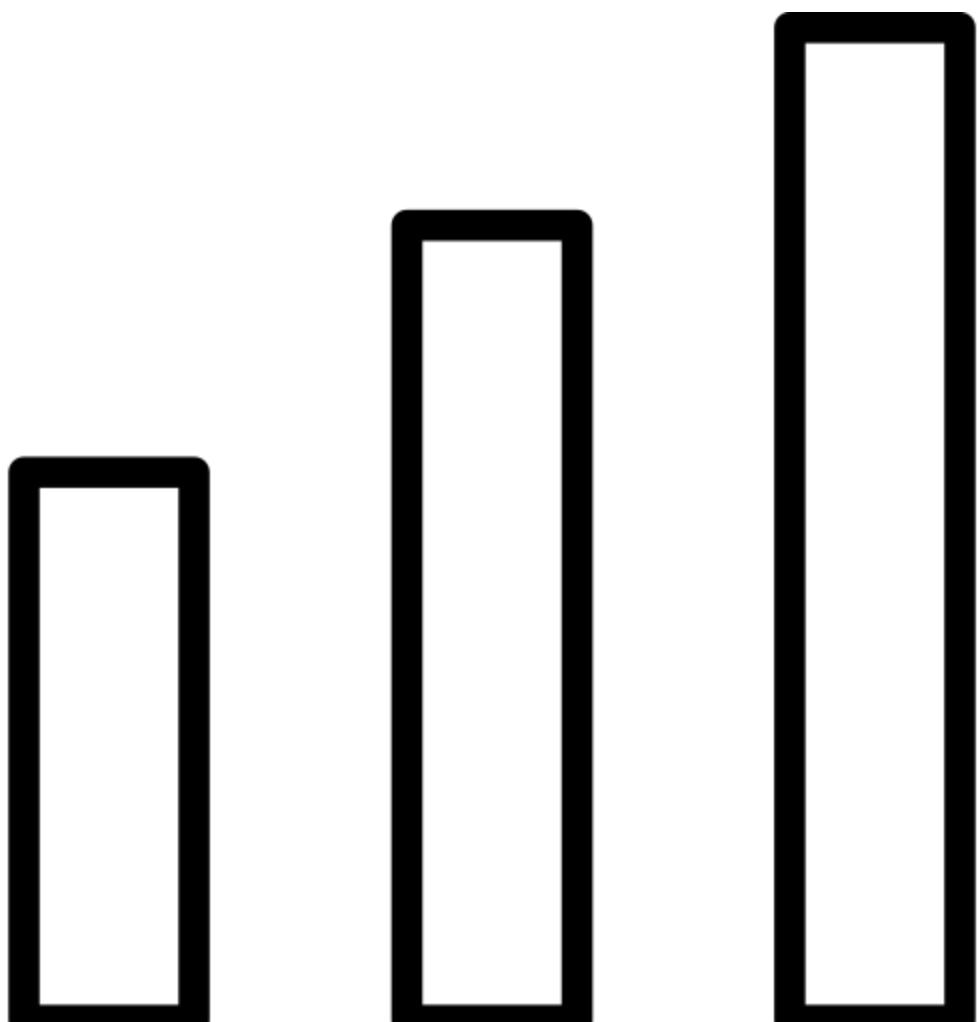


Leave the noise off





Do not do this! Make it easier to understand!

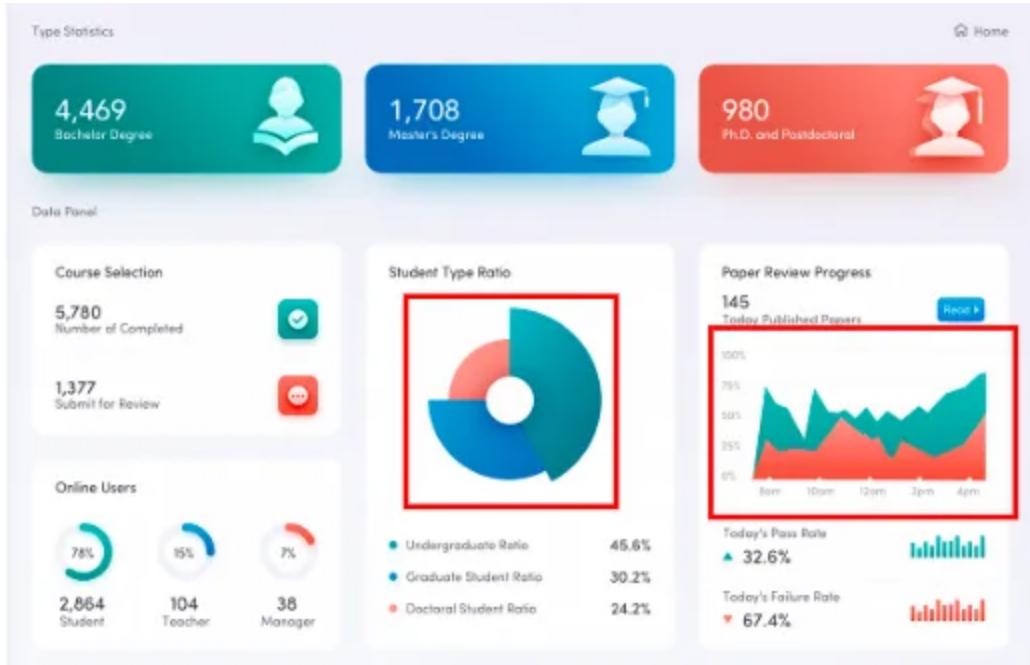


Pick the Right Charts

Too many times people present the right data with the wrong type of chart. Have you ever seen one of the following?

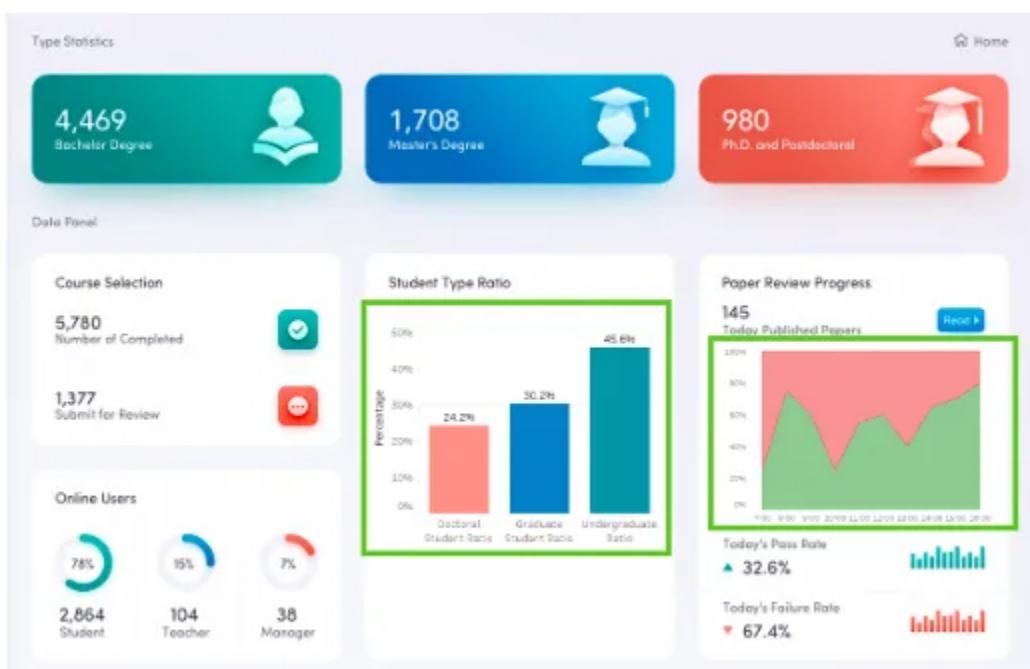
- A bar chart used to indicate a time series (sometimes it works, but this is more an exception than the rule).
- A radar chart when a bar chart would be more informative.

These are common problems. So how can you choose the right chart for your data?



- The donut chart in the middle is unnecessarily difficult to get information from
- The chart on the right is probably an overlapping area chart. Would make more sense to make it stacked. And since it is pass versus fail it probably needs to add up to 100%.

Like this one:



Do not forget:

“There is no data that can be displayed in a pie chart, that cannot be displayed BETTER in some other type of chart.”

- John Tukey

			
Comparison To display measures compared by magnitude	Change over time To display a changing trend of measures	Part-to-whole To display parts that make up measures	Flow To display a flow or dynamic relationships between measures
			 sqlbi™
Ranking To display measures by rank order	Spatial To display measures over geographical or custom maps	Distribution To display the distribution of values of a measure	Correlation To display relationships between measures

Credit: 57th issue of The ESTIEM Magazine (2019)

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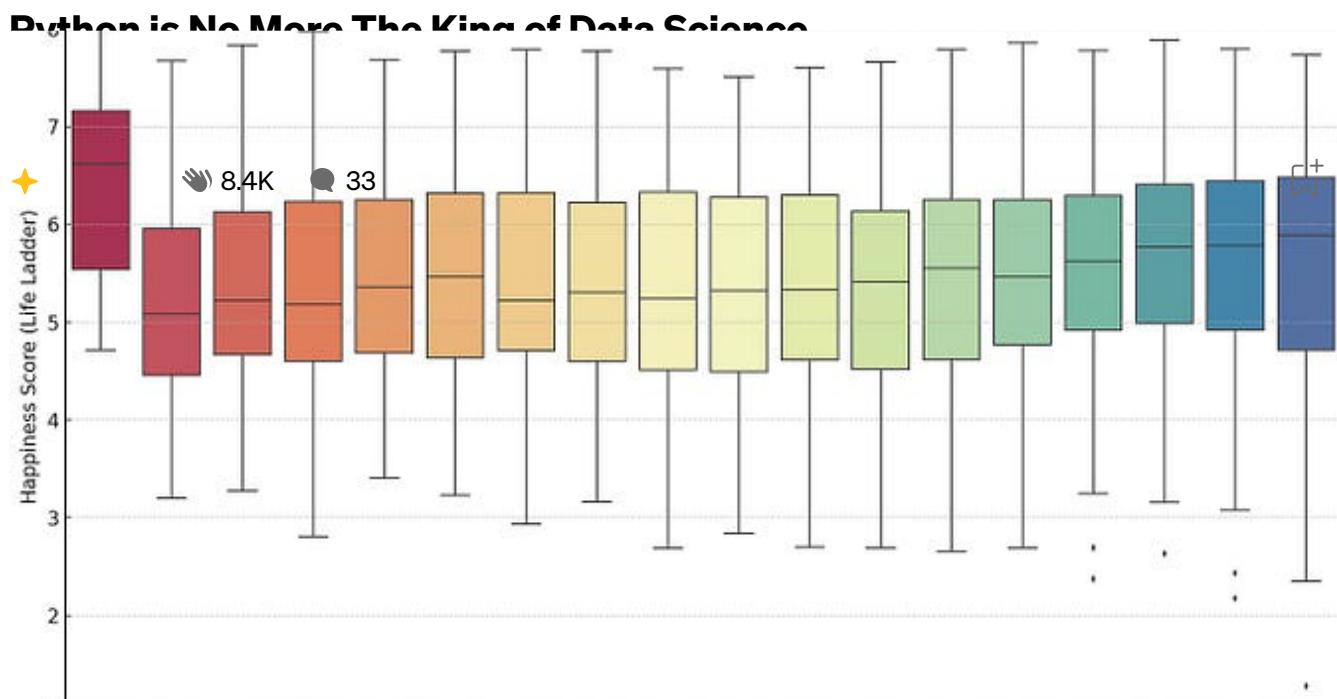
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**amazon.com***Software Development Engineer*

Seattle, WA

Mar. 2020 – May 2021

- Developed Amazon checkout and payment services to handle traffic of 10 Million daily global transactions
- Integrated Iframes for credit cards and bank accounts to secure 80% of all consumer traffic and prevent CSRF, cross-site scripting, and cookie-jacking
- Led Your Transactions implementation for JavaScript front-end framework to showcase consumer transactions and reduce call center costs by \$25 Million
- Recovered Saudi Arabia checkout failure impacting 4000+ customers due to incorrect GET form redirection

Projects

NinjaPrep.io (React)

- Platform to offer coding problem practice with built in code editor and written + video solutions in React
- Utilized Nginx to reverse proxy IP address on Digital Ocean hosts
- Developed using Styled-Components for 95% CSS styling to ensure proper CSS scoping
- Implemented Docker with Seccomp to safely run user submitted code with < 2.2s runtime

HeatMap (JavaScript)

- Visualized Google Takeout location data of location history using Google Maps API and Google Maps heatmap code with React
- Included local file system storage to reliably handle 5mb of location history data
- Implemented Express to include routing between pages and jQuery to parse Google Map and implement heatmap overlay

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1-page. Well-formatted.

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