



# SNS COLLEGE OF ENGINEERING

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Accredited by NAAC-UGC with 'A' Grade

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

## 19AD504 – DATA VISUALIZATION

### UNIT – II

#### DATA VISUALIZING

##### 2.1 Visualizing a single number

There are a number of situations in which it can be advantageous to create a visualization to represent a single number:

- To communicate with less numerate viewers/readers;
- Infographics and dashboards commonly use one important number;
- To attract the attention of distracted or busy viewers/readers;
- To add some humanity or "color", to create an emotional connection; Or to increase the redundancy of the presentation (see Improve the Quality of Data Visualizations Using Redundancy).

##### Option 1: Standard text formatting: font, size, style

- Sometimes the plain text is the best option. Make fonts big and simple so they stand out.

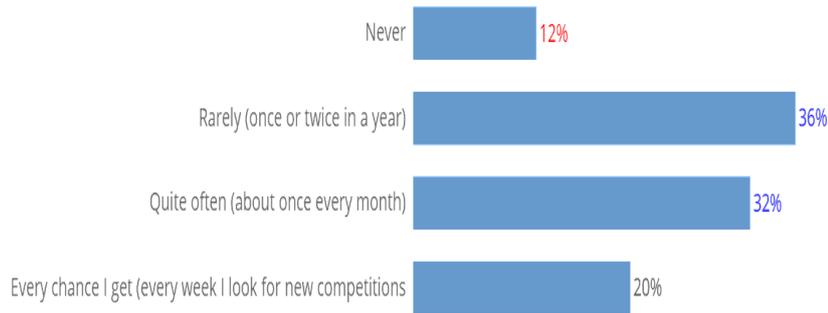
- 669 people died.

##### Option 2: Informative formatting

- Colors, bolding, emphasis, and other formatting options can be used to draw attention to figures and to communicate additional information.
- For example, the red font could draw attention to low results. Example: Sales declined by 23%.



- You can do this in a sentence or in a visualization, such as in the bar chart below, where color is used to encode statistical testing results.



- And you could also use informative formatting via a colored background for numbers, as in the visual confection below.
- In this instance, traffic-light coloring indicates the relative levels of performance of different departments in a supermarket.



### Option 3: Pie charts

- Proportions are often illustrated using pie charts with varying degrees of success.
- They can be particularly elegant for displaying single numbers that are proportions.



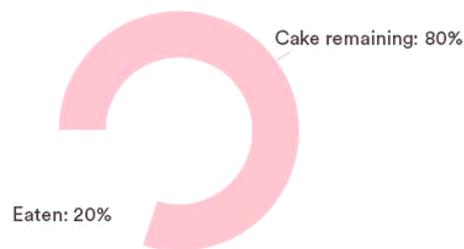
#### Option 4: Donut charts

- Similarly with donut charts. It's just a matter of taste.



#### Option 5: Portion of an image

- The two-category pie chart and donut chart are special cases of a more general strategy, which is to show a portion of an image.



#### Option 6: Overlaid images

- A twist on showing a portion of an image is to proportionally color an image.



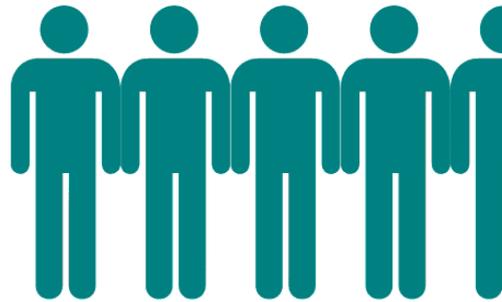
- A common, but misleading, criticism of overlaid image visualizations and all the pictograph type of visualizations is that they are imprecise at best, and innumerate at worst.
- The three visualizations above have all been created to illustrate this point. The one on the left is not too bad.
- The President Trump approval visualization can readily be criticized in that the actual area shaded in blue is less than 37%. This is due to the greater amount of whitespace over the shoulders.
- Particularly problematic is the age visualization. This implicitly compares a number, 37, against some unknown and silly benchmark implied by the top of the image.



- While such criticisms are technically correct, they are misleading. Consider the "worst" of the visualizations, which shows the average age.
- The purpose of the visualization is simply to communicate to the viewer that the average age figure is in some way low. How low? This is communicated by the number at the base. If the actual correct number is shown, there is little prospect of the viewer being misled.
- However, showing a number without the visualization runs the risk that the viewer fails to notice the point at all. This leads to a much higher error.
- Furthermore, there are many contexts in which precision is not even important. How often is half a glass of wine actually precisely half a glass?

### Option 7: Countable pictographs

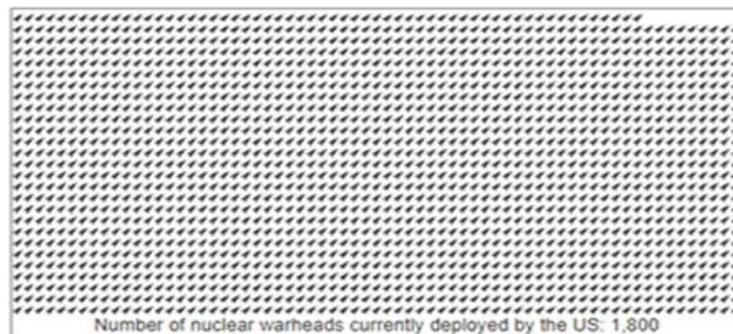
- While all pictographs have a bad reputation, in the case of the countable pictograph, it is quite undeserved.
- Countable pictographs achieve redundancy and thus likely improve the accuracy with which the underlying data is understood by the viewer.



Number of men required to change a diaper: 4.5

### Option 8: Uncountable pictographs

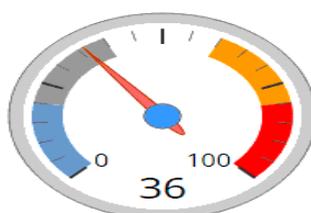
- The goal of the uncountable pictograph is to suggest, in a graphical way, "big". It is often most useful when next to a comparable countable pictograph.



Number of nuclear warheads currently deployed by the US: 1,800

### Option 9: Dials, gauges, and thermometers

- This data is from a study by the Pew Research Center. Go to the original report for a better visualization, which uses a thermometer.



### Option 10: Physical representations

- This photo, from The Guardian, shows 888,246 ceramic red poppies installed around the Tower of London.
- Each poppy represents a British or Colonial serviceman killed in World War I. It is the same basic idea as the uncountable pictograph but on a much grander scale.



### Option 11: Artwork/graphic design



### Option 12: Evocative collages

- And finally the most common of all approaches in marketing reporting is to find an image or images that in some way represent, or evoke, something relevant to the number.



**The options include:**

**Standard text formatting:** Using font, size, and style to emphasize the importance of a single number.

**Informative formatting:** Using colors, bolding, emphasis, and other formatting options to draw attention to figures and to communicate additional information.

**Pie charts:** Showing the proportion of a single number relative to a total using a circular chart.

**Donut charts:** Similar to a pie chart, but with a hole in the center.

**Portion of an image:** Using a portion of an image to represent the magnitude of a single number.

**Overlaid images:** Using two or more images, with the size or transparency of the images representing the magnitude of the number.

**Countable pictographs:** Using symbols or images to represent data, with the specific number of symbols or images representing the magnitude of the number.

**Uncountable pictographs:** Using symbols or images to represent data, with the size or arrangement of the symbols or images representing the magnitude of the number.

**Dials, gauges, and thermometers:** Using a dial, gauge, or thermometer to represent a single number, with the position of the needle or marker on the scale representing the magnitude of the number.

**Physical representations:** Using physical objects to represent a single number, with the number of objects or the size of the objects representing the magnitude of the number.

**Artwork/graphic design:** Using artwork or graphic design to represent a single number in a creative or artistic way.

**Evocative collages:** Using a collage of images, text, and other elements to represent a single number in an evocative or emotional way.

It is noted that some of these options may be imprecise, but they can still be effective at communicating the magnitude of a single number and attracting the attention of viewers. It is also noted that precision may not always be important in certain contexts.

