

Kevin

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④ Data Analytics is the collection and analysis and then use of data to tell stories, using charts and visualizations.

So that businesses can make better decisions.

COURSE 6: Share Data through the Art of

Visualization

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22/02/23

Visualizing Data

Instructor → Kevin

Director of Analytics

Stakeholders usually lack the time, access to data, or expertise needed to find those stories by themselves.

In this course we'll get to look at:

- > The basic concepts of visualization
- > How to plan for and start building effective visualizations (that are inclusive, accessible & consider ^{audience} _{test})
- > Tableau
- > How to use visualizations in presentation & slideshows to continue telling a story with data,

Finally * Anticipate & answer questions from stakeholders and respond to their feedback.

Putting information into an image to make it easier for other people to understand

1502 : map of the known world

In 1700s & 1800s, scientists & mathematicians began to truly embrace the idea of arranging stuff visually.

Shows → Bar graph from 1821.

1990s → Beginning of digital age of data analytics.

+ There are 2 ways an Analyst deals with visualizations →

① Looking at visuals in order to understand and draw conclusions about data

② Creating visuals using raw data to tell a story.



Rules →

① Audience should know what they are looking at in first 5 seconds.

i.e. visual should be clear and easy to follow.

② In next 5 seconds they should be able to understand the conclusion your visualization is making. Even if they aren't familiar with your research.

They might not AGREE → And that's okay.

You should take the feedback and adjust your visualization.

Understandable Effective Convincing

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The four elements of effective data visualizations are

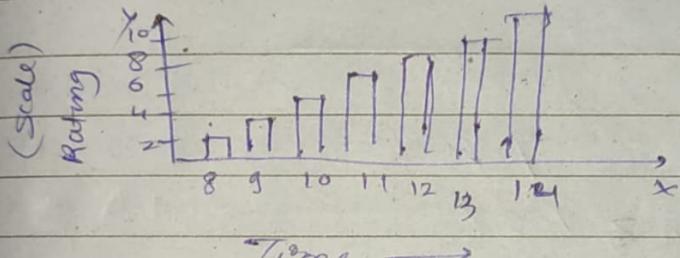
- ① Information (data) {data you're working with}
- ② Story (concept) {should be clear & compelling}
- ③ Goal (function) {specific objective}
- ④ Visual form (metaphor), {effective use of visual expression}

(+) A successful data visualization must have all 4 elements.

→ → → →
Connecting Images with Data!

① Bar graphs:

use size contrast to compare two or more values



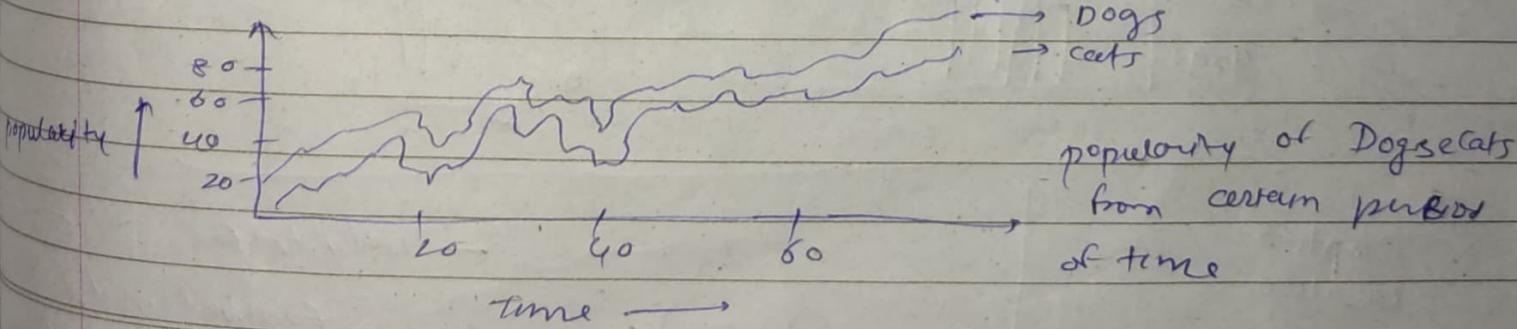
clearly the motivation
increase throughout the
day.

motivation level

② Line graphs:

Help your audience understand shifts or changes in your data.

Used to track changes through period of time

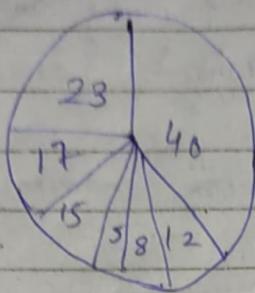


Visualizations can be manipulated by scaling and proportion

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③ Pie Chart \rightarrow

shows how much each part of something makes up the whole.



Legend

:

④ Maps \rightarrow

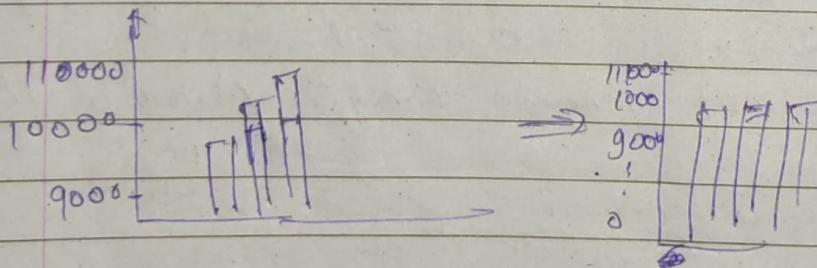
Helps organise data geographically

Example of scaling & proportion

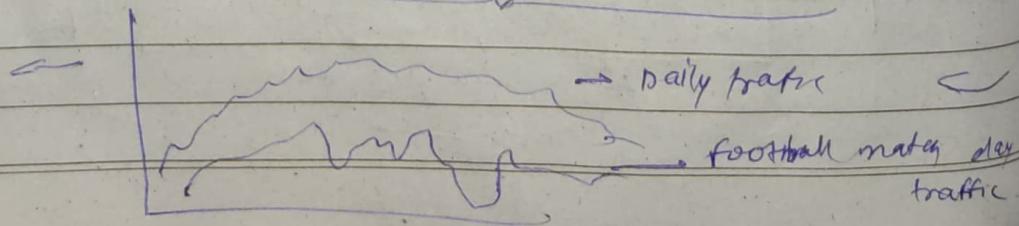
① pie chart sum \neq 100%

② y axis not starting from 0.

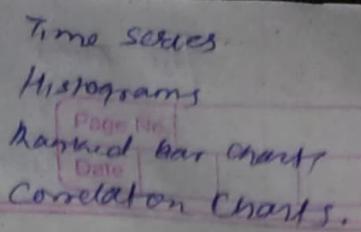
↓ misleading to different conclusion



implies
cavation



Recipe for powerful visualizations



- * One of your biggest considerations when creating a data visualization is where you'd like your audience to focus.
 - > Showing too much can be distracting and leave your audience confused
 - > Resting can be a good thing at times
 - > However showing too little can make your visualization unclear and less meaningful.
- ① If the data is live/ changing
 - > Show visualization only for the objective time.

Histograms

A chart that shows how often data values fall into certain ranges.

- * If your data needs to be ranked, ex. ordering no. of responses to survey question.
First, think about what you wanna highlight in your visual.

- ① Bar charts & Horizontal Bar charts effectively show data that are ranked, with bars arranged in Asc or Desc

- ④ Correlation charts relationship among data.

Causation → Occurs when an action directly leads to an outcome.

The more power you give to the user
the less control you have over your data story

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* Static or Dynamic

↳ Visualizations

- ↓
 - Do not change over time unless they are edited
 - > Control over the visualization
 - > And the data story
 - > Ex. Printed visualizations, charts & graphs created in spreadsheet.

Dynamic visualizations

Interactive ~~and~~ or change over time

- > Some control

→ → → →

Tableau

BI and Analytics platform that helps people see, understand, and make decisions with data.

→ →

The choice betn static or dynamic visualization

- ① Data you're visualizing
- ② The audience you're presenting to
- ③ How you're giving presentation.

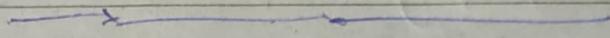
→ →

The elements of art ↗

- > Line : curve, straight, thick, thin, vertical, horizontal, diagonal
- > Shape : Should always be 2D , eye catching size contrast, instantly recognisable
- > Color : Hue, Intensity, value (light - dark, how much light is reflected)
- > Space : B/w, around & in Objects
- > Movement : Sense of flow or action.

color + dark → shades of color shades of blues

color + white → tints of color tints of blues



* Nine Basic Principles of design ↗

- ① Balance
- ② Emphasis
- ③ Movement
- ④ Pattern
- ⑤ Repetition
- ⑥ Proportion
- ⑦ Rhythm
- ⑧ Variety
- ⑨ Unity

* David McCandless's 4 elements of Successful Visualization

- ① Information (data)
- ② Story (concept)
- ③ Aesthetics (emotion)
- ④ Visual form (metaphor)

④ When you're comparing distinct objects

Ex. mobile vs. laptop usage

→ ordered Bar, ordered Column, & Grouped Bar

⑤ Charts that show parts of a whole

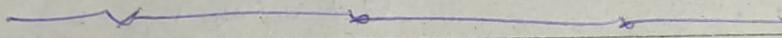
Data Composition →

Combining the individual parts in a visualization and displaying them together as a whole.

→ Stacked Bar, Pie, Donut, Treemap, Stacked Area

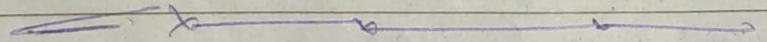
* To show Relationship →

Scatterplot, Bubble, Column/line, Heatmap



Elements for effective visuals →

- Clear meaning
- Sophisticated use of context
- Refined Execution (attention to detail)



* Design Thinking →

A process used to solve complex problems in a user-centric way.

⑥ Identifying alternative strategies for visualization

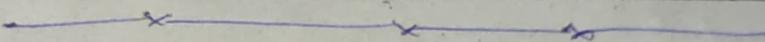
that might not be clear right away.

Design Thinking → Exploring different ways of approaching
the problem and finding solutions.

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Ex. AirBnB :-

- weren't generating much revenue
- looked at product through consumers perspective
- customers didn't like photos
- Hired a professional photographer who took door to door photos in New York.
- Revenue ~~1x2x3~~ Doubled



What it means for DA8+

You'll creating data viz. based on needs of people who will be viewing them.

> Boom audience engaged!

* * Five phases of Design Process (No set order)

- Empathize → Emotions and need of target audience
[Color scheme, obstacles while interacting with viz]
- Define → helps you find audiences needs, true problems.
[Runch data to show, different to different people]
- Ideate → Generate data viz ideas. (experiment with shapes & colors)
- Prototype → Putting charts, graphs, together.
- Test → Showing to team members before showing to stakeholders.

Get feedback and update.

Explore visualization considerations

① Headlines, subtitles, legend.

Headline → A line of words printed in large letters at the top of viz to communicate what data is being represented

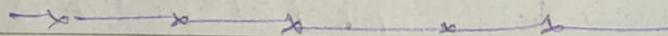
> Charts should have a headline with text size larger than normal and bold/italic

Give it a subtitle to make it more descriptive

- > Use clear concise language
- > Avoid using Abbreviations or acronyms.
 - ↓ Even if they are common knowledge
- > Keep it simple and Align to left.

Subtitle → Supports the headline by adding more context and description.

Place it directly underneath the title.



Legend:

Identifies the meaning of various elements in a data visualization

⊕ ⊕ Dona Wong, direct labelling instead of legend

↓ makes it easier for the audience.

Create alternative ways to access

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Accessible Visualization

People take info in different ways. You might have a viewer who's deaf or hard of hearing & rely on captions.

Or Someone whose colorblind, etc

* Ways to make data visualizations accessible.

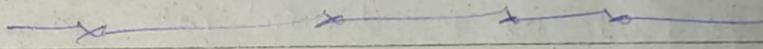
① Labelling : direct Labelling for ease of access for able & unable people alike

② Text Alternative

③ Text based Format

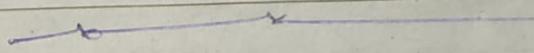
④ Distinguish (foreground & background)

⑤ Simplify



⑥ Andrew, Data Insights manager

"Accessibility is really about making sure that you are creating data visualizations, graphs, charts, tables that anyone can interact with, whether they have a long-term or even a temporary form of impairment"



⑦ Designing a chart in 60 minutes

Prep (5min) : Create mental & physical space for complete thinking environment or

Talk & listen (15 min) : Ask Q by stakeholders etc

Sketchn & design (20min) :

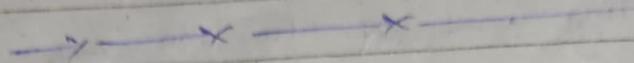
Prototype & improve (20 min) : Gauge effectiveness after generating visualization

Data Visualization with Tableau

> Visual Analytics platform

Meet Tableau → Helps you do more with your data.

> We're using tableau public browser



Activity ③

We're using the World Happiness Data →

First we create a copy of the data

Then Worksheet > New Worksheet

The UI ~~base~~ is divided into many sections.

The marks section is what we're going to use.

① Take "Country" column & drag it onto details in marks section

② Take "Happiness Score" and drag it onto color
& change color such that dark blue → Happiest
dark green → Saddest



we get a world map with countries shaded in such color.

In an instance it can be gauged which country has good happiness score & otherwise.

Dasso selection tool
zoom in/out, select, pan, shape select to

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INVESTIGATE

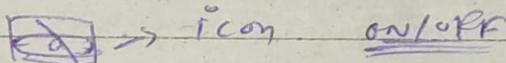
FILTER

- ③ Drag year and country to fields area to filter data on the basis of countries & year.
- ④ To see Happiness score in each country, drag it to label.
- ⑤ Right click on columns to change their data types.

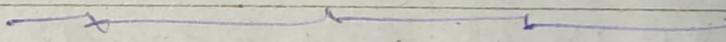
Filter > Show filter will pop a slider at right



You can hide your dashboards also



→ icon on/off



① Create a data viz

② Data > New data source > Upload

→ Numeric Data

Abc → String Data

Globe → Geographic data

Calendar → Date data

Calendar with a clock → Date and time data

Double click to see a relevant map!

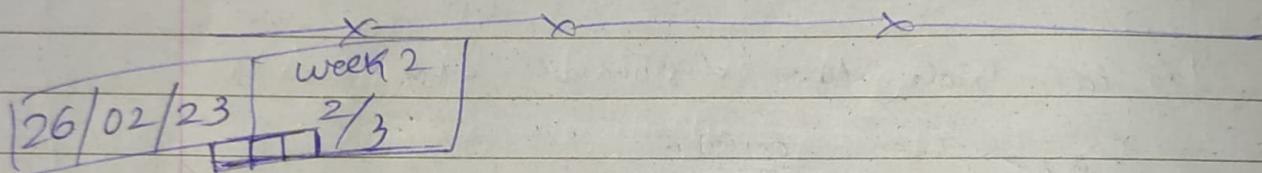
- ③ > Double click / drag country to detail
 > \rightarrow \rightarrow \rightarrow (CO₂ (kt)) to size [10]
 > \rightarrow \rightarrow (CO₂ (kt)) to color

Bigger have different color, etc

> Edit title

[] \downarrow Here

> Right click on sheet & select delete when you need, but be careful it can't be undone



5 Second Rule:

The audience should understand what you are trying to convey within 5 seconds.

This means the viz should be clear, effective and convincing.

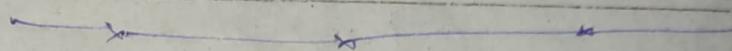
* Diverging Color Palettes

Displays 2 ranges of values using color intensity to show the magnitude of the number and the actual color to show which range the number is from.

| | | |
|------------------------------------|-----------------------------|--------------------|
| Ex: Green \rightarrow Higher nos | Red \rightarrow Lower Nos | Yellow: Middle Nos |
|------------------------------------|-----------------------------|--------------------|

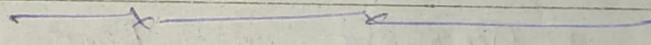
what not to do →

- > Colors should clearly show the difference betn high & low data points
- > Using color pairings that do not fit audience's expectations could add another layer of unnecessary complexity.
- > Do not go overboard while labelling, it makes the viz look too busy, takes up too much space, etc
 - > Using too many different fonts & sizes
 - > Bold, italic, etc



Effective VIZ →

- ① S - Second Rule;
- ② Color-Contrast :
- ③ Conventions & Expectations:
- ④ Minimal Labels



* Considerations to make while creating a data viz →

- ① Where you'd like your audience to focus?
- ② Clear meaning
- ③ No distractions
- ④ Clear Execution

Effects for effective visualization

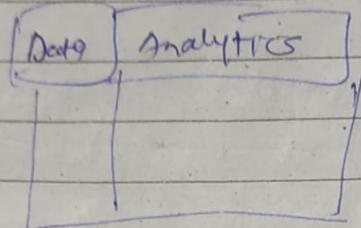
Design Thinking Process

Empathize, prototype, Ideate, Test Define

④ Getting Creative →

→ World Happiness > make a copy
→ Worksheet > New Worksheet

- Add filter year for 2016 | Country → detail
- Happiness → Rows
- Economy → Columns



- Again for family vs Happiness Score, Generosity, Health (life Expectancy), etc.

Now create duplicate charts for family, Health & Generosity as Rows.

→ Now: Click Dashboard > New Dashboard

Drag sheets to form a 2×2 dashboard or any form you like

Dashboard:

A tool that organizes information from multiple datasets into one central location for tracking, analysis, and simple visualization.

Dashboard filter:

A tool for showing only the data that meets a specific criteria while hiding the rest.

① Linking data from multiple sources in Tableau allowed me to create more comprehensive viz that incorporated a variety of variables and dimensions.

② Other dataset that could be included are demographic, economic, geographic, etc.

Without linking data, complex comparative datasets and viz. could be created by manually aggregating and merging data from multiple sources



"Numbers have an important story to tell. They rely on you to give them clear and compelling voice."

"Numbers have an important story to tell. They rely on you to give them a clear and convincing voice." — Stephen Few

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Data Story-telling :

Communicating the meaning of a dataset with visuals and a narrative that are customized for each particular audience.

- ① Engage your audience
- ② Create compelling visuals
- ③ Tell the story in an interesting narrative



Data Storytelling steps:

* Create Examples →

④ Year in Review Emails

Spotify, etc → Highlights most streamed track
top fan of this artist

Reminds listeners how much they enjoy

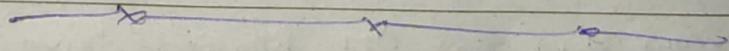
Great way to build customer loyalty! : the service

⑤ Ride sharing → How many miles they travelled

How much saved on gas

Reducing carbon emission

Saving traffic time



A story has a beginning - middle - & END

Keep your story organised and concise

* Not every data is going to Answer Your Question
A very important part of DA job is to
know how to eliminate less important details

* Stories make people CARE

- 3 Steps of Data Storytelling →
- ① Engage your audience
 - ② Create compelling visuals
 - ③ Tell your story in a interesting narration

* First of all you need to know who your audience is?

- What role does this audience play?
- What is their state in the project?
- What do they hope to get from the data insights I deliver?

* Spotlighting →

Scanning through data to quickly identify the most important insights.

One of the ways to spotlight is:

Using sticky notes on Whiteboards

- > write each insight on a stick note
- > spread & display them on a whiteboard
- > Examine, don't get bogged down with tiny details.

* Look for universal ideas and messages again & again
or number or words that are repeated often.

You might see a pattern.

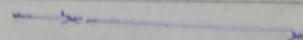
* Keep your KEY MESSAGE crisp & clear

"Don't let the way you create something influence what it's actually saying." Page No. _____ Date _____

Analytical Lead

Carolyn, measurement lead

- > Measures client's advertising investment and figure out ways that it can perform better.



Data Journalist, Chicago Tribune - 3 years
↓
Election season, Olympics

what the data really means.

Understand what tools are available to you,
Know how they work:-

But NEVER let those tools overwhelm your story.



A reader doesn't want to know which tool was used
so try not to let them know.



Use Tableau Dashboards

Used for:

- Share information
- Get people engaged with business plans & goals
- Uncover potential problems

Dashboard:

A tool that organized information from multiple datasets into one central location for tracking analysis, and simple visualization through tables, charts and graphs.

- > Present optimum data, perfect for them
- > Too much data will distract.

A Dashboard keeps things neat and tidy and easy to understand.

~~How~~ →

Start simple: with just most important data points.

↓

If later you think something is missing go back and modify / create a new one.

Important layout / placement of charts, graphs and other visuals.

These elements need to be cohesive, meaning they're balanced & make good use of space on Dashboard.

layout In Tableau, choosing betw Vertical: Adjusts the height & Horizontal: Resizes width or views 2 objects

→ Can select tiled → Single layer grid, automatically resize based on overall dashboard size
or Floating layout → Can be layered over other objects.

* Showing Dashboard with others means you'll lose the control of the Narrative.

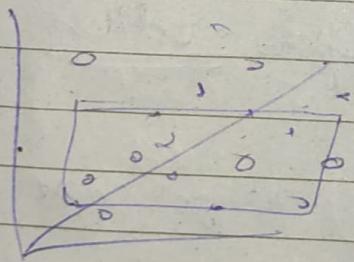
Dashboards put storytelling power in the hands of the viewer

↓
They'll craft their own Narrative & draw their own Conclusion



Filtering in Tableau ↗

Show desired data while hiding the rest.



Select the area or single point & hit exclude / keep only

My For table, select column(s) & hit keep only/exclude

For

Prefiltering ↗ Doing the filtering for stakeholders.
Filters let you "pin on what's imp"

Select data > Insert > Chart
Spreadsheet Selects best type of chart for our data.

| Chart for | | | |
|-----------|--|--|--|
| Date | | | |
| | | | |

* Step
Tab: Customer Response → Select Software Package
Insert > chart > Pre Chart
Zoom

Tab: Country or Response → Select Country, Score
Insert > chart > chart type
Map Volla!

Customize →

Geo > min color → lightest blue
mid color → mid blue
max color → Darkest blue

least satisfied customers → light blue
most → → Darke blue.

—x— x —x—

* Double Clicking chart Opens Editor

* Use the series drop down to change chart colors.