

MLDS 411

DATA VISUALIZATION

Winter 2024 Labs

Alice Zhao

Northwestern | McCORMICK SCHOOL OF
ENGINEERING

Schedule

Week	Date	Time	Tableau Topics	Python Topics
1	January 12	11am	Tableau Review	Library Overview
2	January 19	12pm	Joining, Blending & Relationships	Plotly, Dash
3	January 26	11am	Hierarchies, Groups & Sets	Bokeh
4	February 2	11am	Filters, Parameters & Tooltips	Wordcloud
5	February 9	11am	Dashboards, Stories & Actions	NetworkX
6	February 16	11am	Maps	GeoPandas, Folium
7	February 23	11am	Calculated Fields, Table Calculations	Plotnine
8	March 1	11am	Forecasting, Clustering	Python + Tableau

Follow Ups

Will review near the end of lecture today:

- Why is Tableau running so slowly?
- What are attributes?
- How to drill down and filter visualizations?
- How to drill down two visualizations together and filter other visualizations?
- How to share Tableau workbooks with non-users?
- How to create custom visualizations?

Today's Theme: Calculations

Calculated Fields *Create new fields based on existing fields*

- Arithmetic
- Functions
- If/else statements
- More functions

Table Calculations *Make calculations from a visualization*

- Running total
- Percentage of total
- Difference

Calculated Fields

- **Arithmetic**
 - Cost by Subcategory → Difference
- **Functions**
 - Sum of Sales by Customer → De-Aggregate Measures
 - Sum of Sales by Customer → Max Sale by Customer
 - Sum of Sales by Subcategory → Max Sale by Subcategory
- **If/Else Statements**
 - Sales by Subcategory → If Profitable → Color Marks
- **More Functions**
 - Create → Calculated Field

Table Calculations

- **Running Total**
 - Sales Over Years by Category → Running Total
- **Percentage of Totals**
 - Sales by Category, Subcategory → Percentage of Totals → Grand Total
 - Sales by Category, Subcategory → Percentage of Totals by Subcategory → Sort
- **Difference**
 - Sales by Year and Quarter → Difference
 - Sales by Year and Quarter → Compute Using

Calculation Exercises

- For each subcategory, show the total profit
 - Highlight profits that are negative in red
- Show the sum of sales by quarter, broken down by region
 - Show the cumulative sum of sales by quarter, broken down by region
- For each category, display the total sales and profit
 - Calculate the profit margin ($\text{profit} / \text{sales}$) for each category

Calculations Summary

Need to create a new field?

- Create a calculated field using math and functions

Need to perform calculations on your visualization?

- Apply a table calculation

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- How to create custom visualizations?

Follow Ups

- Why is Tableau running so slowly?
 - Network connection: potential VPN issue
 - Data connection: live vs extract
 - Tableau version: upgrade to latest version
- What are attributes?
 - Alternative to dimensions, but less commonly used
 - Formula: **IF MIN([dimension]) = MAX([dimension]) THEN MIN([dimension]) ELSE “*” END**
 - Blog post: <https://interworks.com/blog/tcostello/2014/05/15/attr-tableaus-attribute-function-explained>

Follow Ups

- How to drill down and filter visualizations
 - Dashboard >> Actions >> Filter
- How to drill down two visualizations together and filter other visualizations
 - Show Filter >> Apply to Worksheets >> Selected Worksheets
 - Dashboard >> Actions >> Filter

Follow Ups

- How to share Tableau workbooks with non-users?
 - If the data can be public, then use Tableau Public (free)
 - If the data cannot be public, then use Tableau Server or Tableau Cloud (\$)
 - Publish to Server / Cloud >> Embed Code >> Share
- How to create custom visualizations?
 - Start with a template or tutorial and tweak for your data set
 - Google: “tile map in Tableau”
 - <https://www.tableau.com/blog/how-make-tiled-maps-tableau-45742>
 - Google: “radial plot in Tableau”
 - <https://boraberan.wordpress.com/2014/12/31/radial-treemaps-bar-charts-in-tableau/> & <https://public.tableau.com/app/profile/bora.beran/viz/RadialCharts-Part2/RadialTreemap>

Follow Ups

- Things to remember about Tableau
 - Tableau is known for being simple and beautiful, not for being customizable and powerful
 - There are workarounds for a lot of things, but it may take many steps
 - Tableau is continuously releasing new features and upgrades
- How do I find answers to Tableau questions?
 - Tableau website: community.tableau.com
 - Tableau blogs with tutorials and templates

Data Visualization in Python Overview

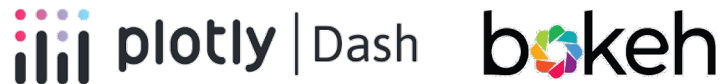
Standard Libraries



Mapping



Interactive Visualizations



Specialty



Plotnine

Overview

- Creates grammar of graphics (ggplot2) visualizations within Python
- Built on top of matplotlib and works well with pandas

Gallery

- <https://plotnine.readthedocs.io/en/v0.12.4/gallery.html>

Demo

- Plotnine_Demo.ipynb