Rotman

INTRO TO DATA VISUALIZATION

Part IV Build Dashboards with Quarto and Plotly Express

September 8, 2024 Prepared by Jay Cao / TDMDAL

Website: <u>https://tdmdal.github.io/dv-2024/</u>



What is a Dashboard

- A way to display related data visualization and summary in one place
- Usually contains interactive and dynamic features
- Usually accessible via a web browser
- Market campaign performance example
 - Key Performance Indicators (KPIs)
 - Metric comparison line plot
 - Aggregated data table
 - Interactivity

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Source: Paid Media Dashboard

Ref: <u>https://www.tableau.com/learn/articles/dashboards/what-is</u>

Most Dashboards are Web Apps



Run-time language: Python, Javascript (Node.js), R (Shiny), etc.

Python Dashboard Tooling

- Purpose of those tools
 - Make dashboard building easy
 - Require minimum knowledge on web technology (html, css, javascript, etc.)
- Landscape
 - <u>Dash</u> (by <u>Plotly</u>)
 - Panel (by Anaconda)
 - Voila (by Quantstack)
 - <u>Streamlit</u>
 - Gradio
 - <u>Shiny for Python</u> (by <u>Posit</u>)
 - Quarto Dashboards (by Posit)

Ref: 1) <u>https://pyviz.org/dashboarding/index.html</u>; 2) <u>https://posit.co/blog/why-shiny-for-python/</u>

Quarto Dashboards

- Easy to use
 - IMO, truly minimum knowledge of web stack
- Support Python and R
- Support simple interactivity (via Javascript)
 - can be deployed as static web pages
- Support enhanced interactivity (via Shiny for Python)
 - need to be deployed with Shiny Server
- Downside
 - Fairly new and in active dev; hence bugs and feature-incomplete



An example of Quarto dashboard with simple interactivity

https://ivelasq.github.io/mortgage-dashboard/

Simple Interactivity Dashboard

- Dashboard that need no backend to run (i.e. no app server, DB, etc.)
 - Sometimes called "static" dashboard, i.e., no app server dependency
- Need only a web server to make it available to the internet
 - For example, you can host it on Github for free
- Use Javascript for basic interactivity
 - You don't need to code in Javascript
- Quarto Dashboard examples
 - <u>https://jjallaire.github.io/stock-explorer-dashboard/</u>

Enhanced Interactivity Dashboard

- Dynamically retrieve data and display/visualize information
- Support complex interactivity
- Require App server, DB, etc. in addition to a Web server
- Quarto Dashboard Examples
 - <u>https://jjallaire.shinyapps.io/penguins-dashboard/</u>

Simple Db – Code Skeleton 1

title: "Superstore" format: dashboard: logo: super.png

```{python}
# load dataset, prepare it for display and plot

• • •

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# Sales (`{python} year`)

## Row {height=15%}

```
```{python}
#| content: valuebox
#| title: "Total Sales"
```

• • •

```{python}
#| content: valuebox
#| title: "Total Profit"

\* \* \*



### Simple Db – Code Skeleton 2 🖉 \$730,890 🖉 \$92,347

#### ## Row {height=35%}

```{python}
#| title: Sales by State
#| padding: 0

sales by state plot

```{python}
#| title: Sales by Segment
#| padding: 0

# sales by segment plot
```

Row {height=35%}

```{python}
#| title: Sales by Category
#| padding: 0

# sales by category plot

```{python}
#| title: Sales by Sub-Category
#| padding: 0

sales by sub-category plot



1. Data: <u>Superstore Sales</u> from Tableau Sample Data 2. Store Icon: <u>Superman icons</u> created by Kalashnyk - Flaticon

Simple Db – Code Skeleton 3 🖉 \$730,890 🖉 \$92,347

Row {height=15%}

::: {.card title="Source"}

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Profit (`{python} year`)

It's Your Turn to Build.

> quarto render superstore.qmd --to dashboard



Enhanced Dashboard – Code Skeleton 1

Superstore V2



Total Sales by State by Category 2014 Metric O Sales 160k Profit 120k Source 100k Data: Superstore Sales from \$470,383 80k Tableau Sample Data Store Icon: Superman icons created 60k by Kalashnyk - Flaticon 40k Sales by State Category Total Profit by Sub-Category (top 10) by Segment 250k 200k 150k \$47,293 100k 50k 40k Segment Sales

Source

Data: [Superstore Sales](https://public.tableau.com/app/learn/sampledata) from Tableau Sample Data

Enhanced Dashboard – Code Skeleton 2





Enhanced Dashboard – Code Skeleton 3


```{python}
#| title: by Segment
#| padding: 0

\* \* \*

### @render\_widget def plot\_by\_segment() ```

# ## Column {width=40%} ```{python} #| title: by Category #| padding: 0 ````

```{python}
#| title: by Sub-Category (top 10)
#| padding: 0



> quarto render superstore-v2.qmd --to dashboard

```
> shiny run app.py
```

Deploy Your Dashboard

- Simple (static) dashboard
 - Any public services that can host website (e.g., <u>Quarto Pub</u>, <u>Github</u>, etc.)
 - Document: Deploy to <u>Quarto Pub</u> or <u>Github</u>
 - Of course you can setup your own web server too
 - You can use quarto publish command to make the deployment easy
- Enhanced (shiny) dashboard
 - Public services such as <u>shinyapps.io</u> and <u>Shiny on Space</u> from <u>Hugging Face</u>
 - Document: Deploy to <u>shinyapps.io</u> or <u>Shiny on Space</u>
 - You can setup your own <u>shiny server</u>