

# INFO 290T

Human-Centered Data Management

Discussion: Polaris



# Announcements

- Moving project proposal to September 19<sup>th</sup>!
- Please come talk to us!!



# A Bit of History: Polaris → Tableau!

- 2003: Founded
- 2013: IPO
- 2019: Bought by Salesforce in a deal worth \$15B
- 2023: Still going!

One of the most successful visual analytics software  
(Other being PowerBI)



Data Analytics

- Sales Commission
- Sales Target
- Sample - Superstore

Search

Tables

- Orders
  - Customer ID
  - Customer Name
  - Location
    - Country/Region
    - Region
    - State/Province
    - City
    - Postal Code
  - Order Date
  - Order ID
  - Order Profitable?
- Product
  - Category
  - Sub-Category
  - Product Name
- Product ID
- Row ID
- Segment
- Ship Date
- Ship Mode
- Ship Status
- Days to Ship Actual
- Days to Ship Scheduled
- Discount
- Profit

Parameters

- Churn Rate
- Commission Rate
- New Business Growth
- New Quota
- Sort by

Pages

Filters

Marks

Automatic

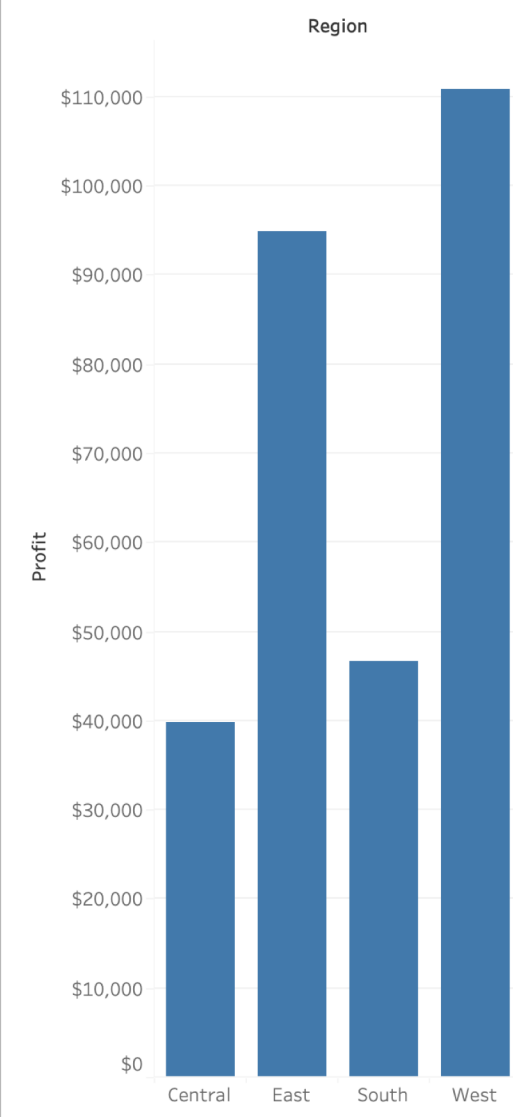
Color Size Label

Detail Tooltip

Columns Region

Rows SUM(Profit)

Sheet 28



Navigation icons: Home, Back, Forward, Refresh, Save, Print, Export, Filter, Standard, Show Me

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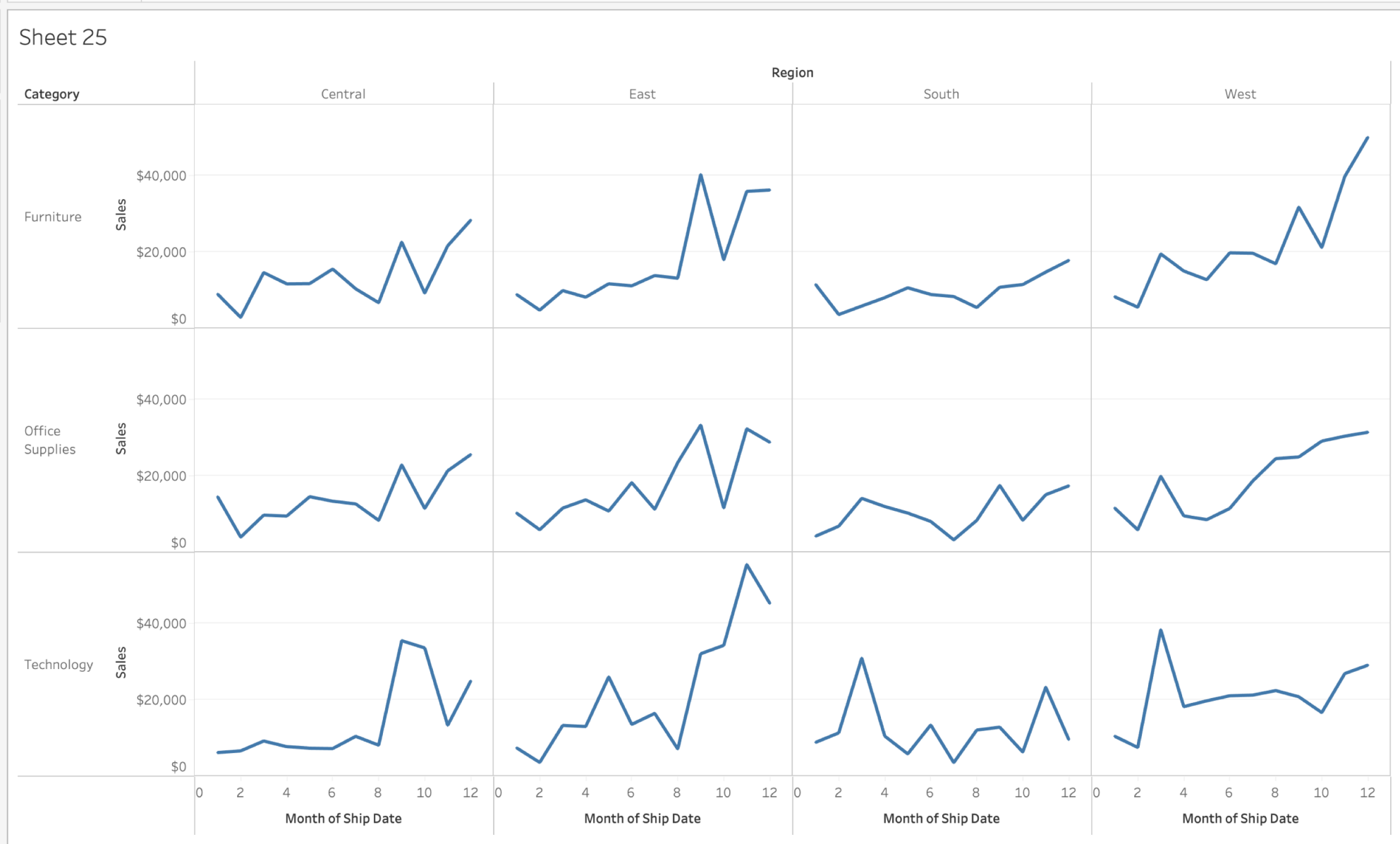
Automatic

Color Size Label

Detail Tooltip Path

Columns Region MONTH(Ship Date)

Rows Category SUM(Sales)



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Filters

Marks

Automatic

Color Size Text

Detail Tooltip

SUM(Profit)

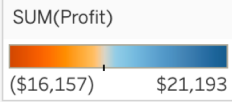
SUM(Profit)

Columns

Rows

Sheet 24

Country/Re..	State/Province	Category / Segment								
		Furniture			Office Supplies			Technology		
		Consumer	Corporate	Home Office	Consumer	Corporate	Home Office	Consumer	Corporate	Home Office
United States	Louisiana	\$676	\$10		\$135	\$140	\$220	\$533	\$302	\$180
	Maine		\$34			\$152	\$17		\$236	\$15
	Maryland	\$608	\$926	\$372	\$2,282	\$1,179	\$342	\$382	\$936	\$5
	Massachusetts	\$738	\$60	\$292	\$1,477	\$1,574	\$889	\$477	\$336	\$943
	Michigan	\$1,485	\$2,876	\$314	\$10,120	\$2,004	\$2,881	\$1,345	\$936	\$2,501
	Minnesota	\$947	\$190	\$887	\$6,123	\$615	\$1,042	\$433	\$311	\$275
	Mississippi	\$897	\$40	\$7	\$491	\$285	\$466	\$496	\$231	\$259
	Missouri	\$396	\$74	\$155	\$532	\$278	\$1,986	\$230	\$2,553	\$232
	Montana			\$22	\$177	\$13	\$99	\$101		\$1,422
	Nebraska	\$399		\$120	\$358	\$174	\$26	\$847	\$41	\$73
	Nevada	\$114	\$405	\$6	\$366	\$172	\$1,742	\$254	\$199	\$59
	New Hampshire	\$27	\$168	(\$41)	\$380	\$65	\$205		\$58	\$845
	New Jersey	\$322	\$607	\$4	\$2,095	\$1,557	\$1,019	\$999	\$3,007	\$164
	New Mexico	\$252			\$88	\$183	\$297	\$21	\$156	\$160
	New York	\$4,008	\$469	\$1,381	\$14,439	\$7,686	\$3,869	\$21,193	\$8,370	\$12,624
	North Carolina	(\$2,847)	(\$610)	(\$30)	\$721	\$258	(\$1,400)	(\$563)	(\$3,460)	\$439
	North Dakota				\$217		\$14			
	Ohio	(\$630)	(\$2,947)	(\$629)	(\$354)	(\$20)	\$259	(\$10,290)	(\$1,980)	(\$379)
	Oklahoma	\$1,466	\$468	\$220	\$591	\$25	\$503	\$965	\$26	\$589
	Oregon	(\$715)	(\$228)	(\$544)	(\$70)	\$229	\$13	(\$53)	\$181	(\$1)
	Pennsylvania	(\$4,500)	(\$1,183)	(\$1,514)	(\$3,326)	(\$1,163)	(\$683)	\$535	(\$2,852)	(\$874)
	Rhode Island	\$453	(\$53)	\$514	\$164	\$203	\$1,407		\$999	\$3,599
	South Carolina	\$543	\$70		\$237	\$453	\$12	\$232	\$222	
	South Dakota		\$67		\$16	\$178			\$134	
	Tennessee	(\$366)	(\$822)	(\$1,020)	(\$2,955)	(\$125)	(\$119)	(\$269)	\$307	\$28
	Texas	(\$5,539)	(\$3,442)	(\$1,456)	(\$16,157)	(\$1,908)	(\$520)	\$1,099	\$1,301	\$891
	Utah	\$532	\$78	\$22	\$914	\$188	\$231	\$95	\$36	\$450
	Vermont	\$179	\$1,013		\$196	\$409			\$111	\$337
	Virginia	\$2,535	\$1,558	\$1,110	\$1,900	\$3,576	\$510	\$5,091	\$2,174	\$143
	Washington	\$3,271	\$2,028	\$1,895	\$6,251	\$4,017	\$922	\$10,295	\$3,251	\$1,473
	West Virginia	(\$77)					\$263			
	Wisconsin	\$1,376	\$2,170	\$293	\$710	\$444	\$812	\$1,366	\$806	\$425
	Wyoming			\$100						



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Parameters

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Pages

Columns

Rows

Filters

Marks

Circle

Color Size Label

Detail Tooltip

SUM(Profit)

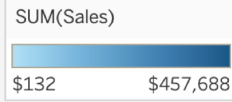
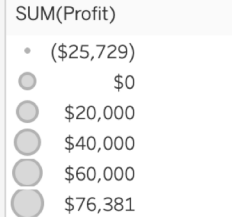
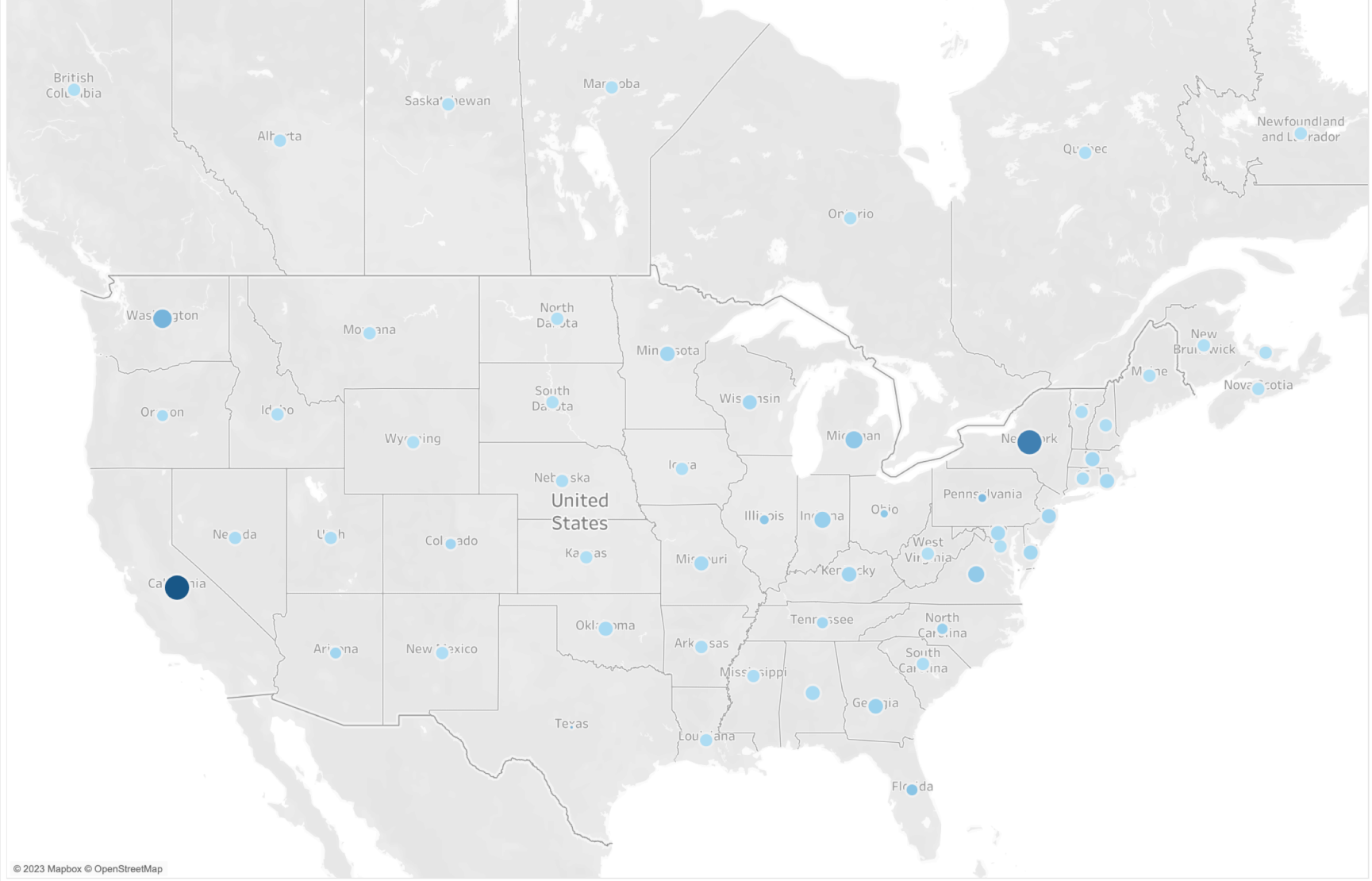
SUM(Sales)

Country/Re..

State/Provi..

SUM(Quantity)

Sheet 23



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Pages

Columns

Rows

Filters

Sheet 26

Marks

Automatic

Color Size Label

Detail Tooltip

Country/Re..

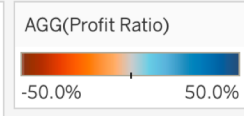
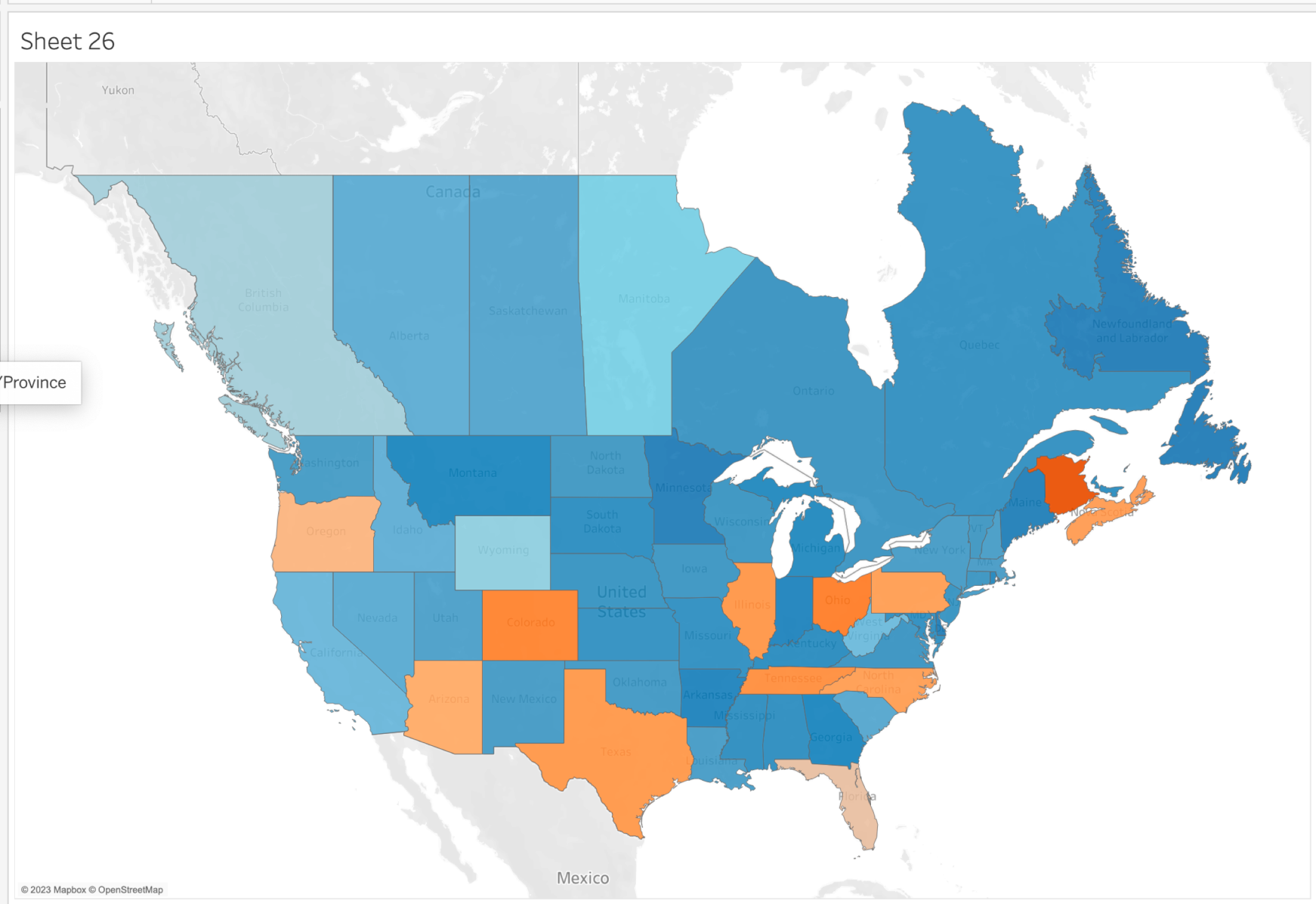
State/Pr..

AGG(Profit Rat)

State/Province

Longitude (generated)

Latitude (generated)





Navigation icons: Home, Back, Forward, Refresh, Save, Print, Export, etc. Standard view selected. Show Me icon.

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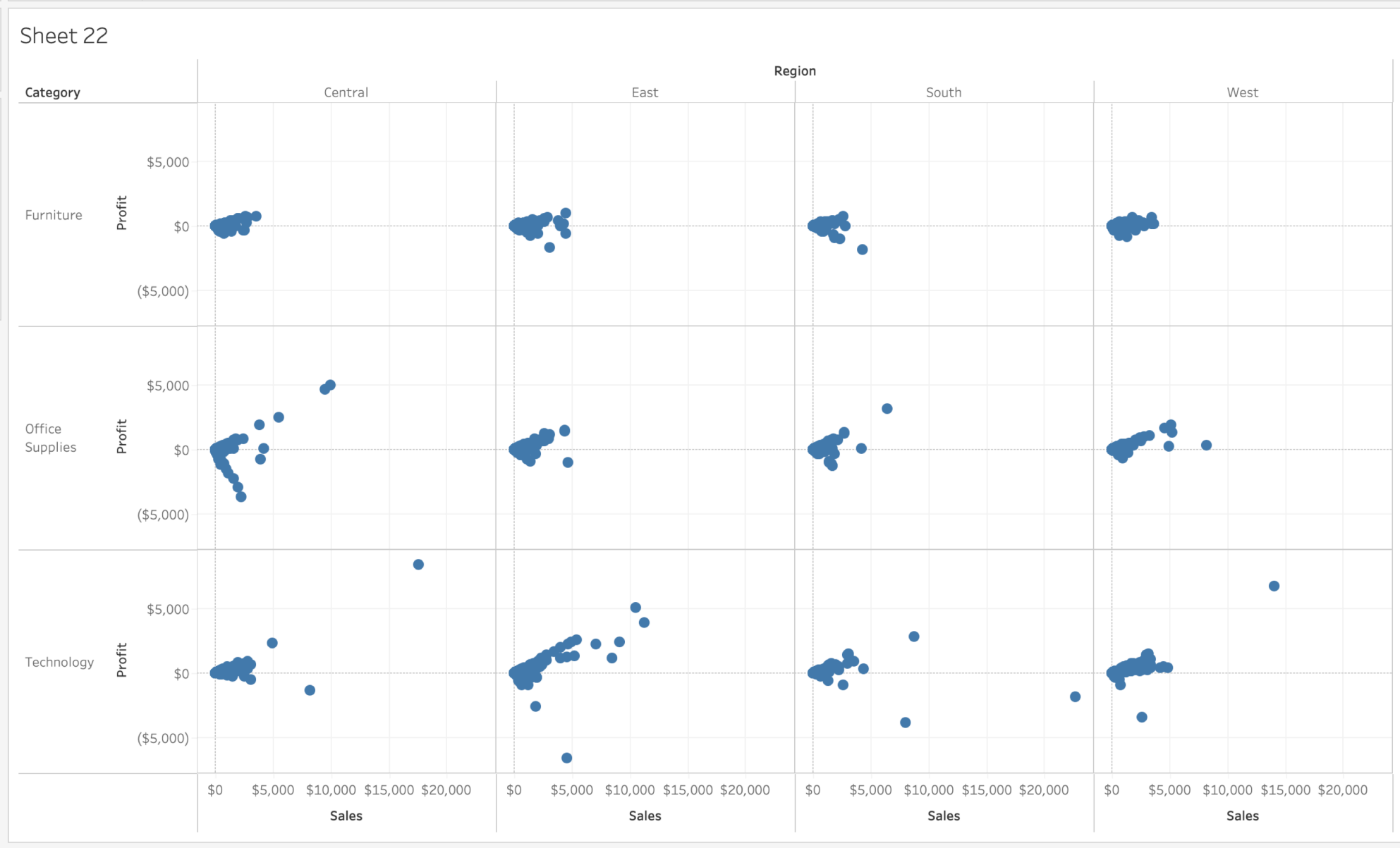
Filters

Marks

- Circle
- Color
- Size
- Label
- Detail
- Tooltip

Columns: Region, Sales

Rows: Category, Profit



**Data** | Analytics | Pages

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Sales Target  
Sample - Superstore

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**Columns** | Sub-Category

**Rows** | SUM(Profit) | SUM(Sales)

**Filters**

**Marks**

All

Shape

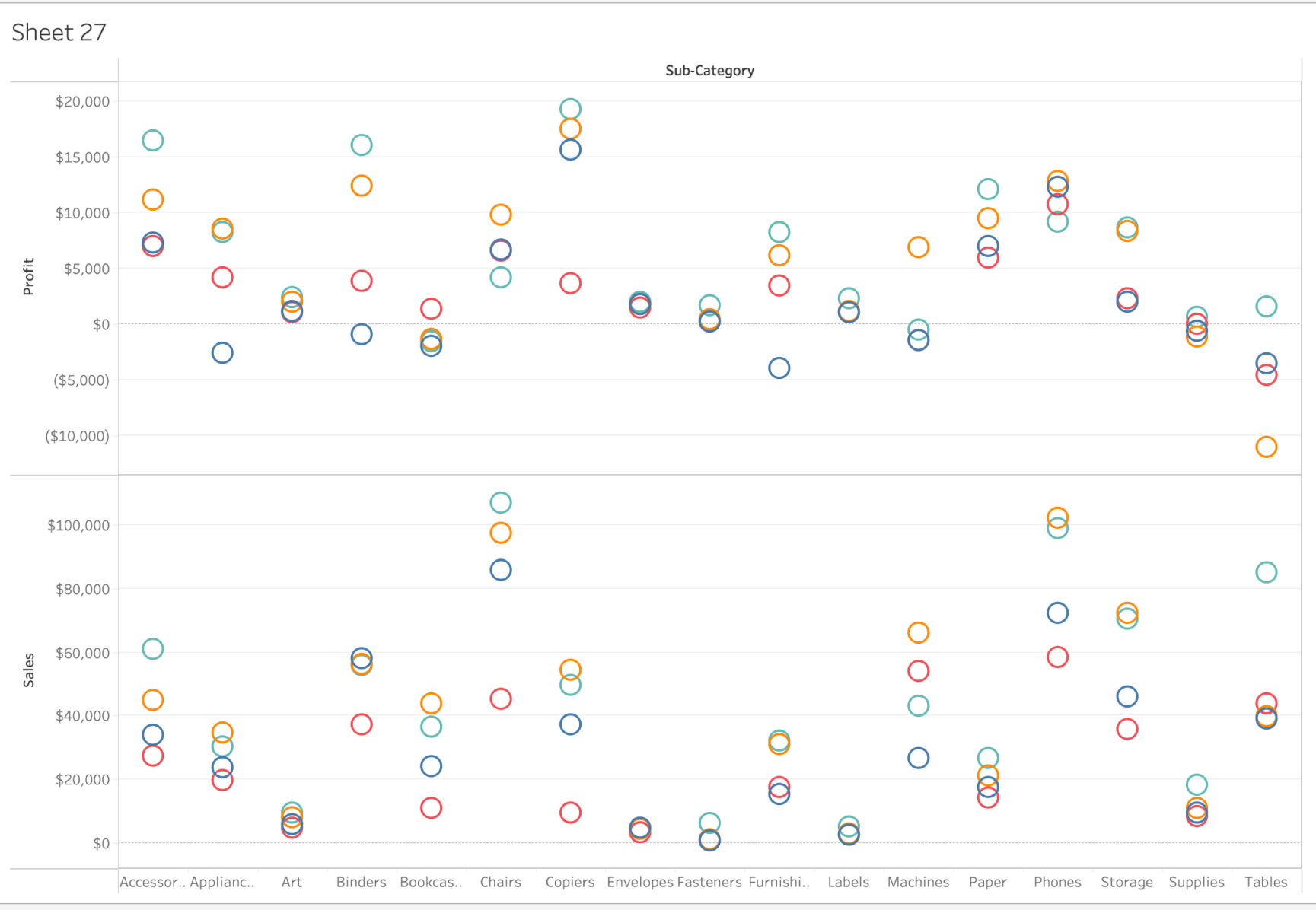
Color | Size | Label

Detail | Tooltip | Shape

Region

SUM(Profit)

SUM(Sales)



Region

- Central
- East
- South
- West

# Discussion

- My key takeaways from the paper
  - Tabular interface to depict charts (information-dense)
  - Elegant algebra and mapping to relational queries



# Discussion: Informal Archaeology!

- Paper that influenced this paper:
  - Wilkinson's grammar of graphics
    - Many successful packages: ggplot2, vega/vega-lite
    - Alternative way of thinking composing graphics (less relational, less declarative)
    - Arguably as successful
- Paper that this paper influenced:
  - “Show me: automatic presentation for visual analysis”
  - Figuring out which mark to use, how to add a field to a shelf, and how to automatically build visualizations for multiple field is hard!
  - Show me helps



# Discussion: Is this enough automation?

If you were to inject automation further into this, how would you do it?

- Often I don't even know which attributes – or pairs thereof to look at.
- How should I start?
- How do I go about finding the answer to a specific question: “why is my sales low”?
- If there are many panes, which pane should I focus on?
- How do I make sense of outliers?

What is the danger of additional automation?



# Discussion: Scalability

- Scalability largely brushed under the covers.
- How many SQL queries do we issue (at least)?
- Do we need that many SQL queries?
  - In which cases do we not need that many SQL queries?
- What would you do for scalability?
  - If you were using Polaris/Tableau and wanted to get interactive latencies?



# Discussion: Improving the paper

- If you were the authors how would you improve the paper itself?
- Experiments! User study!
- Lots of “take our word for it”
- Still... lots of impact!

