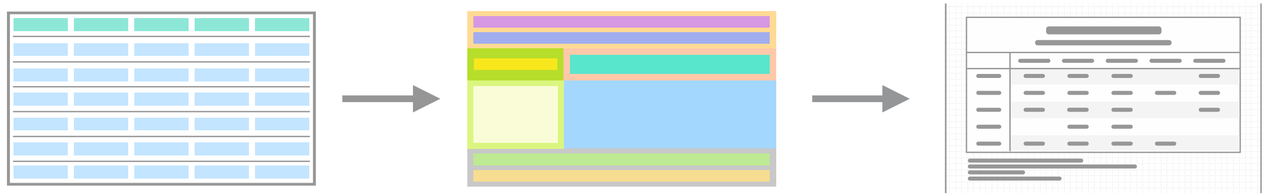
Making Beautiful, Publication Quality Tables in Python is Possible in **2024**



About Us

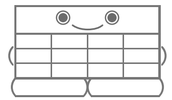
Software Engineers at Posit, PBC.

Collectively have:

— 2 PhDs 📜📜

— 2 dogs 🐶🐶

— 5 cats 🐈🐈🐈🐈🐈



1 table mascot

We are table display fanatics!

PyCon US **2024** (May 17th)

Michael Chow

Richard Iannone

Display Tables... What Do We Want?

shape: (15, 5)

product	revenue_dollars	revenue_pct	margin_dollars	margin_pct
str	f64	f64	f64	f64
"Grinder"	904.5	0.03	567.96	0.04
"Moka pot"	2045.25	0.07	181.08	0.01
"Cold brew"	288.75	0.01	241.77	0.02
"Filter"	404.25	0.01	70.01	0.02
"Drip machine"	2632.0	0.1	1374.45	0.09
…	…	…	…	…
"Dripper"	575.75	0.02	139.02	0.01
"Scale"	3801.0	0.13	2910.29	0.19
"Kettle"	756.25	0.02	617.52	0.04
"Espresso Machi…	8406.0	0.28	3636.44	0.24
"Total"	30284.25	1.0	14932.16	1.0

Less of This

Sales of Coffee Equipment

		Revenue		Profit		
icon	product	Earnings	Fraction	Earnings	Fraction	monthly_sales
	Grinder	$904K	3%	$568K	4%	
	Moka pot	$2.05M	7%	$181K	1%	
	Cold brew	$289K	1%	$242K	2%	
	Filter	$404K	1%	$70.0K	0%	
	Drip machine	$2.63M	9%	$1.37M	9%	
	AeroPress	$2.60M	9%	$1.29M	9%	
	Pour over	$846K	3%	$365K	2%	
	French press	$1.11M	4%	$748K	5%	
	Cezve	$2.51M	9%	$1.97M	13%	
	Chemex	$3.14M	11%	$818K	6%	
	Scale	$3.80M	13%	$2.91M	20%	
	Kettle	$756K	3%	$618K	4%	
	Espresso Machine	$8.41M	29%	$3.64M	25%	
	Total	**$29.4M**	**102%**	**$14.8M**	**100%**	

More of This

Overview

TABLE GOALS

Tables as Data Visualization

Sales of Coffee Equipment

icon	product	Revenue Earnings	Revenue Fraction	Profit Earnings	Profit Fraction	monthly_sales
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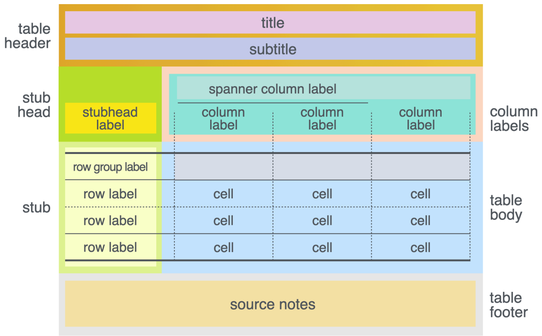
	Espresso Machine	$8.41M	29%	$3.64M	25%	
	Total	**$29.4M**	**102%**	**$14.8M**	**100%**	

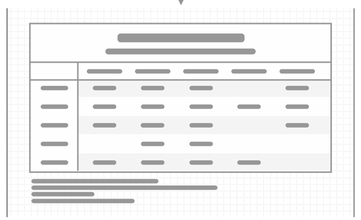
Display Framework



KEY INGREDIENTS

Polars or Pandas DF

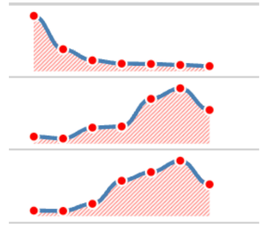
Great Tables



Beautiful Display Table

ADVANCED DESIGN

`.fmt_nanoplot()`



`.data_color()`

79	24.6%	40.9%	18.6%	0.8
89	62.8%	0 %	7.4%	0 %
123	18.2%	4.1%	46.7%	8.1
125	1.4%	42 %	19.7%	9.9
140	13.1%	10.5%	40.7%	6.6
145	1 %	0 %	45 %	24.5
146	10 %	22.7%	23.7%	15 %
200	4.6%	18.1%	30.2%	6 %
261	12.4%	10 %	9.6%	17.1
261	3 %	4.9%	31.5%	16.8

Formatting

$3.990312712 \times 10^{-10}$

$568K	4%
$181K	1%

TABLE GOALS

Tables as Data Visualization

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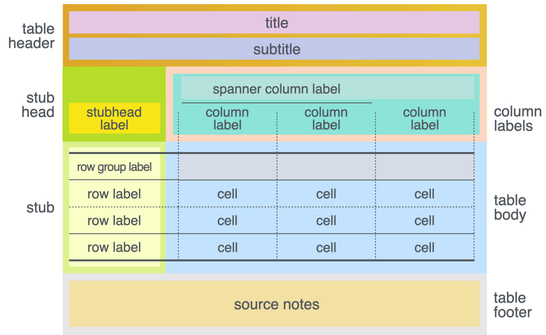
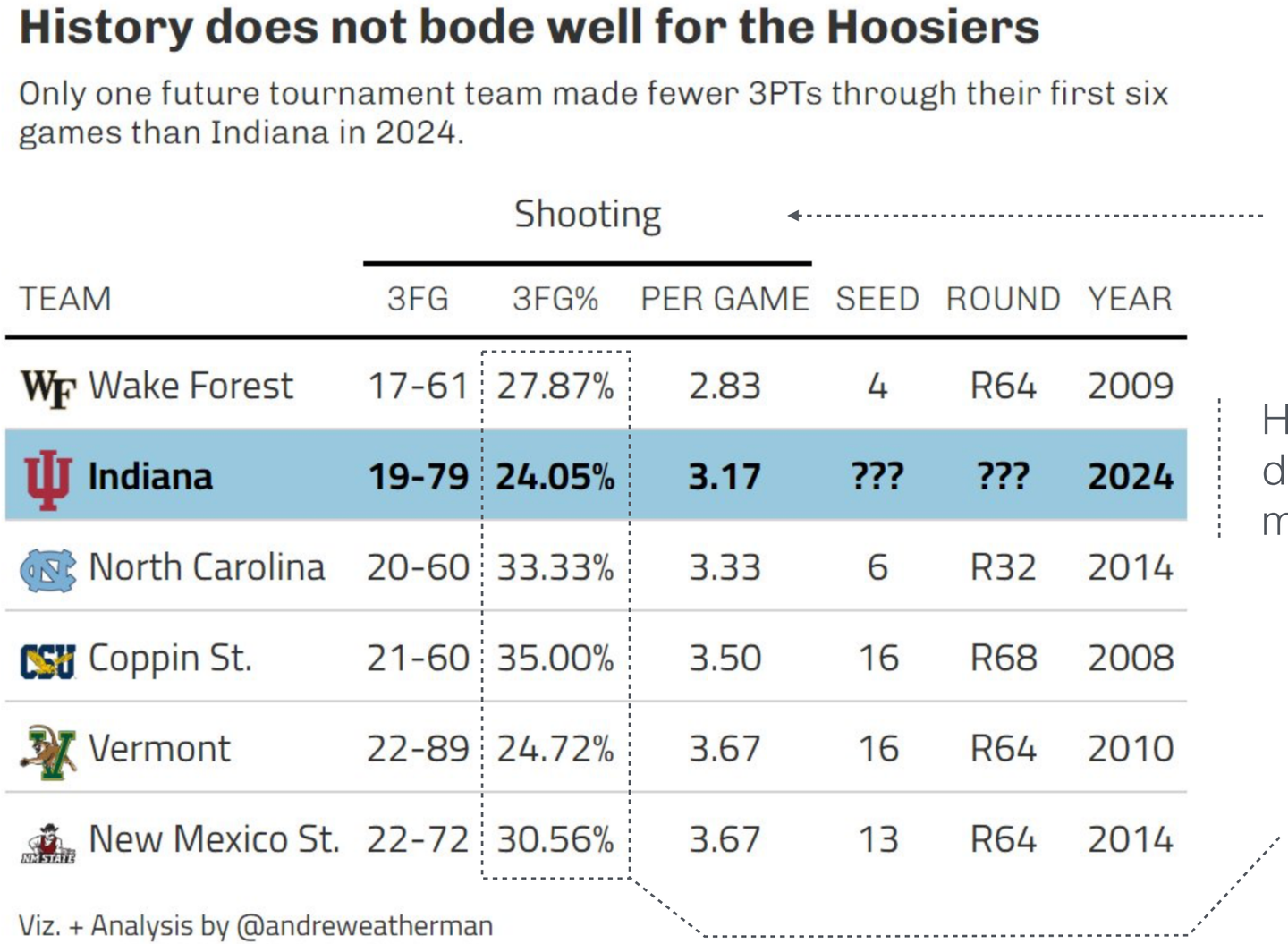


Beautiful Tables from the Internet

The heading explains the purpose of the table.



History does not bode well for the Hoosiers

Only one future tournament team made fewer 3PTs through their first six games than Indiana in 2024.

	Shooting					
TEAM	3FG	3FG%	PER GAME	SEED	ROUND	YEAR
Wake Forest	17-61	27.87%	2.83	4	R64	2009
Indiana	**19-79**	**24.05%**	**3.17**	**???**	**???**	**2024**
North Carolina	20-60	33.33%	3.33	6	R32	2014
Coppin St.	21-60	35.00%	3.50	16	R68	2008
Vermont	22-89	24.72%	3.67	16	R64	2010
New Mexico St.	22-72	30.56%	3.67	13	R64	2014

Viz. + Analysis by @andreweatherman

This spanner groups like columns together.

Team logos quickly convey the identity of each row.

Highlighted row draws attention to main subject.

Percentage values formatted for high readability.

Beautiful Tables from the Internet

The rows are subdivided into groups for better organization.

Player Report Card: Kyle Filipowski

Position groups are determined by Barttorvik. Data through Jan 16, 2024

STAT	VALUE	Percentile relative to bigs across... NATIONAL	HIGH-MAJORS	CONF. RANK
Box (Per-Game)				
Minutes	29.8	92%	86%	28
Points	18.2	98%	97%	5
Off. Rebounds	2.3	62%	51%	9
Def. Rebounds	6.5	94%	91%	2
Turnovers	1.7	30%	28%	54
Shooting				
eFG%	56.7%	51%	35%	22
3FG%	41.2%	84%	84%	21
FT%	68.4%	66%	65%	56
3FGA/FGA[1]	24.4	87%	89%	68
Advanced				
Off. Rating[2]	119.9	83%	66%	17
Def. Rating	88.9	95%	89%	2
Usage	28.8	96%	97%	5
PORPAG[3]	5.1	99%	98%	2

[1] 3FG attempts per 100 FGA

[2] Offensive and defensive ratings represent points scored/allowed per 100 possessions

[3] PORPAG represents points above replacement player at that usage

These bar charts enable fast visual comparisons.

The footnotes here provide additional detail.

Beautiful Tables from the Internet

2023 Median **CO2 Intensity** (gCO2eq/kWh) and **Power Consumption** Breakdown (%)

Zone	CO2 Intensity	Hydro	Nuclear	Wind	Solar	Geothermal	Biomass	Gas	Coal	Oil	Unknown	Hydro Discharge	Battery Discharge
Sweden	22	43.5%	29.2%	21.4%	0.9%	0 %	0.2%	0.2%	0.2%	0 %	4.4%	0 %	0 %
Iceland	28	72.4%	0 %	0 %	0 %	27.6%	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Quebec	30	91.5%	0.9%	4.7%	0 %	0 %	2.5%	0.4%	0 %	0 %	0 %	0 %	0 %
France	44	10.5%	64.3%	10.4%	4.8%	0 %	1.4%	6.6%	0.5%	0.3%	0.1%	1.1%	0 %
Tasmania	67	66.3%	0 %	19.2%	5.8%	0 %	0 %	0.6%	8.1%	0 %	0 %	0 %	0 %
Ontario	70	26 %	51.9%	8.1%	0.5%	0 %	0.2%	13.3%	0 %	0 %	0 %	0 %	0 %
Finland	79	24.6%	40.9%	18.6%	0.8%	0 %	6.6%	2.2%	5.2%	0 %	1.1%	0 %	0 %
New Zealand	89	62.8%	0 %	7.4%	0 %	18.2%	0 %	6.1%	3.6%	0 %	2 %	0 %	0 %
West Denmark	123	18.2%	4.1%	46.7%	8.1%	0 %	7.5%	5.9%	8.2%	0.4%	0.6%	0.3%	0 %
Belgium	125	1.4%	42 %	19.7%	9.9%	0 %	3.3%	18.7%	1.5%	0.1%	2.1%	1.4%	0 %
East Denmark	140	13.1%	10.5%	40.7%	6.6%	0 %	14.3%	4.2%	7.2%	1.2%	2.2%	0.1%	0 %
South Australia	145	1 %	0 %	45 %	24.5%	0 %	0 %	21.8%	7 %	0.1%	0 %	0 %	0.5%
Spain	146	10 %	22.7%	23.7%	15 %	0 %	2.1%	21.8%	1.6%	0.2%	0.3%	2.5%	0 %
Great Britain	200	4.6%	18.1%	30.2%	6 %	0 %	5.1%	33.2%	1.2%	0 %	1 %	0.6%	0 %
California	261	12.4%	10 %	9.6%	17.1%	3.1%	1.7%	42 %	1.2%	0 %	0.9%	0 %	1.9%
Netherlands	261	3 %	4.9%	31.5%	16.8%	0 %	5 %	27.7%	9 %	0.8%	1.1%	0.2%	0 %
New York ISO	276	22.6%	22.7%	3.9%	0.1%	0 %	0.1%	48.3%	0.6%	0 %	1.8%	0 %	0 %
Italy (North)	305	24.5%	11.9%	2.9%	6.9%	0.3%	2.2%	37 %	2.6%	0.2%	8.7%	2.8%	0 %
Germany	375	5.9%	4.3%	29 %	11.8%	0 %	9.6%	11.3%	24.5%	0.5%	0.7%	2.3%	0 %
Ireland	377	2.6%	1.1%	36 %	0.4%	0 %	2.5%	46.2%	9.5%	1.4%	0.1%	0 %	0 %
Texas	392	0.1%	9.1%	25.2%	7.2%	0 %	0 %	44.4%	13.8%	0 %	0.3%	0 %	0 %
Alberta	440	2.9%	0 %	11.4%	2.7%	0 %	2.6%	67.5%	8.1%	0 %	4.6%	0 %	0 %
Western Australia	450	0 %	0 %	15.5%	19.1%	0 %	0.4%	35.1%	29.7%	0 %	0 %	0 %	0.1%
Victoria	511	6.3%	0 %	20.6%	12.7%	0 %	0 %	1.4%	58.8%	0 %	0 %	0 %	0.2%
India (North)	547	21.3%	2.2%	1.5%	7.7%	0 %	0 %	1.9%	64.3%	0 %	1.2%	0 %	0 %
New South Wales	604	4.9%	0 %	9.2%	19.6%	0 %	0.1%	2.2%	64 %	0 %	0 %	0 %	0.1%
Queensland	681	2.1%	0 %	4 %	19.8%	0 %	0.2%	6.7%	67.1%	0 %	0 %	0 %	0.1%
South Africa	703	0.9%	4.2%	5.7%	3.2%	0 %	0 %	0 %	80.9%	2.6%	0.1%	2.3%	0 %
Poland	753	2.6%	1.4%	15.2%	8.5%	0 %	1.8%	8.5%	59.2%	1.5%	0.2%	1.1%	0 %

Table: @GrantChalmers | **Source**: api.electricitymap.org | **Methodology**: https://www.electricitymaps.com/methodology Emission factors used to calculate CO2 Intensity can be found on the *Carbon intensity and emission factors* tab.

Some emissions factors are based on IPCC 2014 defaults, while some are based on more accurate regional factors. All zones are publicly available on the *Carbon intensity and emission factors* tab via Google docs link

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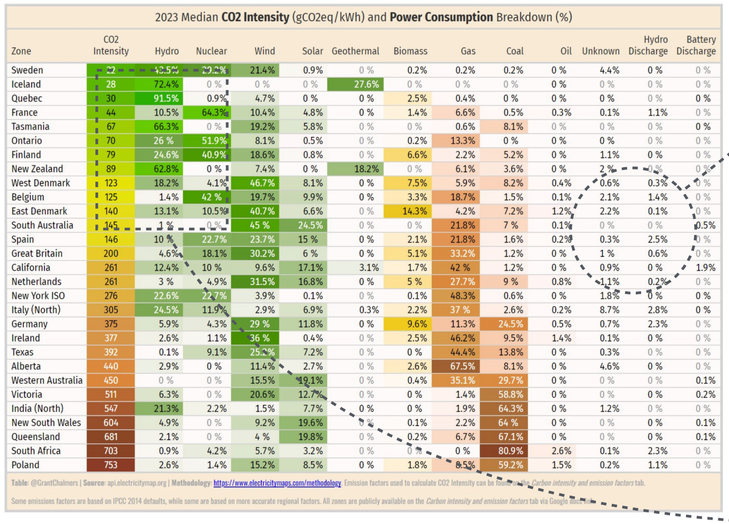

2023 Median **CO2 Intensity** (gCO2eq/kWh) and **Power Consumption** Breakdown (%)

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France	44	10.5%	64.3%	10.4%	4.8%	0 %	1.4%	6.6%	0.5%	0.3%	0.1%	1.1%	0 %
Tasmania	67	66.3%	0 %	19.2%	5.8%	0 %	0 %	0.6%	8.1%	0 %	0 %	0 %	0 %
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East Denmark	140	13.1%	10.5%	40.7%	6.6%	0 %	14.3%	4.2%	7.2%	1.2%	2.2%	0.1%	0 %
South Australia	145	1 %	0 %	45 %	24.5%	0 %	0 %	21.8%	7 %	0.1%	0 %	0 %	0.5%
Spain	146	10 %	22.7%	23.7%	15 %	0 %	2.1%	21.8%	1.6%	0.2%	0.3%	2.5%	0 %
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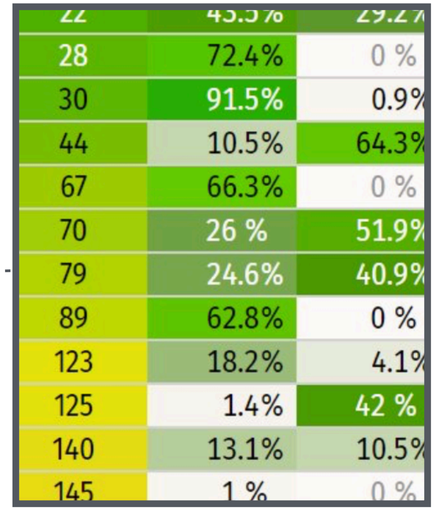
Nicely formatted percentage values with decimal alignment.



Heat map makes it easier to scan the data values and it aids comparisons.

These Tables: Made from Code

History does not bode well for the Hoosiers

Only one future tournament team made fewer 3PTs through their first six games than Indiana in 2024.

	Shooting					
TEAM	3FG	3FG%	PER GAME	SEED	ROUND	YEAR
Wake Forest	17-61	27.87%	2.83	4	R64	2009
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Viz. + Analysis by @andreweatherman

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Iceland	28	72.4%	0 %	0 %	0 %	27.6%	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Quebec	30	91.5%	0.9%	4.7%	0 %	0 %	2.5%	0.4%	0 %	0 %	0 %	0 %	0 %
France	44	10.5%	64.3%	10.4%	4.8%	0 %	1.4%	6.6%	0.5%	0.3%	0.1%	1.1%	0 %
Tasmania	67	66.3%	0 %	19.2%	5.8%	0 %	0 %	0.6%	8.1%	0 %	0 %	0 %	0 %
Ontario	70	26 %	51.9%	8.1%	0.5%	0 %	0.2%	13.3%	0 %	0 %	0 %	0 %	0 %
Finland	79	24.6%	40.9%	18.6%	0.8%	0 %	6.6%	2.2%	5.2%	0 %	1.1%	0 %	0 %
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Belgium	125	1.4%	42 %	19.7%	9.9%	0 %	3.3%	18.7%	1.5%	0.1%	2.1%	1.4%	0 %
East Denmark	140	13.1%	10.5%	40.7%	6.6%	0 %	14.3%	4.2%	7.2%	1.2%	2.2%	0.1%	0 %
South Australia	145	1 %	0 %	45 %	24.5%	0 %	0 %	21.8%	7 %	0.1%	0 %	0 %	0.5%
Spain	146	10 %	22.7%	23.7%	15 %	0 %	2.1%	21.8%	1.6%	0.2%	0.3%	2.5%	0 %
Great Britain	200	4.6%	18.1%	30.2%	6 %	0 %	5.1%	31.2%	1.2%	0 %	1 %	0.6%	0 %
California	261	12.4%	10 %	9.6%	17.1%	3.1%	1.7%	42 %	1.2%	0 %	0.9%	0 %	1.9%
Netherlands	261	3 %	4.9%	31.5%	16.8%	0 %	5 %	27.7%	9 %	0.8%	1.1%	0.2%	0 %
New York ISO	276	22.6%	22.7%	3.9%	0.1%	0 %	0.1%	48.3%	0.6%	0 %	1.8%	0 %	0 %
Italy (North)	305	24.5%	11.9%	2.9%	6.9%	0.3%	2.2%	37 %	2.6%	0.2%	8.7%	2.8%	0 %
Germany	375	5.9%	4.3%	29 %	11.8%	0 %	9.6%	11.3%	24.5%	0.5%	0.7%	2.3%	0 %
Ireland	377	2.6%	1.1%	36 %	0.4%	0 %	2.5%	46.2%	9.5%	1.4%	0.1%	0 %	0 %
Texas	392	0.1%	9.1%	25.2%	7.2%	0 %	0 %	44.4%	13.8%	0 %	0.3%	0 %	0 %
Alberta	440	2.9%	0 %	11.4%	2.7%	0 %	2.6%	67.5%	8.1%	0 %	4.6%	0 %	0 %
Western Australia	450	0 %	0 %	15.5%	19.1%	0 %	0.4%	35.1%	29.7%	0 %	0 %	0 %	0.1%
Victoria	511	6.3%	0 %	20.6%	12.7%	0 %	0 %	1.4%	58.8%	0 %	0 %	0 %	0.2%
India (North)	547	21.3%	2.2%	1.5%	7.7%	0 %	0 %	1.9%	64.3%	0 %	1.2%	0 %	0 %
New South Wales	604	4.9%	0 %	9.2%	19.6%	0 %	0.1%	2.2%	64 %	0 %	0 %	0 %	0.1%
Queensland	681	2.1%	0 %	4 %	19.8%	0 %	0.2%	6.7%	67.1%	0 %	0 %	0 %	0.1%
South Africa	703	0.9%	4.2%	5.7%	3.2%	0 %	0 %	0 %	80.9%	2.6%	0.1%	2.3%	0 %
Poland	753	2.6%	1.4%	15.2%	8.5%	0 %	1.8%	8.5%	59.2%	1.5%	0.2%	1.1%	0 %

Table: @GrantChalmers | Source: api.electricitymap.org | Methodology: https://www.electricitymaps.com/methodology Emission factors used to calculate CO2 Intensity can be found on the *Carbon intensity and emission factors* tab.

Some emissions factors are based on IPCC 2014 defaults, while some are based on more accurate regional factors. All zones are publicly available on the *Carbon intensity and emission factors* tab via Google docs link

Player Report Card: Kyle Filipowski

Position groups are determined by Barttorvik. Data through Jan 16, 2024

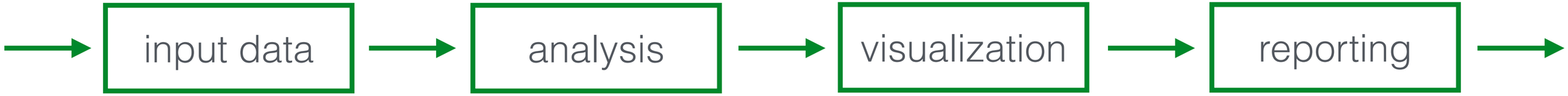
STAT	VALUE	Percentile relative to bigs across... NATIONAL	HIGH-MAJORS	CONF. RANK
Box (Per-Game)				
Minutes	29.8	92%	86%	28
Points	18.2	98%	97%	5
Off. Rebounds	2.3	62%	51%	9
Def. Rebounds	6.5	94%	91%	2
Turnovers	1.7	30%	28%	54
Shooting				
eFG%	56.7%	51%	35%	22
3FG%	41.2%	84%	84%	21
FT%	68.4%	66%	65%	56
3FGA/FGA[1]	24.4	87%	89%	68
Advanced				
Off. Rating[2]	119.9	83%	66%	17
Def. Rating	88.9	95%	89%	2
Usage	28.8	96%	97%	5
PORPAG[3]	5.1	99%	98%	2

[1] 3FG attempts per 100 FGA

[2] Offensive and defensive ratings represent points scored/allowed per 100 possessions

[3] PORPAG represents points above replacement player at that usage

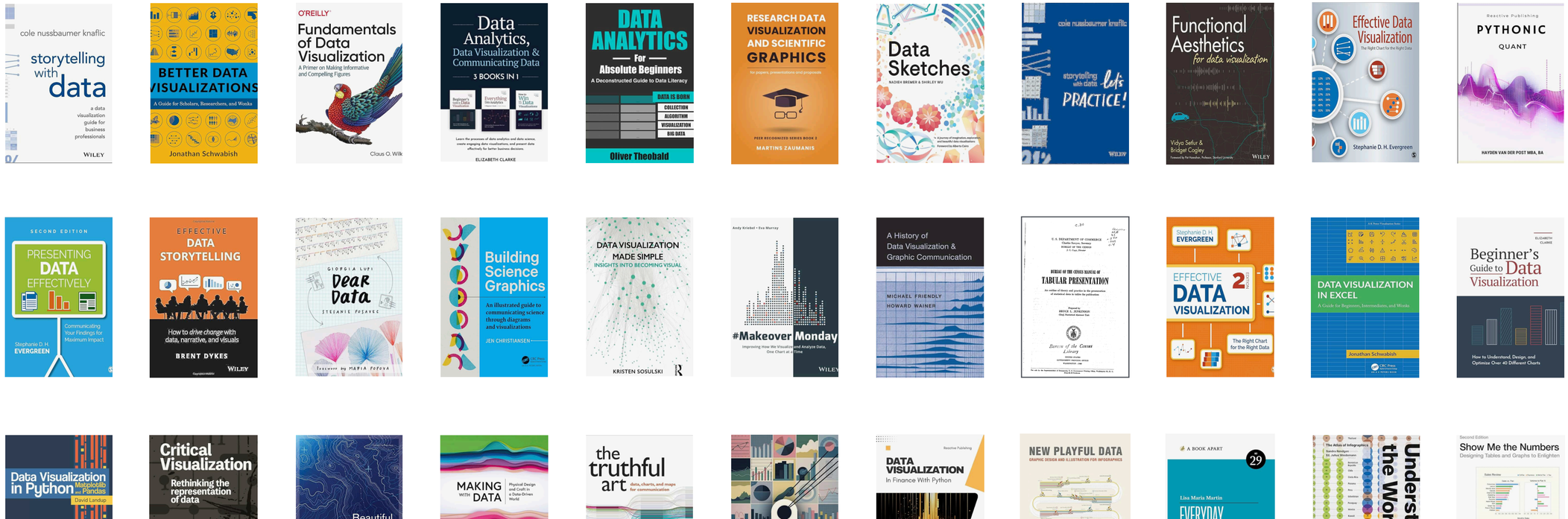
We benefit from a reproducible workflow.



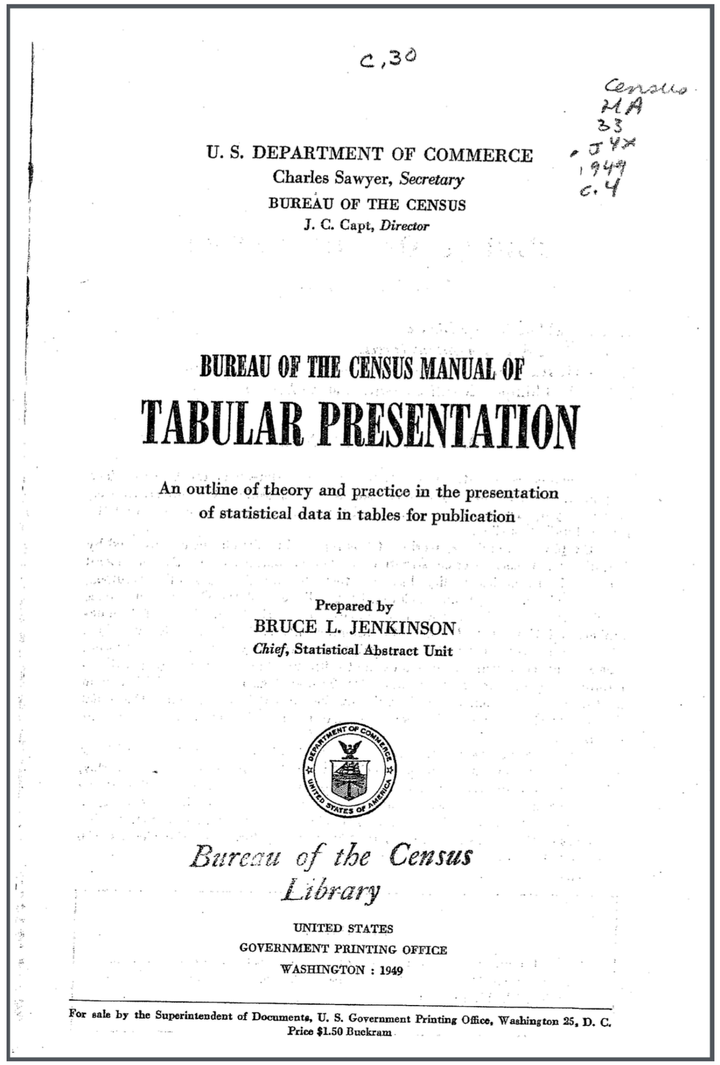
How Did We Get Here?

We needed to get the best ideas on table generation before devising an API.

Surprisingly, there weren't too many authoritative texts on table design, so we had to look hard...



How Did We Get Here?



c.30

Census
MA
33
J4x
1949
c.4

U. S. DEPARTMENT OF COMMERCE
Charles Sawyer, *Secretary*
BUREAU OF THE CENSUS
J. C. Capt, *Director*

BUREAU OF THE CENSUS MANUAL OF

TABULAR PRESENTATION

An outline of theory and practice in the presentation of statistical data in tables for publication

Prepared by
BRUCE L. JENKINSON
Chief, Statistical Abstract Unit

Bureau of the Census
Library

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1949

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.
Price $1.50 Buckram

*This is the **Census Manual of Tabular Presentation**.*

*It dials concepts on table display to **11**.*

*It provides **many** solid and useful recommendations.*

How Did We Get Here?

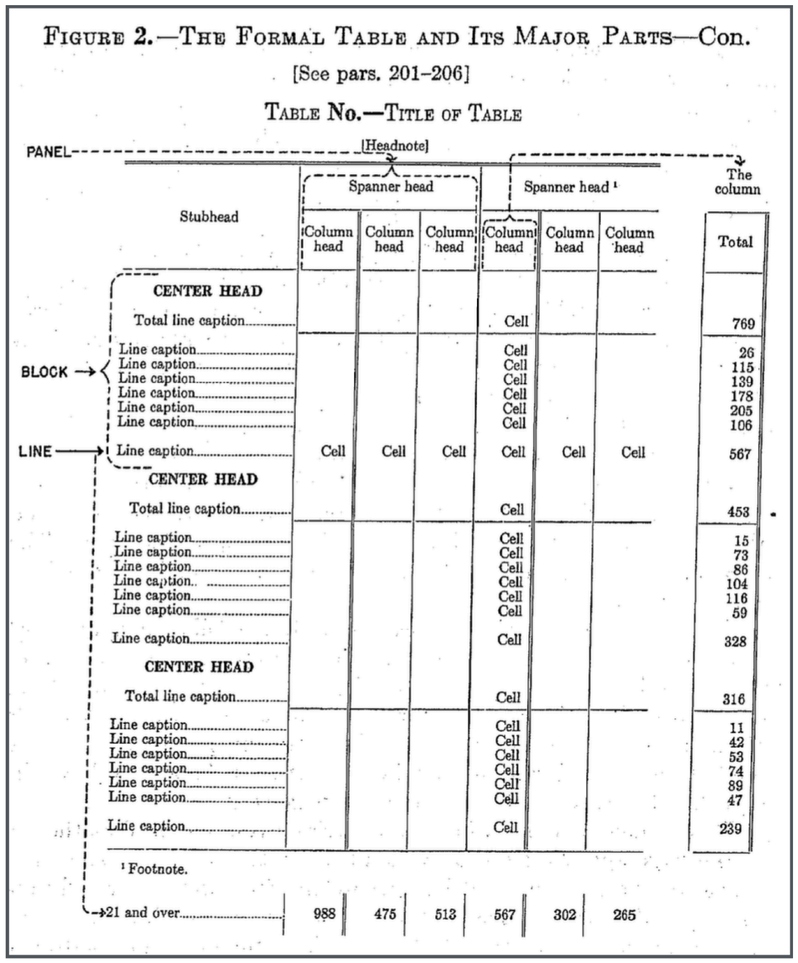


FIGURE 2.—THE FORMAL TABLE AND ITS MAJOR PARTS—Con.

[See pars. 201–206]

TABLE No.—TITLE OF TABLE

PANEL — [Headnote] — The column

Stubhead	Spanner head: Column head	Column head	Column head	Spanner head [1]: Column head	Column head	Column head	Total
CENTER HEAD							
Total line caption				Cell			769
BLOCK → Line caption				Cell			26
Line caption				Cell			115
Line caption				Cell			139
Line caption				Cell			178
Line caption				Cell			205
Line caption				Cell			106
LINE → Line caption	Cell	Cell	Cell	Cell	Cell	Cell	567
CENTER HEAD							
Total line caption				Cell			453
Line caption				Cell			15
Line caption				Cell			73
Line caption				Cell			86
Line caption				Cell			104
Line caption				Cell			116
Line caption				Cell			59
Line caption				Cell			328
CENTER HEAD							
Total line caption				Cell			316
Line caption				Cell			11
Line caption				Cell			42
Line caption				Cell			53
Line caption				Cell			74
Line caption				Cell			89
Line caption				Cell			47
Line caption				Cell			239
[1] Footnote.							
→21 and over	988	475	513	567	302	265	

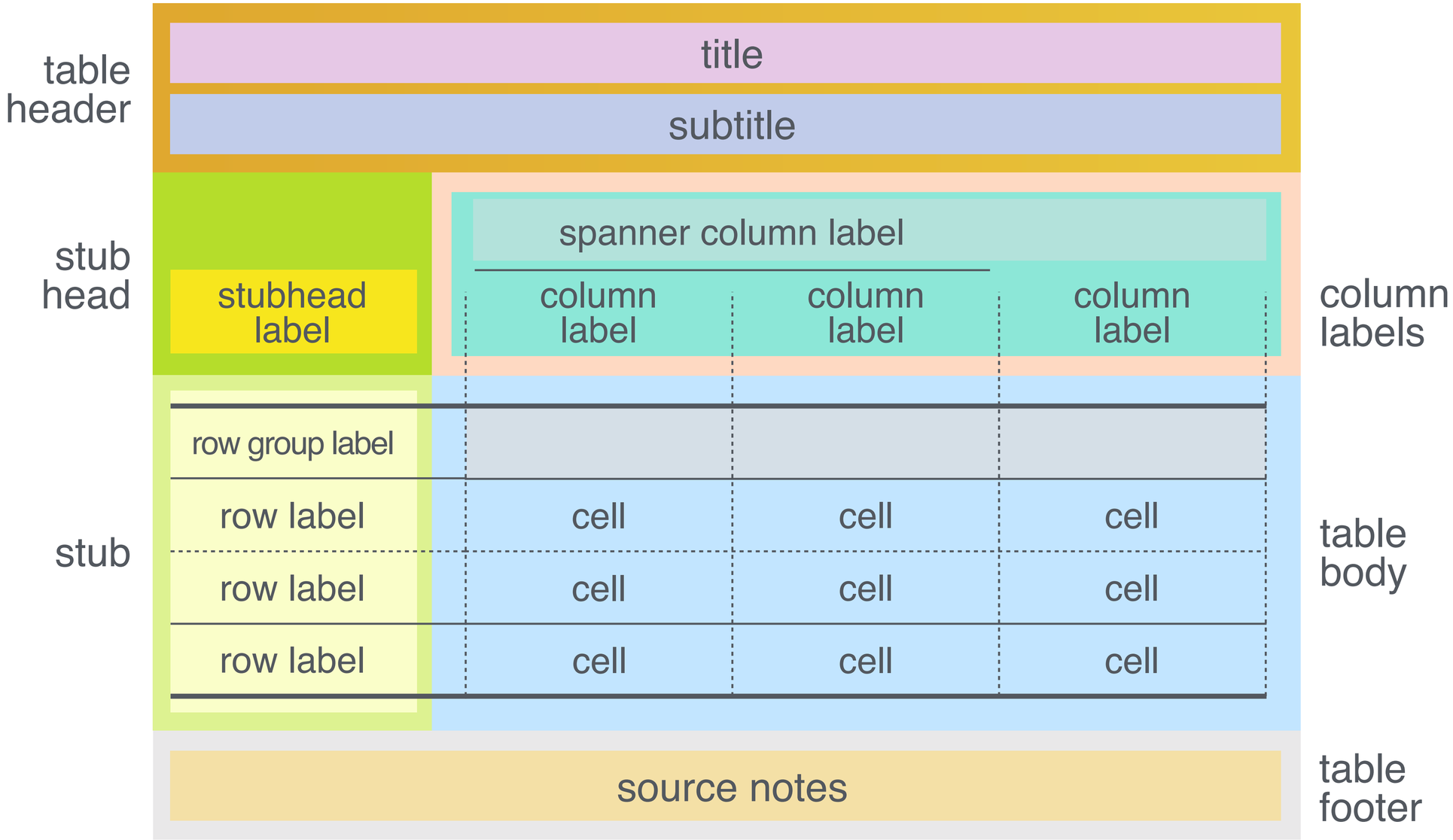
*This is the **Census Manual of Tabular Presentation**.*

*It dials concepts on table display to **11**.*

*It provides **many** solid and useful recommendations.*

*Importantly: it formalizes the **structure of a table**.*

Our Modern Take on a Table Display Framework



How Do You Make Tables Today?

Raw DataFrame

shape: (15, 5)

product	revenue_dollars	revenue_pct	margin_dollars	margin_pct
str	f64	f64	f64	f64
"Grinder"	904.5	0.03	567.96	0.04
"Moka pot"	2045.25	0.07	181.08	0.01
"Cold brew"	288.75	0.01	241.77	0.02
"Filter"	404.25	0.01	70.01	0.02
"Drip machine"	2632.0	0.1	1374.45	0.09
…	…	…	…	…
"Dripper"	575.75	0.02	139.02	0.01
"Scale"	3801.0	0.13	2910.29	0.19
"Kettle"	756.25	0.02	617.52	0.04
"Espresso Machi…	8406.0	0.28	3636.44	0.24
"Total"	30284.25	1.0	14932.16	1.0

You could present this to others,
but it's not recommended.

How Do You Make Tables Today?

Raw DataFrame

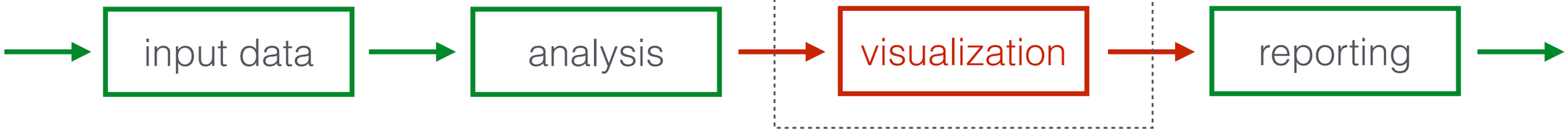
shape: (15, 5)

product	revenue_dollars	revenue_pct	margin_dollars	margin_pct
str	f64	f64	f64	f64
"Grinder"	904.5	0.03	567.96	0.04
"Moka pot"	2045.25	0.07	181.08	0.01
"Cold brew"	288.75	0.01	241.77	0.02
"Filter"	404.25	0.01	70.01	0.02
"Drip machine"	2632.0	0.1	1374.45	0.09
…	…	…	…	…
"Dripper"	575.75	0.02	139.02	0.01
"Scale"	3801.0	0.13	2910.29	0.19
"Kettle"	756.25	0.02	617.52	0.04
"Espresso Machi…	8406.0	0.28	3636.44	0.24
"Total"	30284.25	1.0	14932.16	1.0

Excel

Product	Revenue $ (000's)	Revenue %	Margin $ (000's)	Margin %
Grinder	$904.50	3%	$567.96	4%
Moka pot	$2,045.25	7%	$181.08	1%
Cold brew	$288.75	1%	$241.77	2%
Filter	$404.25	1%	$70.01	0%
Drip machine	$2,632.00	10%	$1,374.45	9%
AeroPress	$2,601.50	9%	$1,293.78	9%
Pour over	$846.00	3%	$364.53	2%
French press	$1,113.25	4%	$748.12	5%
Cezve	$2,512.50	8%	$1,969.52	13%
Chemex	$3,137.25	10%	$817.68	5%
Dripper	$575.75	2%	$139.02	1%
Scale	$3,801.00	13%	$2,910.29	19%
Kettle	$756.25	2%	$617.52	4%
Espresso Machine	$8,406.00	28%	$3,636.44	24%
Total	**$30,284.25**	**100%**	**$14,932.16**	**100%**

You could instead make a nice display table with Excel. But your reproducible workflow is now broken.



How Do You Make Tables Today?

Excel

Product	Revenue $ (000's)	Revenue %	Margin $ (000's)	Margin %
Grinder	$904.50	3%	$567.96	4%
Moka pot	$2,045.25	7%	$181.08	1%
Cold brew	$288.75	1%	$241.77	2%
Filter	$404.25	1%	$70.01	0%
Drip machine	$2,[illegible]2.00	10%	$1,374.45	9%
AeroPress	$2,601.50	9%	$1,293.78	9%
Pour over	$846.00	3%	$364.53	2%
French press	$1,113.25	4%	$748.12	5%
Cezve	$2,512.50	8%	$1,969.52	13%
Chemex	$3,137.25	10%	$817.68	5%
Dripper	$575.75	2%	$139.02	1%
Scale	$3,801.00	13%	$2,910.29	19%
Kettle	$756.25	2%	$617.52	4%
Espresso Machine	$8,406.00	28%	$3,636.44	24%
Total	**$30,284.25**	**100%**	**$14,932.16**	**100%**

Great Tables

Sales of Coffee Equipment						
		Revenue		Profit		
	Product	Amount	Percent	Amount	Percent	Monthly Revenue
	Grinder	$904K	3%	$568K	4%	
	Moka pot	$2.05M	7%	$181K	1%	
	Cold brew	$289K	1%	$242K	2%	
	Filter	$404K	1%	$70.0K	0%	
	Drip machine	$2.63M	9%	$1.37M	9%	
	AeroPress	$2.60M	9%	$1.29M	9%	
	Pour over	$846K	3%	$365K	2%	
	French press	$1.11M	4%	$748K	5%	
	Cezve	$2.51M	9%	$1.97M	13%	
	Chemex	$3.14M	11%	$818K	6%	
	Scale	$3.80M	13%	$2.91M	20%	
	Kettle	$756K	3%	$618K	4%	
	Espresso Machine	$8.41M	29%	$3.64M	25%	
	Total	**$29.4M**	**102%**	**$14.8M**	**100%**	

Using **Great Tables**, you work entirely in Python! It's reproducible, less effort, and the tables look great!

Great Tables

Great Tables is focused
purely on the display of tables.

It's not the only
approach but it is:

— comprehensive
— actively-developed
— attentive to all table-related problems

We'll use **Great Tables** to illustrate
the process and design behind
making presentation-quality tables.

Overview

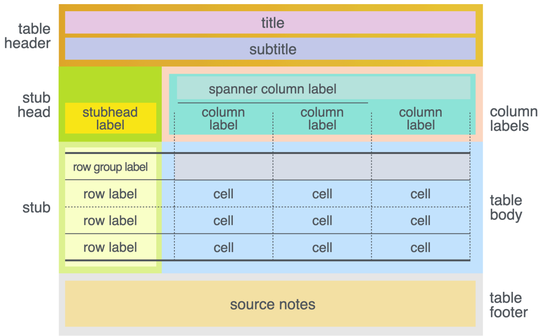
TABLE GOALS

Tables as Data Visualization

Sales of Coffee Equipment

icon	product	Revenue Earnings	Revenue Fraction	Profit Earnings	Profit Fraction	monthly_sales
	Grinder	$904K	3%	$568K	4%	
	Moka pot	$2.05M	7%	$181K	1%	
	Cold brew	$289K	1%	$242K	2%	
	Filter	$404K	1%	$70.0K	0%	
	Cezve	$2.51M	9%	$1.97M	13%	
	Chemex	$3.14M	11%	$818K	6%	
	Scale	$3.80M	13%	$2.91M	20%	
	Kettle	$756K	3%	$618K	4%	
	Espresso Machine	$8.41M	29%	$3.64M	25%	
	Total	**$29.4M**	**102%**	**$14.8M**	**100%**	

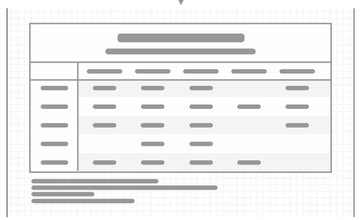
Display Framework



KEY INGREDIENTS

Polars or Pandas DF

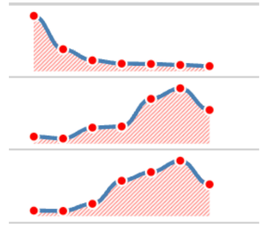
Great Tables



Beautiful Display Table

ADVANCED DESIGN

`.fmt_nanoplot()`



`.data_color()`

79	24.6%	40.9%	18.6%	0.8
89	62.8%	0 %	7.4%	0 %
123	18.2%	4.1%	46.7%	8.1
125	1.4%	42 %	19.7%	9.9
140	13.1%	10.5%	40.7%	6.6
145	1 %	0 %	45 %	24.5
146	10 %	22.7%	23.7%	15 %
200	4.6%	18.1%	30.2%	6 %
261	12.4%	10 %	9.6%	17.1
261	3 %	4.9%	31.5%	16.8

Formatting

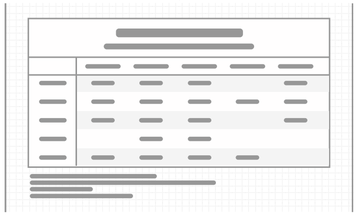
$3.990312712 \times 10^{-10}$

$568K	4%
$181K	1%

KEY INGREDIENTS

Polars or
Pandas
DF

Great Tables



Beautiful
Display
Table

Key Ingredients: Structure, Format, Style

Sales of Coffee Equipment				
	Revenue		Profit	
product	Amount	Percent	Amount	Percent
Grinder	$904K	3%	$568K	4%
Moka pot	$2.05M	7%	$181K	1%
Cold brew	$289K	1%	$242K	2%
Filter	$404K	1%	$70.0K	0%
Drip machine	$2.63M	9%	$1.37M	9%
AeroPress	$2.60M	9%	$1.29M	9%
Pour over	$846K	3%	$365K	2%
French press	$1.11M	4%	$748K	5%
Cezve	$2.51M	9%	$1.97M	13%
Chemex	$3.14M	11%	$818K	6%
Scale	$3.80M	13%	$2.91M	20%
Kettle	$756K	3%	$618K	4%
Espresso Machine	$8.41M	29%	$3.64M	25%
Total	**$29.4M**	**102%**	**$14.8M**	**100%**

Title.

Column spanners.

Nice column labels.

STRUCTURE

Compact dollar values.

Percentages.

FORMAT

Fill color.

Bold text.

STYLE

Let’s Talk Imports and Polars Selectors First

product	revenue_dollars	revenue_pct	profit_dollars	profit_pct
Grinder	904500.0	0.03	567960.0	0.04
Moka pot	2045250.0	0.07	181080.0	0.01
Cold brew	288750.0	0.01	241770.0	0.02
Filter	404250.0	0.01	70010.0	0.0
Drip machine	2632000.0	0.09	1374450.0	0.09
AeroPress	2601500.0	0.09	1293780.0	0.09
Pour over	846000.0	0.03	364530.0	0.02
French press	1113250.0	0.04	748120.0	0.05
Cezve	2512500.0	0.09	1969520.0	0.13
Chemex	3137250.0	0.11	817680.0	0.06
Scale	3801000.0	0.13	2910290.0	0.2
Kettle	756250.0	0.03	617520.0	0.04
Espresso Machine	8406000.0	0.29	3636440.0	0.25
Total	29448500.0	1.02	14793150.0	1.0

```
from great_tables import GT

import polars
import polars.selectors as cs
```

```
cs.starts_with("revenue")

sel_rev = cs.starts_with("revenue")
```

Polars selectors let us target columns, and we need exactly that sort of thing for **Great Tables**.

Key Ingredients: Structure, Format, Style

product	revenue_dollars	revenue_pct	profit_dollars	profit_pct
Grinder	904500.0	0.03	567960.0	0.04
Moka pot	2045250.0	0.07	181080.0	0.01
Cold brew	288750.0	0.01	241770.0	0.02
Filter	404250.0	0.01	70010.0	0.0
Drip machine	2632000.0	0.09	1374450.0	0.09
AeroPress	2601500.0	0.09	1293780.0	0.09
Pour over	846000.0	0.03	364530.0	0.02
French press	1113250.0	0.04	748120.0	0.05
Cezve	2512500.0	0.09	1969520.0	0.13
Chemex	3137250.0	0.11	817680.0	0.06
Scale	3801000.0	0.13	2910290.0	0.2
Kettle	756250.0	0.03	617520.0	0.04
Espresso Machine	8406000.0	0.29	3636440.0	0.25
Total	29448500.0	1.02	14793150.0	1.0

```
(
GT(coffee_table)
)
```

Key Ingredients: Structure, Format, Style

Sales of Coffee Equipment				
product	revenue_dollars	revenue_pct	profit_dollars	profit_pct
Grinder	904500.0	0.03	567960.0	0.04
Moka pot	2045250.0	0.07	181080.0	0.01
Cold brew	288750.0	0.01	241770.0	0.02
Filter	404250.0	0.01	70010.0	0.0
Drip machine	2632000.0	0.09	1374450.0	0.09
AeroPress	2601500.0	0.09	1293780.0	0.09
Pour over	846000.0	0.03	364530.0	0.02
French press	1113250.0	0.04	748120.0	0.05
Cezve	2512500.0	0.09	1969520.0	0.13
Chemex	3137250.0	0.11	817680.0	0.06
Scale	3801000.0	0.13	2910290.0	0.2
Kettle	756250.0	0.03	617520.0	0.04
Espresso Machine	8406000.0	0.29	3636440.0	0.25
Total	29448500.0	1.02	14793150.0	1.0

```
(
  GT(coffee_table)
  .tab_header("Sales of Coffee Equipment")
)
```

Key Ingredients: Structure, Format, Style

Sales of Coffee Equipment				
	Revenue			
product	revenue_dollars	revenue_pct	profit_dollars	profit_pct
Grinder	904500.0	0.03	567960.0	0.04
Moka pot	2045250.0	0.07	181080.0	0.01
Cold brew	288750.0	0.01	241770.0	0.02
Filter	404250.0	0.01	70010.0	0.0
Drip machine	2632000.0	0.09	1374450.0	0.09
AeroPress	2601500.0	0.09	1293780.0	0.09
Pour over	846000.0	0.03	364530.0	0.02
French press	1113250.0	0.04	748120.0	0.05
Cezve	2512500.0	0.09	1969520.0	0.13
Chemex	3137250.0	0.11	817680.0	0.06
Scale	3801000.0	0.13	2910290.0	0.2
Kettle	756250.0	0.03	617520.0	0.04
Espresso Machine	8406000.0	0.29	3636440.0	0.25
Total	29448500.0	1.02	14793150.0	1.0

```
(
  GT(coffee_table)
  .tab_header("Sales of Coffee Equipment")
  .tab_spanner(
    label="Revenue"
    columns=cs.starts_with("revenue")
  )
)
```

Key Ingredients: Structure, Format, Style

Sales of Coffee Equipment				
	Revenue		Profit	
product	revenue_dollars	revenue_pct	profit_dollars	profit_pct
Grinder	904500.0	0.03	567960.0	0.04
Moka pot	2045250.0	0.07	181080.0	0.01
Cold brew	288750.0	0.01	241770.0	0.02
Filter	404250.0	0.01	70010.0	0.0
Drip machine	2632000.0	0.09	1374450.0	0.09
AeroPress	2601500.0	0.09	1293780.0	0.09
Pour over	846000.0	0.03	364530.0	0.02
French press	1113250.0	0.04	748120.0	0.05
Cezve	2512500.0	0.09	1969520.0	0.13
Chemex	3137250.0	0.11	817680.0	0.06
Scale	3801000.0	0.13	2910290.0	0.2
Kettle	756250.0	0.03	617520.0	0.04
Espresso Machine	8406000.0	0.29	3636440.0	0.25
Total	29448500.0	1.02	14793150.0	1.0

```
(
  GT(coffee_table)
  .tab_header("Sales of Coffee Equipment")
  .tab_spanner(
    label="Revenue"
    columns=cs.starts_with("revenue")
  )
  .tab_spanner(
    label="Profit"
    columns=cs.starts_with("profit")
  )
)
```

Key Ingredients: Structure, Format, Style

Sales of Coffee Equipment				
	Revenue		Profit	
Product	Amount	Percent	Amount	Percent
Grinder	904500.0	0.03	567960.0	0.04
Moka pot	2045250.0	0.07	181080.0	0.01
Cold brew	288750.0	0.01	241770.0	0.02
Filter	404250.0	0.01	70010.0	0.0
Drip machine	2632000.0	0.09	1374450.0	0.09
AeroPress	2601500.0	0.09	1293780.0	0.09
Pour over	846000.0	0.03	364530.0	0.02
French press	1113250.0	0.04	748120.0	0.05
Cezve	2512500.0	0.09	1969520.0	0.13
Chemex	3137250.0	0.11	817680.0	0.06
Scale	3801000.0	0.13	2910290.0	0.2
Kettle	756250.0	0.03	617520.0	0.04
Espresso Machine	8406000.0	0.29	3636440.0	0.25
Total	29448500.0	1.02	14793150.0	1.0

```
(
  GT(coffee_table)
  .tab_header("Sales of Coffee Equipment")
  .tab_spanner(
    label="Revenue"
    columns=cs.starts_with("revenue")
  )
  .tab_spanner(
    label="Profit"
    columns=cs.starts_with("profit")
  )
  .cols_label(
    revenue_dollars="Amount"
    profit_dollars="Amount"
    revenue_pct="Percent"
    profit_pct="Percent"
    product="Product"
  )
)
```

Key Ingredients: Structure, Format, Style

Sales of Coffee Equipment				
	Revenue		Profit	
Product	Amount	Percent	Amount	Percent
Grinder	$904K	3%	$568K	4%
Moka pot	$2.05M	7%	$181K	1%
Cold brew	$289K	1%	$242K	2%
Filter	$404K	1%	$70.0K	0%
Drip machine	$2.63M	9%	$1.37M	9%
AeroPress	$2.60M	9%	$1.29M	9%
Pour over	$846K	3%	$365K	2%
French press	$1.11M	4%	$748K	5%
Cezve	$2.51M	9%	$1.97M	13%
Chemex	$3.14M	11%	$818K	6%
Scale	$3.80M	13%	$2.91M	20%
Kettle	$756K	3%	$618K	4%
Espresso Machine	$8.41M	29%	$3.64M	25%
Total	$29.4M	102%	$14.8M	100%

```
(
  ...
  # formatting ----
  .fmt_percent(
    columns=cs.ends_with("pct"),
    decimals=0,
  )
  .fmt_number(
    columns=cs.ends_with("dollars"),
    compact=True,
    pattern="${x}",
    n_sigfig=3,
  )
)
```

Key Ingredients: Structure, Format, Style

Sales of Coffee Equipment				
	Revenue		Profit	
Product	Amount	Percent	Amount	Percent
Grinder	$904K	3%	$568K	4%
Moka pot	$2.05M	7%	$181K	1%
Cold brew	$289K	1%	$242K	2%
Filter	$404K	1%	$70.0K	0%
Drip machine	$2.63M	9%	$1.37M	9%
AeroPress	$2.60M	9%	$1.29M	9%
Pour over	$846K	3%	$365K	2%
French press	$1.11M	4%	$748K	5%
Cezve	$2.51M	9%	$1.97M	13%
Chemex	$3.14M	11%	$818K	6%
Scale	$3.80M	13%	$2.91M	20%
Kettle	$756K	3%	$618K	4%
Espresso Machine	$8.41M	29%	$3.64M	25%
Total	**$29.4M**	**102%**	**$14.8M**	**100%**

```
(
        from great_tables import loc, style
  ...
  # styling ----
  .tab_style(
    locations=loc.body(columns=sel_rev),
    style=style.fill(color="aliceblue"),
  )
)
```

where

what

Key Ingredients: Structure, Format, Style

Sales of Coffee Equipment				
	Revenue		Profit	
Product	Amount	Percent	Amount	Percent
Grinder	$904K	3%	$568K	4%
Moka pot	$2.05M	7%	$181K	1%
Cold brew	$289K	1%	$242K	2%
Filter	$404K	1%	$70.0K	0%
Drip machine	$2.63M	9%	$1.37M	9%
AeroPress	$2.60M	9%	$1.29M	9%
Pour over	$846K	3%	$365K	2%
French press	$1.11M	4%	$748K	5%
Cezve	$2.51M	9%	$1.97M	13%
Chemex	$3.14M	11%	$818K	6%
Scale	$3.80M	13%	$2.91M	20%
Kettle	$756K	3%	$618K	4%
Espresso Machine	$8.41M	29%	$3.64M	25%
Total	**$29.4M**	**102%**	**$14.8M**	**100%**

```
(
    from great_tables import loc, style
  ...
  # styling ----
  .tab_style(
    locations=loc.body(columns=sel_rev),
    style=style.fill(color="aliceblue"),
  )
  .tab_style(
    locations=loc.body(columns=sel_profit),
    style=style.fill(color="papayawhip"),
  )
  .tab_style(
    locations=loc.body(
      rows=pl.col("product") == "Total"),
    )
    style=style.text(weight="bold"),
  )
)
```

where

what

Key Ingredients: Structure, Format, Style

Sales of Coffee Equipment				
	Revenue		Profit	
Product	Amount	Percent	Amount	Percent
Grinder	$904K	3%	$568K	4%
Moka pot	$2.05M	7%	$181K	1%
Cold brew	$289K	1%	$242K	2%
Filter	$404K	1%	$70.0K	0%
Drip machine	$2.63M	9%	$1.37M	9%
AeroPress	$2.60M	9%	$1.29M	9%
Pour over	$846K	3%	$365K	2%
French press	$1.11M	4%	$748K	5%
Cezve	$2.51M	9%	$1.97M	13%
Chemex	$3.14M	11%	$818K	6%
Scale	$3.80M	13%	$2.91M	20%
Kettle	$756K	3%	$618K	4%
Espresso Machine	$8.41M	29%	$3.64M	25%
Total	**$29.4M**	**102%**	**$14.8M**	**100%**

Bonus Ingredients: Images and Plots

Images can be added via `.fmt_icon()`.

Sales of Coffee Equipment

	Product	Revenue		Profit		Monthly Revenue
		Amount	Percent	Amount	Percent	
	Grinder	$904K	3%	$568K	4%	
	Moka pot	$2.05M	7%	$181K	1%	
	Cold brew	$289K	1%	$242K	2%	
	Filter	$404K	1%	$70.0K	0%	
	Drip machine	$2.63M	9%	$1.37M	9%	
	AeroPress	$2.60M	9%	$1.29M	9%	
	Pour over	$846K	3%	$365K	2%	
	French press	$1.11M	4%	$748K	5%	
	Cezve	$2.51M	9%	$1.97M	13%	
	Chemex	$3.14M	11%	$818K	6%	
	Scale	$3.80M	13%	$2.91M	20%	
	Kettle	$756K	3%	$618K	4%	
	Espresso Machine	$8.41M	29%	$3.64M	25%	
	Total	**$29.4M**	**102%**	**$14.8M**	**100%**	

Small plots can be created by using `.fmt_nanoplot()`.

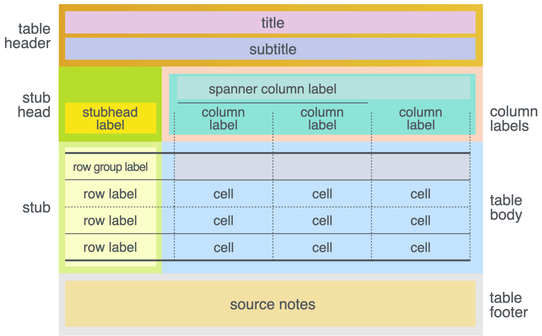
Overview

TABLE GOALS

Tables as Data Visualization

Sales of Coffee Equipment						
		Revenue		Profit		
icon	product	Earnings	Fraction	Earnings	Fraction	monthly_sales
	Grinder	$904K	3%	$568K	4%	
	Moka pot	$2.05M	7%	$181K	1%	
	Cold brew	$289K	1%	$242K	2%	
	Filter	$404K	1%	$70.0K	0%	
	Cezve	$2.51M	9%	$1.97M	13%	
	Chemex	$3.14M	11%	$818K	6%	
	Scale	$3.80M	13%	$2.91M	20%	
	Kettle	$756K	3%	$618K	4%	
	Espresso Machine	$8.41M	29%	$3.64M	25%	
	Total	**$29.4M**	**102%**	**$14.8M**	**100%**	

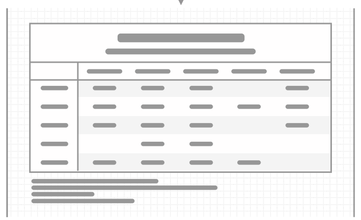
Display Framework



KEY INGREDIENTS

Polars or Pandas DF

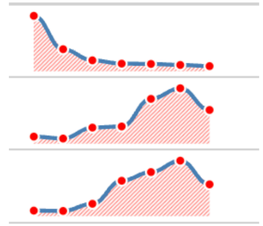
Great Tables



Beautiful Display Table

ADVANCED DESIGN

`.fmt_nanoplot()`



`.data_color()`

79	24.6%	40.9%	18.6%	0.8
89	62.8%	0 %	7.4%	0 %
123	18.2%	4.1%	46.7%	8.1
125	1.4%	42 %	19.7%	9.9
140	13.1%	10.5%	40.7%	6.6
145	1 %	0 %	45 %	24.5
146	10 %	22.7%	23.7%	15 %
200	4.6%	18.1%	30.2%	6 %
261	12.4%	10 %	9.6%	17.1
261	3 %	4.9%	31.5%	16.8

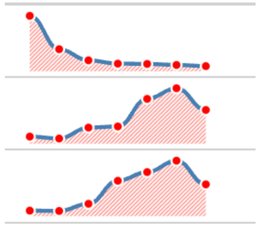
Formatting

$3.990312712 \times 10^{-10}$

$568K	4%
$181K	1%

ADVANCED DESIGN

.fmt_nanoplot()



.data_color()

79	24.6%	40.9%	18.6%	0.8
89	62.8%	0 %	7.4%	0 %
123	18.2%	4.1%	46.7%	8.1
125	1.4%	42 %	19.7%	9.9
140	13.1%	10.5%	40.7%	6.6
145	1 %	0 %	45 %	24.5
146	10 %	22.7%	23.7%	15 %
200	4.6%	18.1%	30.2%	6 %
261	12.4%	10 %	9.6%	17.1
261	3 %	4.9%	31.5%	16.8

Formatting

$3.990312712 \times 10^{-10}$

$568K	4%
$181K	1%

`.fmt_nanoplot()`: Small Plots within Table Cells

Sales of Coffee Equipment						
		Revenue		Profit		
	Product	Amount	Percent	Amount	Percent	Monthly Revenue
	Grinder	$904K	3%	$568K	4%	
	Moka pot	$2.05M	7%	$181K	1%	
	Cold brew	$289K	1%	$242K	2%	
	Filter	$404K	1%	$70.0K	0%	
	Drip machine	$2.63M	9%	$1.37M	9%	
	AeroPress	$2.60M	9%	$1.29M	9%	
	Pour over	$846K	3%	$365K	2%	
	French press	$1.11M	4%	$748K	5%	
	Cezve	$2.51M	9%	$1.97M	13%	
	Chemex	$3.14M	11%	$818K	6%	
	Scale	$3.80M	13%	$2.91M	20%	
	Kettle	$756K	3%	$618K	4%	
	Espresso Machine	$8.41M	29%	$3.64M	25%	
	Total	**$29.4M**	**102%**	**$14.8M**	**100%**	

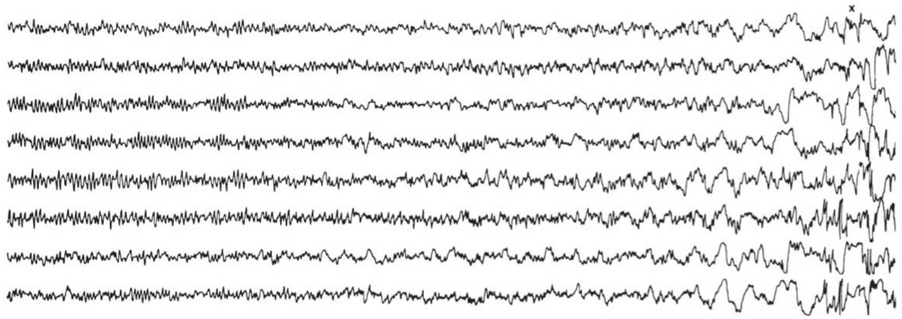
Nanoplots are compact visualizations that reveal trends in the data.

Cold brews for hot summers. 🌴

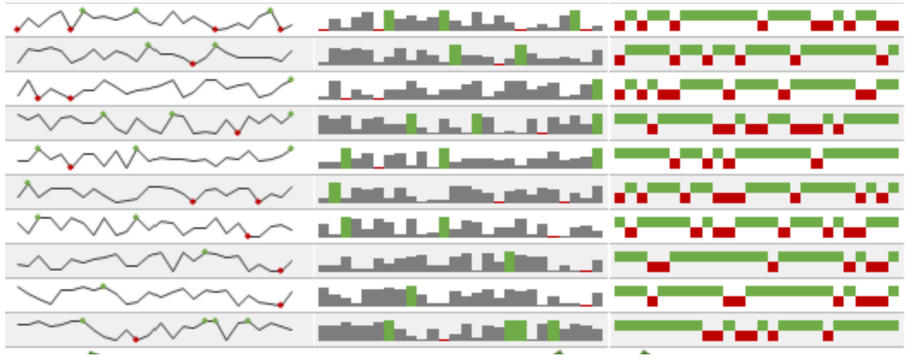
Rare sell, but when it happens: 💵

`.fmt_nanoplot()`: Small Plots within Table Cells

a



b



Nanoplots were inspired by sparklines, popularized by Tufte.

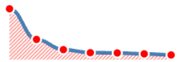
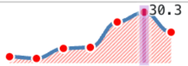
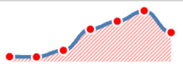
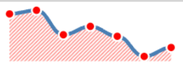
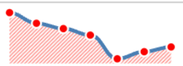
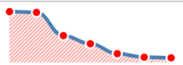
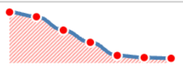
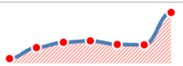
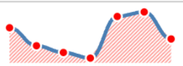
An implementation of sparklines was added to Excel. And people seem to like that feature!

[a] ECG scans from Kenneth A. Kooi, *Fundamentals of Electroencephalography (1971).*
[b] Screenshot of various sparkline visualizations produced in Microsoft Excel.

`.fmt_nanoplot()`: Small Plots within Table Cells

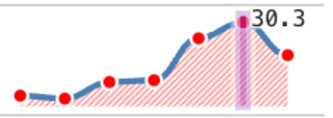
Partial summary of daily tests performed on YF patient

Measurements from Day 3 through to Day 8.

Test	Normal Range	*Progression*
Viral load (copies per mL)	—	
WBC ($\times 10^9$/L)	4–10	
Neutrophils ($\times 10^9$/L)	2–8	
RBC ($\times 10^{12}$/L)	4–5.5	
Hb (g/L)	120–160	
PLT ($\times 10^9$/L)	100–300	
ALT (U/L)	9–50	
AST (U/L)	15–40	
TBIL (µmol/L)	0–18.8	
DBIL (µmol/L)	0–6.8	
NH3 (mmol/L)	10–47	
PT (s)	9.4–12.5	
APTT (s)	25.1–36.5	
PTA (%)	70–130	

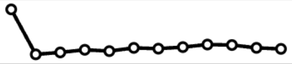
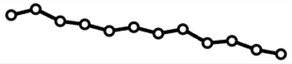
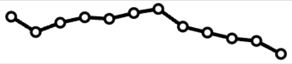
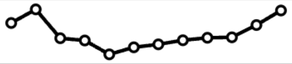
With nanoplots, the time to insight can be minimized.

WBC increasing beyond normal range.



`.fmt_nanoplot()`: Small Plots within Table Cells

Nanoplots can be used in many different contexts:

	COMPANY	SP (2024-05-09)
APPL	Apple Inc.	
MSFT	Microsoft Corporation	
NVDA	NVIDIA Corporation	
GOOGL	Alphabet Inc.	
AMZN	Amazon.com Inc.	
NFLX	Netflix, Inc.	
SNOW	Snowflake Inc.	
NET	Cloudflare, Inc.	

Stock Prices

TEMP (2023-05-09)	
NEW YORK	
CHICAGO	
ATLANTA	
LOS ANGELES	
PORTLAND	
SEATTLE	
SAN DIEGO	
DENVER	

Weather Data

Pizzas sold on **January 1, 2015**

Between the opening hours of 11:30 to 22:30

	PIZZAS SOLD
CHICKEN	
CLASSIC	
SUPREME	
VEGGIE	

Sales Data

`.data_color()`: Heat Maps in Tables

2023 Median **CO2 Intensity** (gCO2eq/kWh) and **Power Consumption** Breakdown (%)

Zone	CO2 Intensity	Hydro	Nuclear	Wind	Solar	Geothermal	Biomass	Gas	Coal	Oil	Unknown	Hydro Discharge	Battery Discharge
Sweden	22	43.5%	29.2%	21.4%	0.9%	0 %	0.2%	0.2%	0.2%	0 %	4.4%	0 %	0 %
Iceland	28	72.4%	0 %	0 %	0 %	27.6%	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Quebec	30	91.5%	0.9%	4.7%	0 %	0 %	2.5%	0.4%	0 %	0 %	0 %	0 %	0 %
France	44	10.5%	64.3%	10.4%	4.8%	0 %	1.4%	6.6%	0.5%	0.3%	0.1%	1.1%	0 %
Tasmania	67	66.3%	0 %	19.2%	5.8%	0 %	0 %	0.6%	8.1%	0 %	0 %	0 %	0 %
Ontario	70	26 %	51.9%	8.1%	0.5%	0 %	0.2%	13.3%	0 %	0 %	0 %	0 %	0 %
Finland	79	24.6%	40.9%	18.6%	0.8%	0 %	6.6%	2.2%	5.2%	0 %	1.1%	0 %	0 %
New Zealand	89	62.8%	0 %	7.4%	0 %	18.2%	0 %	6.1%	3.6%	0 %	2 %	0 %	0 %
West Denmark	123	18.2%	4.1%	46.7%	8.1%	0 %	7.5%	5.9%	8.2%	0.4%	0.6%	0.3%	0 %
Belgium	125	1.4%	42 %	19.7%	9.9%	0 %	3.3%	18.7%	1.5%	0.1%	2.1%	1.4%	0 %
East Denmark	140	13.1%	10.5%	40.7%	6.6%	0 %	14.3%	4.2%	7.2%	1.2%	2.2%	0.1%	0 %
South Australia	145	1 %	0 %	45 %	24.5%	0 %	0 %	21.8%	7 %	0.1%	0 %	0 %	0.5%
Spain	146	10 %	22.7%	23.7%	15 %	0 %	2.1%	21.8%	1.6%	0.2%	0.3%	2.5%	0 %
Great Britain	200	4.6%	18.1%	30.2%	6 %	0 %	5.1%	33.2%	1.2%	0 %	1 %	0.6%	0 %
California	261	12.4%	10 %	9.6%	17.1%	3.1%	1.7%	42 %	1.2%	0 %	0.9%	0 %	1.9%
Netherlands	261	3 %	4.9%	31.5%	16.8%	0 %	5 %	27.7%	9 %	0.8%	1.1%	0.2%	0 %
New York ISO	276	22.6%	22.7%	3.9%	0.1%	0 %	0.1%	48.3%	0.6%	0 %	1.8%	0 %	0 %
Italy (North)	305	24.5%	11.9%	2.9%	6.9%	0.3%	2.2%	37 %	2.6%	0.2%	8.7%	2.8%	0 %
Germany	375	5.9%	4.3%	29 %	11.8%	0 %	9.6%	11.3%	24.5%	0.5%	0.7%	2.3%	0 %
Ireland	377	2.6%	1.1%	36 %	0.4%	0 %	2.5%	46.2%	9.5%	1.4%	0.1%	0 %	0 %
Texas	392	0.1%	9.1%	25.2%	7.2%	0 %	0 %	44.4%	13.8%	0 %	0.3%	0 %	0 %
Alberta	440	2.9%	0 %	11.4%	2.7%	0 %	2.6%	67.5%	8.1%	0 %	4.6%	0 %	0 %
Western Australia	450	0 %	0 %	15.5%	19.1%	0 %	0.4%	35.1%	29.7%	0 %	0 %	0 %	0.1%
Victoria	511	6.3%	0 %	20.6%	12.7%	0 %	0 %	1.4%	58.8%	0 %	0 %	0 %	0.2%
India (North)	547	21.3%	2.2%	1.5%	7.7%	0 %	0 %	1.9%	64.3%	0 %	1.2%	0 %	0 %
New South Wales	604	4.9%	0 %	9.2%	19.6%	0 %	0.1%	2.2%	64 %	0 %	0 %	0 %	0.1%
Queensland	681	2.1%	0 %	4 %	19.8%	0 %	0.2%	6.7%	67.1%	0 %	0 %	0 %	0.1%
South Africa	703	0.9%	4.2%	5.7%	3.2%	0 %	0 %	0 %	80.9%	2.6%	0.1%	2.3%	0 %
Poland	753	2.6%	1.4%	15.2%	8.5%	0 %	1.8%	8.5%	59.2%	1.5%	0.2%	1.1%	0 %

Table: @GrantChalmers | **Source**: api.electricitymap.org | **Methodology**: https://www.electricitymaps.com/methodology. Emission factors used to calculate CO2 Intensity can be found on the *Carbon intensity and emission factors* tab.

Some emissions factors are based on IPCC 2014 defaults, while some are based on more accurate regional factors. All zones are publicly available on the *Carbon intensity and emission factors* tab via Google docs link

`.data_color()`: generate a heat map with a palette.

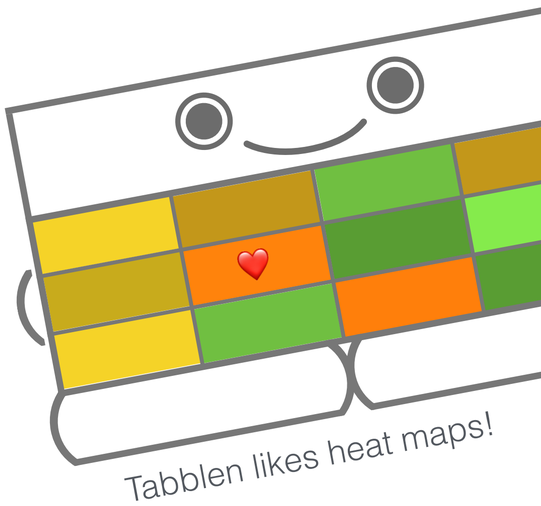
It makes the large amount of information here much easier to digest at a glance.

Larger values can be seen right away. Negligible values lack color.

`.data_color()`: Heat Maps in Tables

Two big advantages from plots:

1. emphasizes differences in values
2. reveals trends in the data



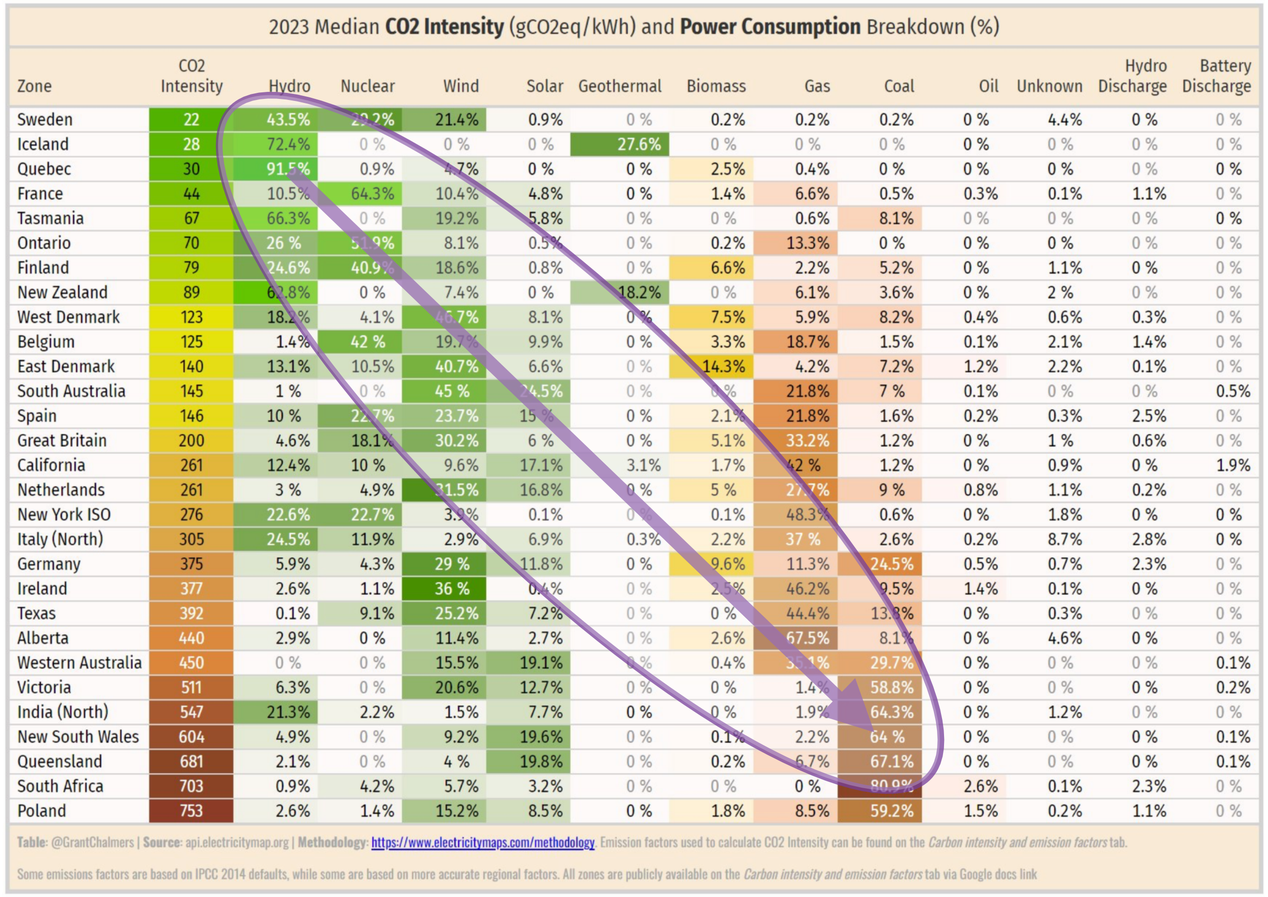
Row: compare across measures.

Zone	Hydro	Nuclear	Wind	Solar	Geothermal
France	10.5%	64.3%	10.4%	4.8%	0 %

Column: compare across observations.

Zone	CO2 Intensity
Sweden	22
Iceland	28
Quebec	30
France	44
Tasmania	67
Ontario	70

`.data_color()`: Heat Maps in Tables



2023 Median **CO2 Intensity** (gCO2eq/kWh) and **Power Consumption** Breakdown (%)

Zone	CO2 Intensity	Hydro	Nuclear	Wind	Solar	Geothermal	Biomass	Gas	Coal	Oil	Unknown	Hydro Discharge	Battery Discharge
Sweden	22	43.5%	29.2%	21.4%	0.9%	0 %	0.2%	0.2%	0.2%	0 %	4.4%	0 %	0 %
Iceland	28	72.4%	0 %	0 %	0 %	27.6%	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Quebec	30	91.5%	0.9%	4.7%	0 %	0 %	2.5%	0.4%	0 %	0 %	0 %	0 %	0 %
France	44	10.5%	64.3%	10.4%	4.8%	0 %	1.4%	6.6%	0.5%	0.3%	0.1%	1.1%	0 %
Tasmania	67	66.3%	0 %	19.2%	5.8%	0 %	0 %	0.6%	8.1%	0 %	0 %	0 %	0 %
Ontario	70	26 %	51.9%	8.1%	0.5%	0 %	0.2%	13.3%	0 %	0 %	0 %	0 %	0 %
Finland	79	24.6%	40.9%	18.6%	0.8%	0 %	6.6%	2.2%	5.2%	0 %	1.1%	0 %	0 %
New Zealand	89	62.8%	0 %	7.4%	0 %	18.2%	0 %	6.1%	3.6%	0 %	2 %	0 %	0 %
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Belgium	125	1.4%	42 %	19.7%	9.9%	0 %	3.3%	18.7%	1.5%	0.1%	2.1%	1.4%	0 %
East Denmark	140	13.1%	10.5%	40.7%	6.6%	0 %	14.3%	4.2%	7.2%	1.2%	2.2%	0.1%	0 %
South Australia	145	1 %	0 %	45 %	24.5%	0 %	0 %	21.8%	7 %	0.1%	0 %	0 %	0.5%
Spain	146	10 %	22.7%	23.7%	15 %	0 %	2.1%	21.8%	1.6%	0.2%	0.3%	2.5%	0 %
Great Britain	200	4.6%	18.1%	30.2%	6 %	0 %	5.1%	33.2%	1.2%	0 %	1 %	0.6%	0 %
California	261	12.4%	10 %	9.6%	17.1%	3.1%	1.7%	42 %	1.2%	0 %	0.9%	0 %	1.9%
Netherlands	261	3 %	4.9%	31.5%	16.8%	0 %	5 %	27.7%	9 %	0.8%	1.1%	0.2%	0 %
New York ISO	276	22.6%	22.7%	3.9%	0.1%	0 %	0.1%	48.3%	0.6%	0 %	1.8%	0 %	0 %
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Texas	392	0.1%	9.1%	25.2%	7.2%	0 %	0 %	44.4%	13.8%	0 %	0.3%	0 %	0 %
Alberta	440	2.9%	0 %	11.4%	2.7%	0 %	2.6%	67.5%	8.1%	0 %	4.6%	0 %	0 %
Western Australia	450	0 %	0 %	15.5%	19.1%	0 %	0.4%	35.1%	29.7%	0 %	0 %	0 %	0.1%
Victoria	511	6.3%	0 %	20.6%	12.7%	0 %	0 %	1.4%	58.8%	0 %	0 %	0 %	0.2%
India (North)	547	21.3%	2.2%	1.5%	7.7%	0 %	0 %	1.9%	64.3%	0 %	1.2%	0 %	0 %
New South Wales	604	4.9%	0 %	9.2%	19.6%	0 %	0.1%	2.2%	64 %	0 %	0 %	0 %	0.1%
Queensland	681	2.1%	0 %	4 %	19.8%	0 %	0.2%	6.7%	67.1%	0 %	0 %	0 %	0.1%
South Africa	703	0.9%	4.2%	5.7%	3.2%	0 %	0 %	0 %	90.9%	2.6%	0.1%	2.3%	0 %
Poland	753	2.6%	1.4%	15.2%	8.5%	0 %	1.8%	8.5%	59.2%	1.5%	0.2%	1.1%	0 %

Table: @GrantChalmers | **Source**: api.electricitymap.org | **Methodology**: https://www.electricitymaps.com/methodology. Emission factors used to calculate CO2 Intensity can be found on the *Carbon intensity and emission factors* tab.

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We can see a global pattern of values in the table.

Trend here: energy from fossil fuels leads to higher CO_2 intensity values.

Formatting Methods: They Are Powerful and Plentiful

There are *lots* of useful formatting methods for cell values.

We can format numbers, dates, and strings with a large set of very flexible and powerful methods.

UNFORMATTED	.fmt_number()	.fmt_integer()	.fmt_scientific()	.fmt_percent()	.fmt_currency()	.fmt_bytes()	pattern= arg
Value	Value	Value	Value	Value	Value	Value	Value
1.2	1.20	1	1.20×10^{0}	1.2%	£1.20	1 B	<1 B>
30.3	30.30	30	3.03×10^{1}	30.3%	£30.30	30 B	<30 B>
1023	1,023.00	1,023	1.02×10^{3}	1,023%	£1,023.00	1 kB	<1 kB>
34502.4	34,502.40	34,502	3.45×10^{4}	34,502.4%	£34,502.40	34.5 kB	<34.5 kB>
-7900345	–7,900,345.00	–7,900,345	-7.90×10^{6}	–7,900,345%	–£7,900,345.00	–7.9 MB	<–7.9 MB>
9.23	9.23	9	9.23×10^{0}	9.2%	£9.23	9 B	<9 B>

Formatting Methods: They Are Powerful and Plentiful

There are *lots* of useful formatting methods for cell values.

We can format numbers, dates, and strings with a large set of very flexible and powerful methods.

.fmt_number()	.fmt_integer()	.fmt_scientific()	.fmt_percent()	.fmt_currency()	.fmt_bytes()	pattern= arg
Value	Value	Value	Value	Value	Value	Value
1.20	1	1.20	1.2%	£1.20	1 B	<1 B>
30.30	30	3.03×10^{1}	30.3%	£30.30	30 B	<30 B>
1,023.00	1,023	1.02×10^{3}	1,023%	£1,023.00	1 kB	<1 kB>
34,502.40	34,502	3.45×10^{4}	34,502.4%	£34,502.40	34.5 kB	<34.5 kB>
–7,900,345.00	–7,900,345	-7.90×10^{6}	–7,900,345%	–£7,900,345.00	–7.9 MB	<–7.9 MB>
9.23	9	9.23	9.2%	£9.23	9 B	<9 B>

Many more available:

- `.fmt_date()`
- `.fmt_time()`
- `.fmt_datetime()`
- `.fmt_image()`
- `.fmt_markdown()`

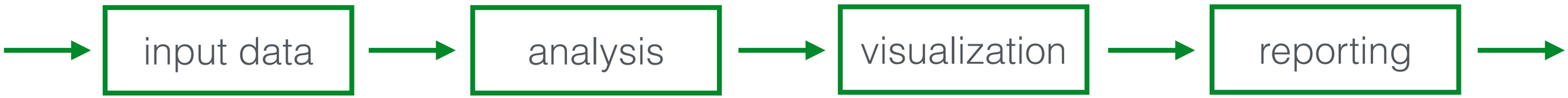
...and others in development.

Summing Up

Making beautiful, publication quality tables in Python is *not only* possible in **2024**...

...it's actually really great!

Tables are cool! And people love good-looking ones.



Don't break the reproducibility chain.

Use GT here

Your life will be vastly improved. Tables rule.

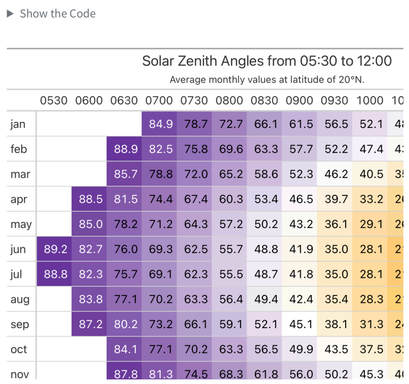
Finding Out More

To get started with Great Tables, use this:

```
pip install great_tables
```

Check out the **Great Tables** project website:

```
posit-dev.github.io/great-tables
```



▶ Show the Code

Solar Zenith Angles from 05:30 to 12:00

Average monthly values at latitude of 20°N.

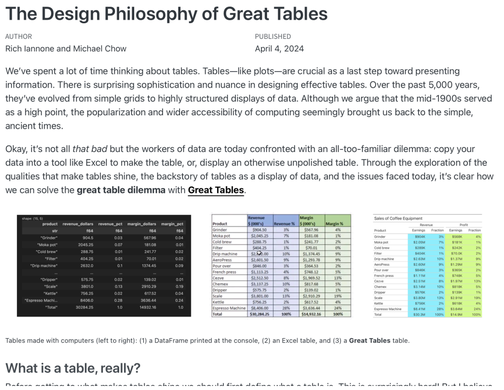
	0530	0600	0630	0700	0730	0800	0830	0900	0930	1000	10
jan				84.9	78.7	72.7	66.1	61.5	56.5	52.1	4
feb			88.9	82.5	75.8	69.6	63.3	57.7	52.2	47.4	4
mar			85.7	78.8	72.0	65.2	58.6	52.3	46.2	40.5	3
apr		88.5	81.5	74.4	67.4	60.3	53.4	46.5	39.7	33.2	2
may		85.0	78.2	71.2	64.3	57.2	50.2	43.2	36.1	29.1	2
jun	89.2	82.7	76.0	69.3	62.5	55.7	48.8	41.9	35.0	28.1	2
jul	88.8	82.3	75.7	69.1	62.3	55.5	48.7	41.8	35.0	28.1	2
aug		83.8	77.1	70.2	63.3	56.4	49.4	42.4	35.4	28.3	2
sep		87.2	80.2	73.2	66.1	59.1	52.1	45.1	38.1	31.3	2
oct			84.1	77.1	70.2	63.3	56.5	49.9	43.5	37.5	3
nov			87.8	81.3	74.5	68.3	61.8	56.0	50.2	45.3	4

View notebook

Highest Paid Athletes in 2023

	Name	icon	Sport	Earnings		
				Total $M	Off field $M	Off field %
1	Cristiano Ronaldo		Soccer	136.0	90.0	
2	Lionel Messi		Soccer	130.0	65.0	
3	Kylian Mbappé		Soccer	120.0	20.0	
4	LeBron James		Basketball	119.5	75.0	
5	Canelo Alvarez		Boxing	110.0	10.0	
6	Dustin Johnson		Golf	107.0	5.0	
7	Phil Mickelson		Golf	106.0	2.0	

Examples



The Design Philosophy of Great Tables

AUTHOR
Rich Iannone and Michael Chow

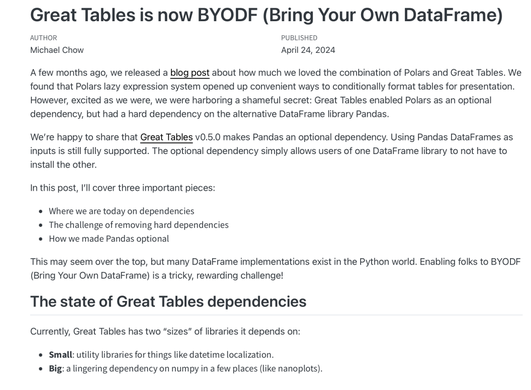
PUBLISHED
April 4, 2024

We've spent a lot of time thinking about tables. Tables—like plots—are crucial as a last step toward presenting information. There is surprising sophistication and nuance in designing effective tables. Over the past 5,000 years, they've evolved from simple grids to highly structured displays of data. Although we argue that the mid-1900s served as a high point, the popularization and wider accessibility of computing seemingly brought us back to the simple, ancient times.

Okay, it's not all *that bad* but the workers of data are today confronted with an all-too-familiar dilemma: copy your data into a tool like Excel to make the table, or, display an otherwise unpolished table. Through the exploration of the qualities that make tables shine, the backstory of tables as a display of data, and the issues faced today, it's clear how we can solve the **great table dilemma** with **Great Tables**.

Tables made with computers (left to right): (1) a DataFrame printed at the console, (2) an Excel table, and (3) a **Great Tables** table.

What is a table, really?



Great Tables is now BYODF (Bring Your Own DataFrame)

AUTHOR
Michael Chow

PUBLISHED
April 24, 2024

A few months ago, we released a blog post about how much we loved the combination of Polars and Great Tables. We found that Polars lazy expression system opened up convenient ways to conditionally format tables for presentation. However, excited as we were, we were harboring a shameful secret: Great Tables enabled Polars as an optional dependency, but had a hard dependency on the alternative DataFrame library Pandas.

We're happy to share that Great Tables v0.5.0 makes Pandas an optional dependency. Using Pandas DataFrames as inputs is still fully supported. The optional dependency simply allows users of one DataFrame library to not have to install the other.

In this post, I'll cover three important pieces:

- Where we are today on dependencies
- The challenge of removing hard dependencies
- How we made Pandas optional

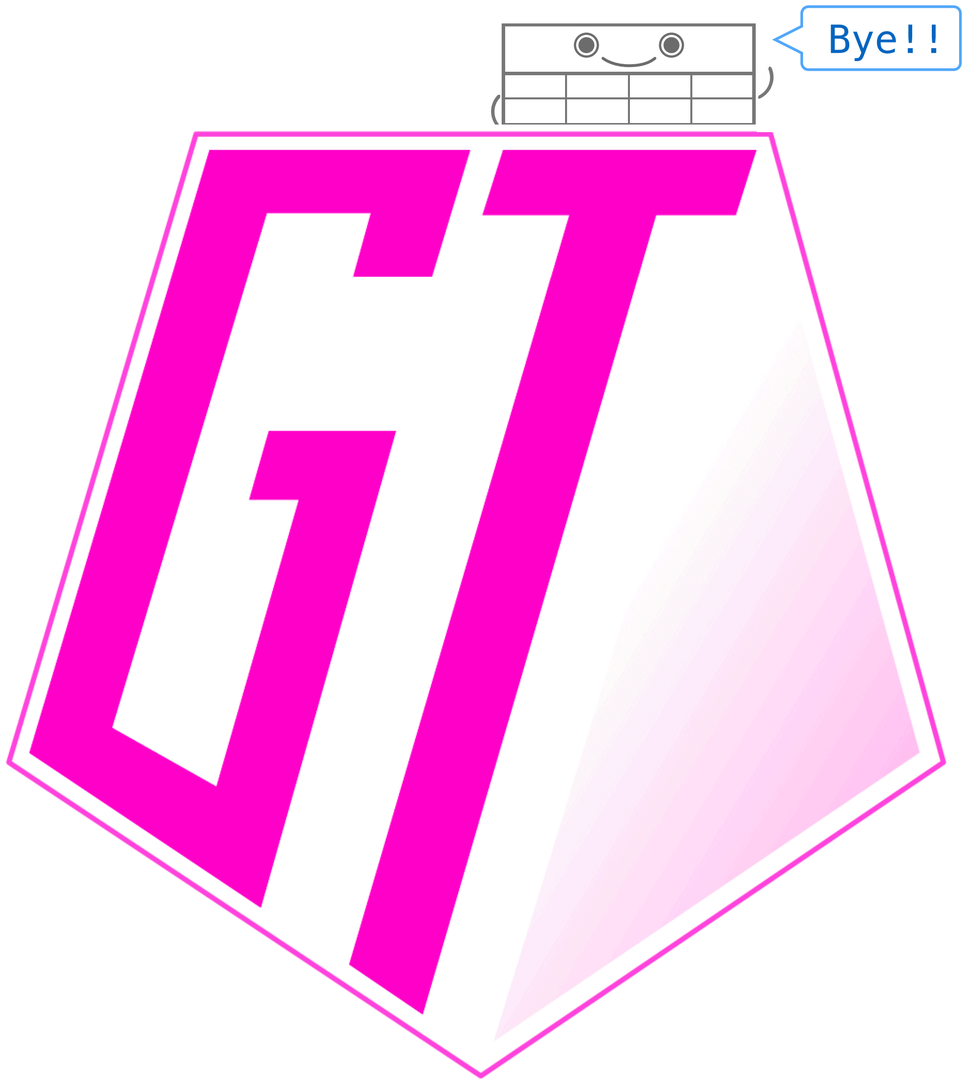
This may seem over the top, but many DataFrame implementations exist in the Python world. Enabling folks to BYODF (Bring Your Own DataFrame) is a tricky, rewarding challenge!

The state of Great Tables dependencies

Currently, Great Tables has two "sizes" of libraries it depends on:

- **Small**: utility libraries for things like datetime localization.
- **Big**: a lingering dependency on numpy in a few places (like nanoplots).

Blog


Bye!!