



Vega-Altair

A Simple, Friendly, and Powerful Data Visualization Library



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@binste

**“Visualization gives you answers
to questions you didn’t know
you had.” – Ben Shneiderman**

Outline

What is Altair and why should you care

Be creative and customize

History, what's new, and what's coming

What stars have to do with it



		Name	Horsepower	L/100km	Origin
0	chevrolet chevelle malibu		130	13.1	USA
1	buick skylark 320		165	15.7	USA
2	plymouth satellite		150	13.1	USA
3	amc rebel sst		150	14.7	USA
4	ford torino		140	13.8	USA
cars_df =					

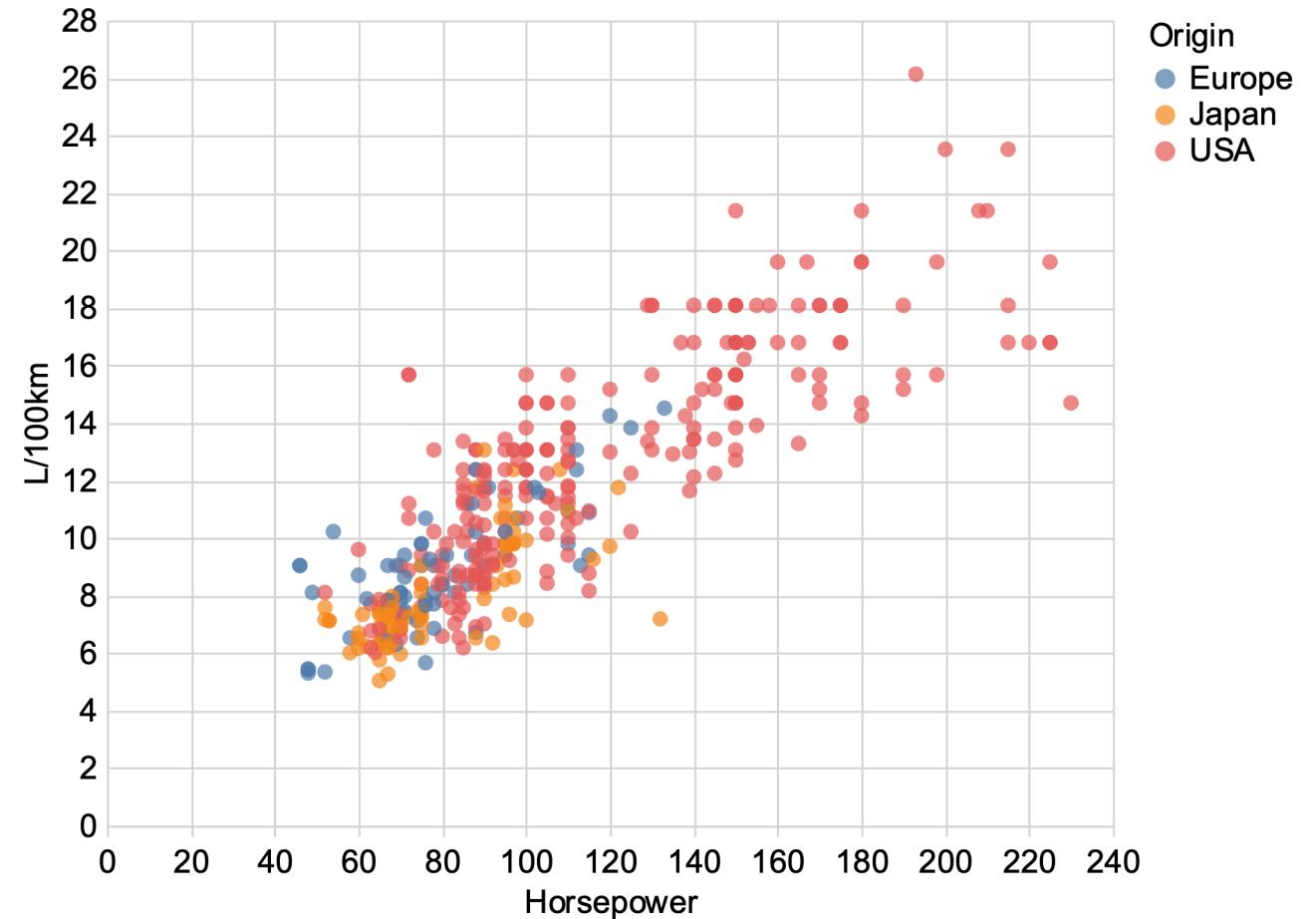
401	ford mustang gl		86	8.7	USA
402	vw pickup		52	5.3	Europe
403	dodge rampage		84	7.4	USA
404	ford ranger		79	8.4	USA
405	chevy s-10		82	7.6	USA

406 rows × 4 columns

Source: PRIMDATA: Data Sets for Use With PRIM-H, Donoho, David and Ramos, Ernesto (1982)

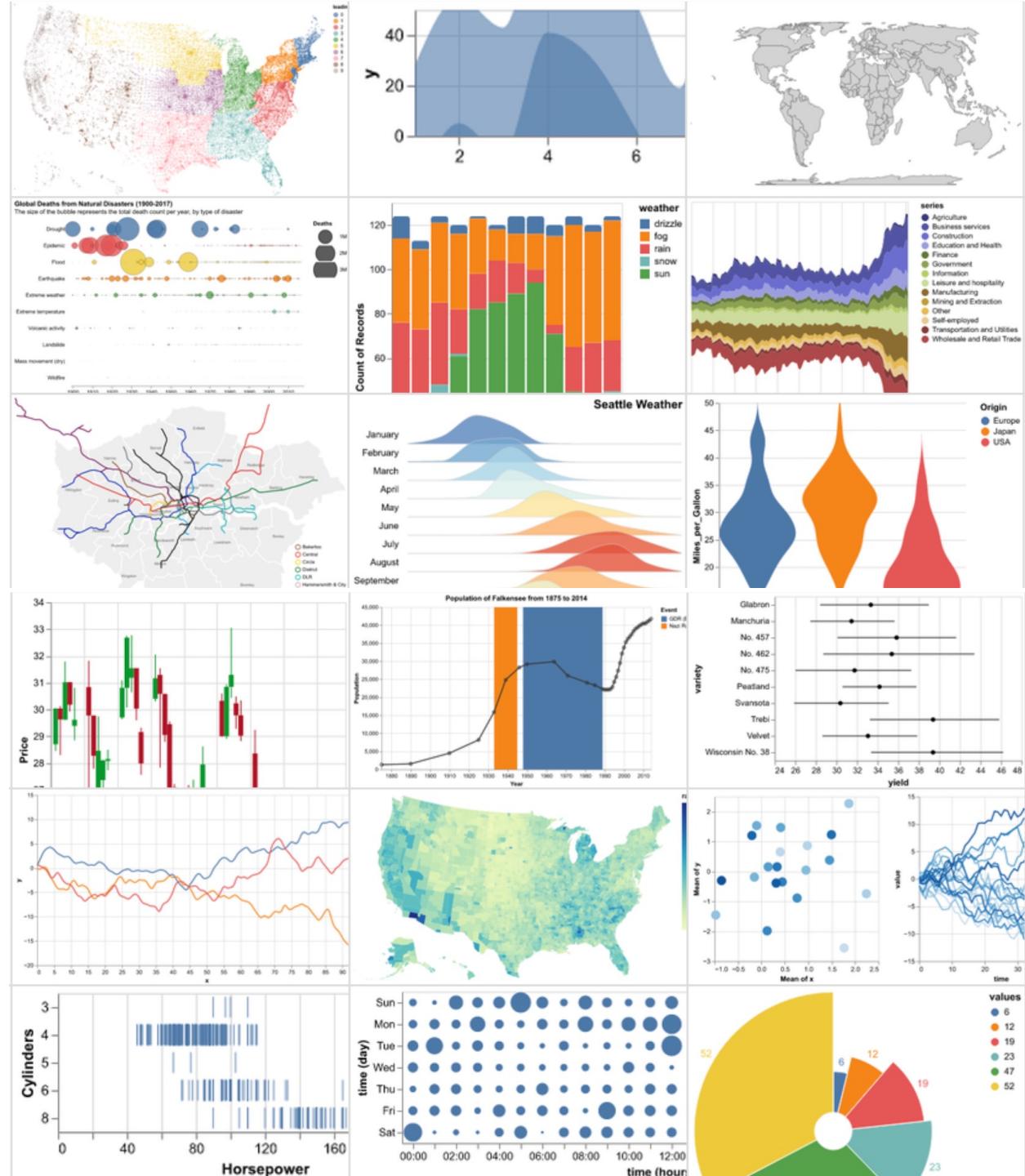
```
import altair as alt  
Mark  
alt.Chart(cars_df).mark_circle().encode(  
    alt.X("Horsepower"),  
    alt.Y("L/100km"),  
    alt.Color("Origin"))
```

Encoding channels



Marks

- Area
- Bar
- Circle
- Geoshape
- Line
- Rect
- Text
- ...

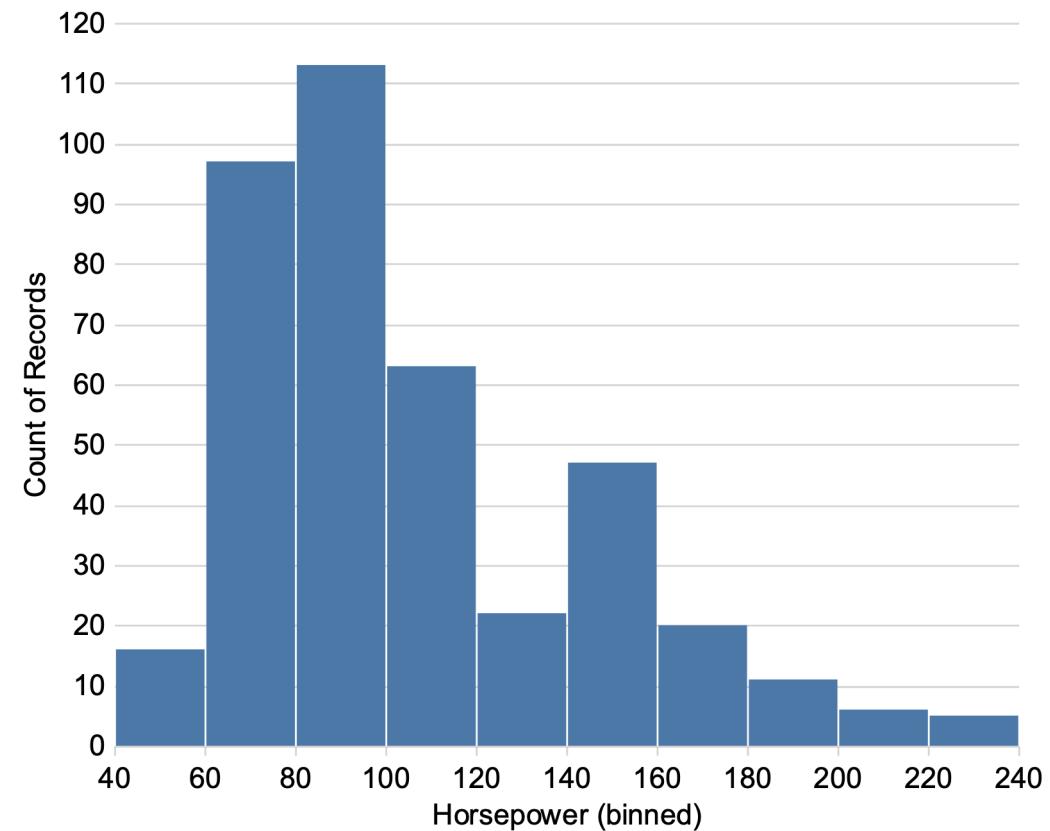
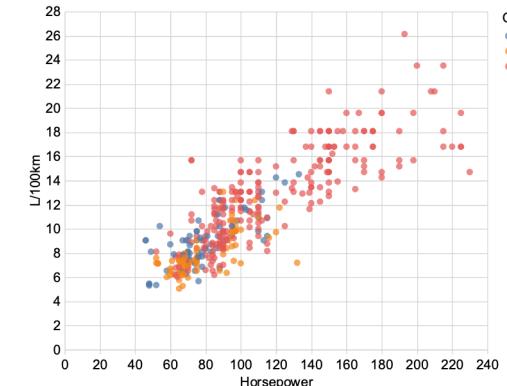


```
plt.scatter(...)
```

```
alt.Chart(cars_df).mark_circle().encode(  
    alt.X("Horsepower"),  
    alt.Y("L/100km"),  
    alt.Color("Origin"))  
)
```

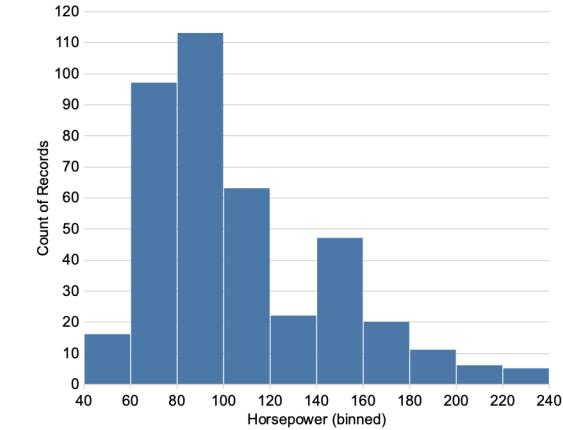
```
plt.hist(...)
```

```
alt.Chart(cars_df).mark_bar().encode(  
    alt.X("Horsepower").bin(),  
    alt.Y("count()"))  
)
```



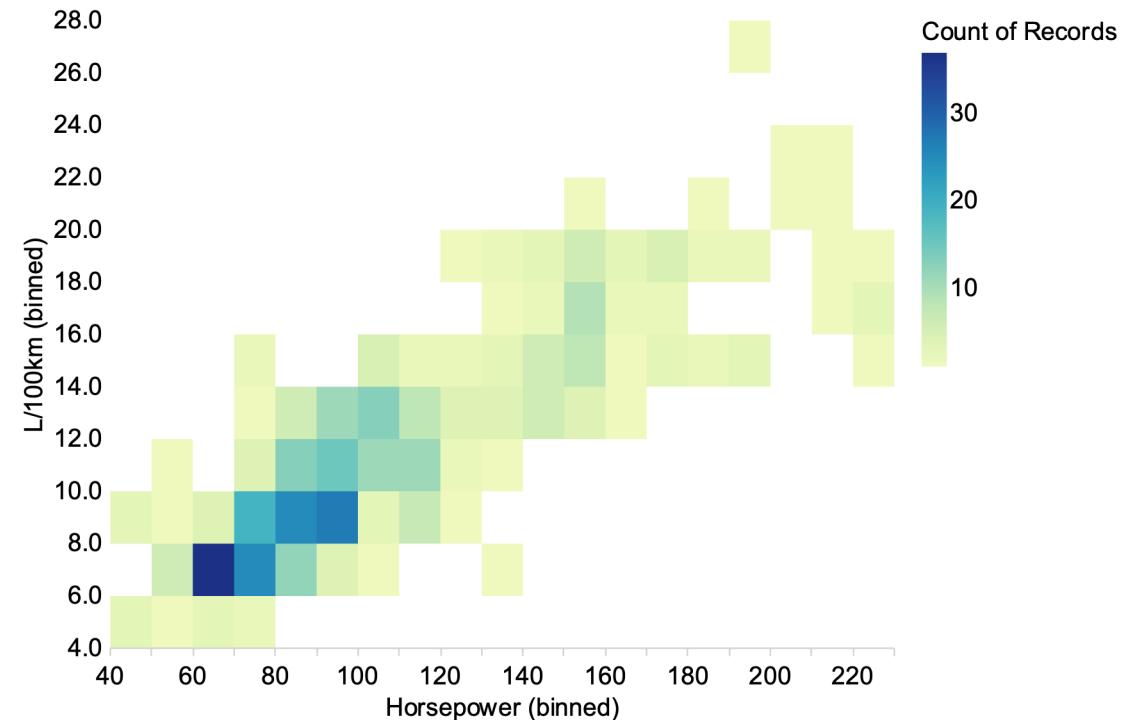
```
plt.hist(...)
```

```
alt.Chart(cars_df).mark_bar().encode(  
    alt.X("Horsepower").bin(),  
    alt.Y("count()")  
)
```



```
plt.hist2d(...)
```

```
alt.Chart(cars_df).mark_rect().encode(  
    alt.X("Horsepower").bin(maxbins=20),  
    alt.Y("L/100km").bin(maxbins=20),  
    alt.Color("count()",  
)
```

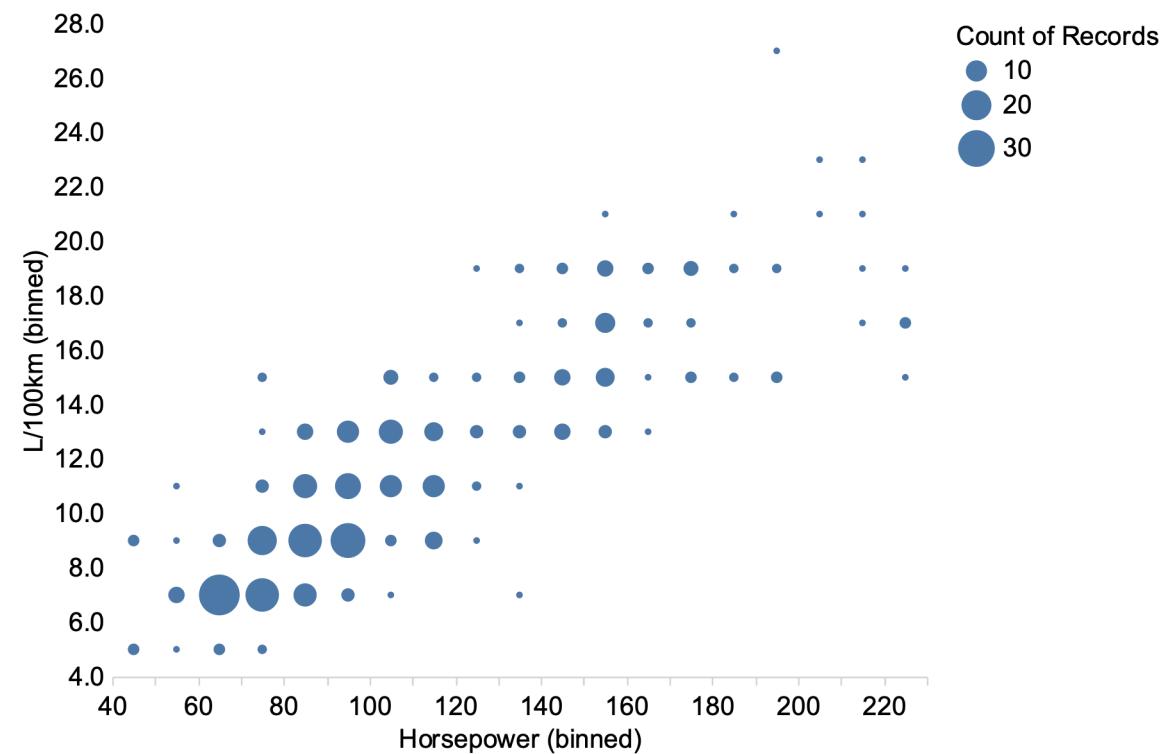
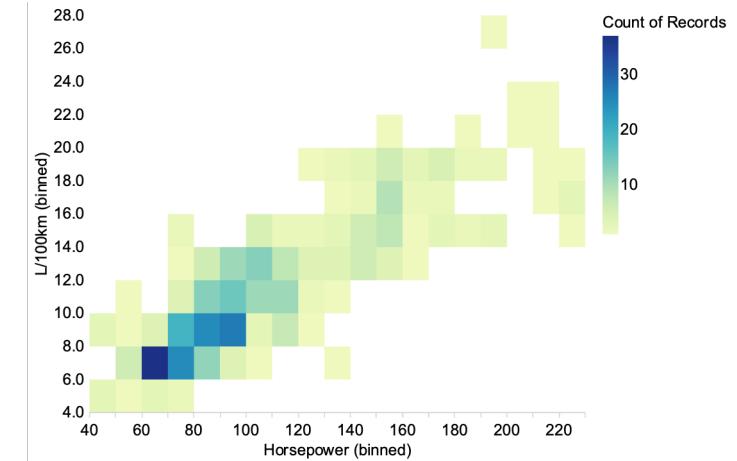


```
plt.hist2d(...)
```

```
    alt.Chart(cars_df).mark_rect().encode(  
        alt.X("Horsepower").bin(maxbins=20),  
        alt.Y("L/100km").bin(maxbins=20),  
        alt.Color("count()"),  
)
```

```
?
```

```
    alt.Chart(cars_df).mark_circle().encode(  
        alt.X("Horsepower").bin(maxbins=20),  
        alt.Y("L/100km").bin(maxbins=20),  
        alt.Size("count()"),  
)
```



The **Vega-Altair** grammar is a **brain-friendly** way to explore data.

It helps you achieve a **flow state** and be **creative**.



Springer

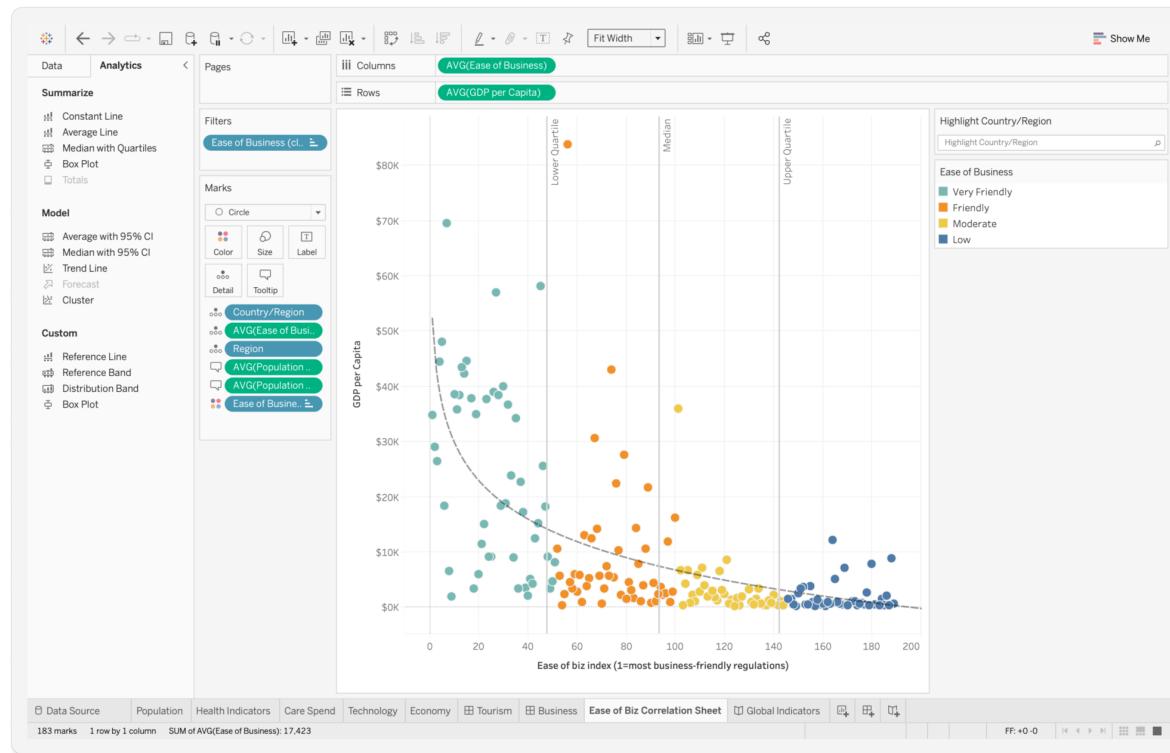
Statistics and Computing

Leland Wilkinson

**The Grammar
of Graphics**

Second Edition

Tableau

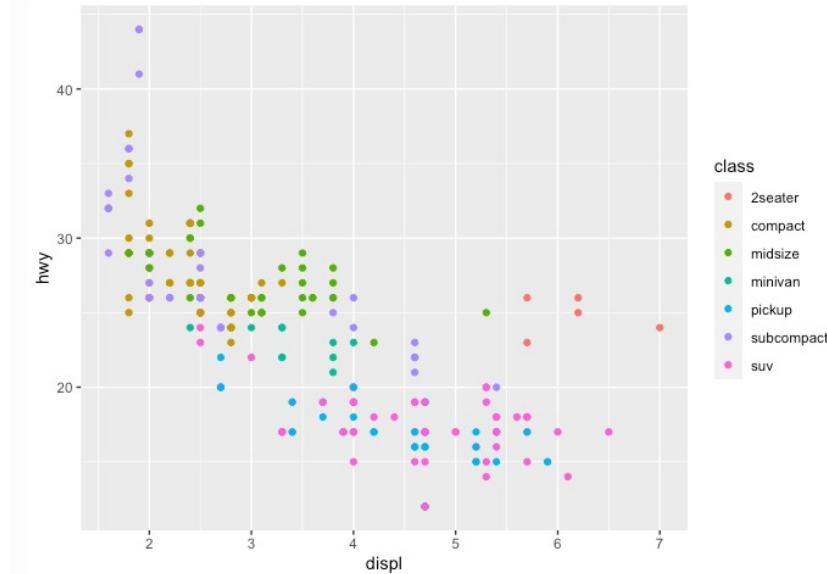


Source: <https://www.tableau.com/products/desktop>

ggplot2

```
library(ggplot2)
```

```
ggplot(mpg, aes(displ, hwy, colour = class)) +  
  geom_point()
```



Source: <https://ggplot2.tidyverse.org/>

Grammar of Graphics

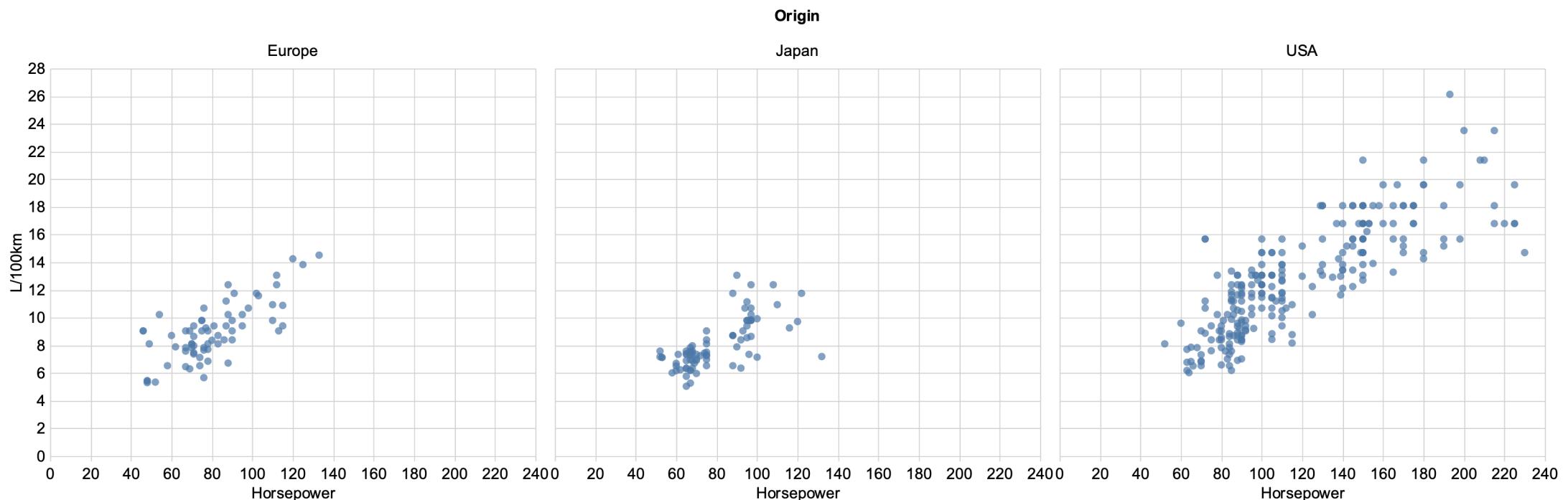
Data	Input data source to visualize.
Transform	Filter, aggregation, binning, etc.
Mark	Data-representative graphics.
Encoding	Mapping between data and mark properties.
Scale	Functions that map data values to visual values.
Guides	Axes & legends that visualize scales.

```
import altair as alt  
Data          Mark  
alt.Chart(cars_df).mark_circle().encode(  
    alt.X("Horsepower"),  
    alt.Y("L/100km"),  
    alt.Color("Origin"))  
)
```

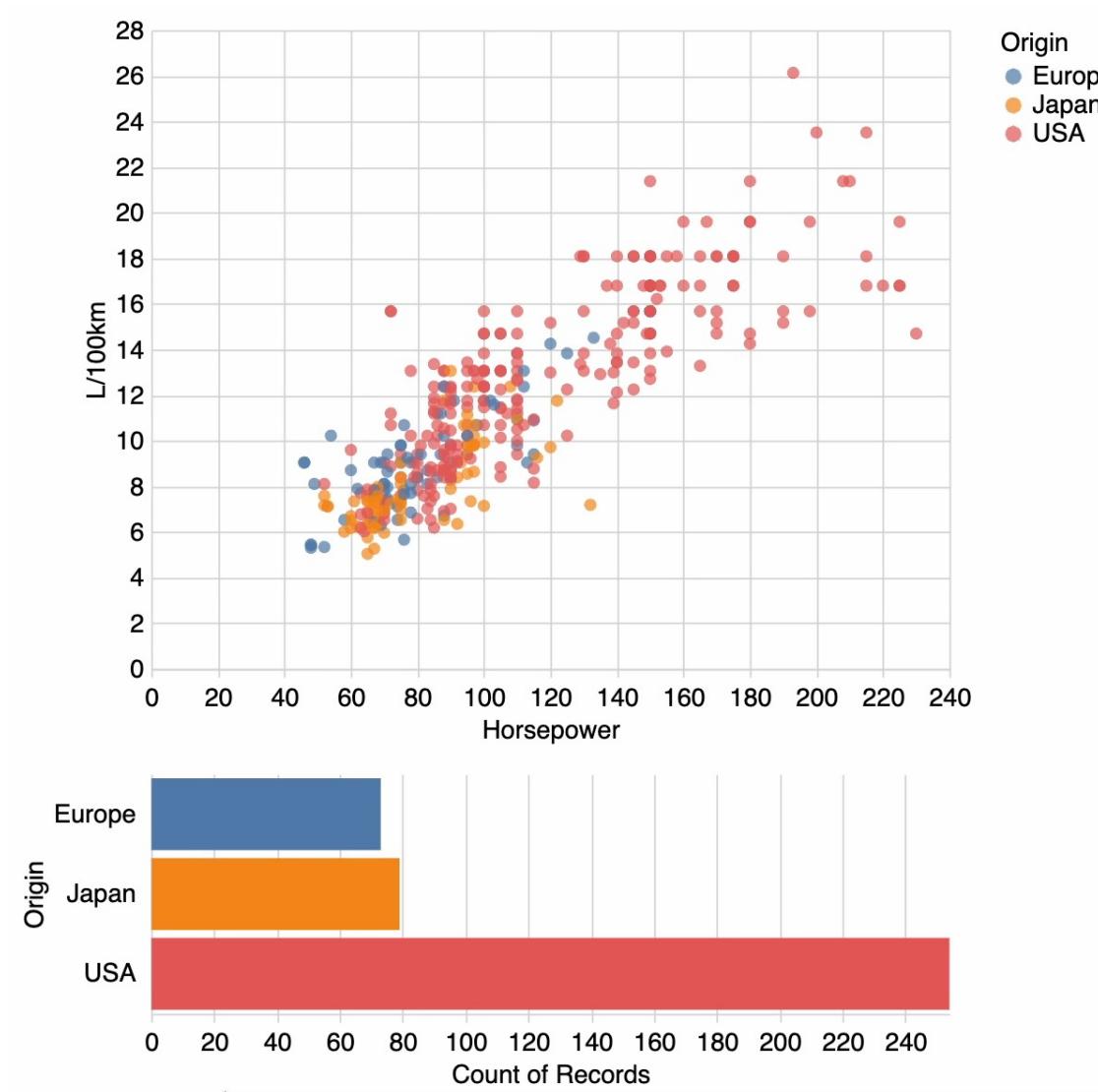
Encoding channels

Vega-Altair includes grammar for multi-view...

```
alt.Chart(cars_df).mark_circle().encode(  
    alt.X("Horsepower"),  
    alt.Y("L/100km"),  
    alt.Column("Origin")  
)
```



... and interactivity



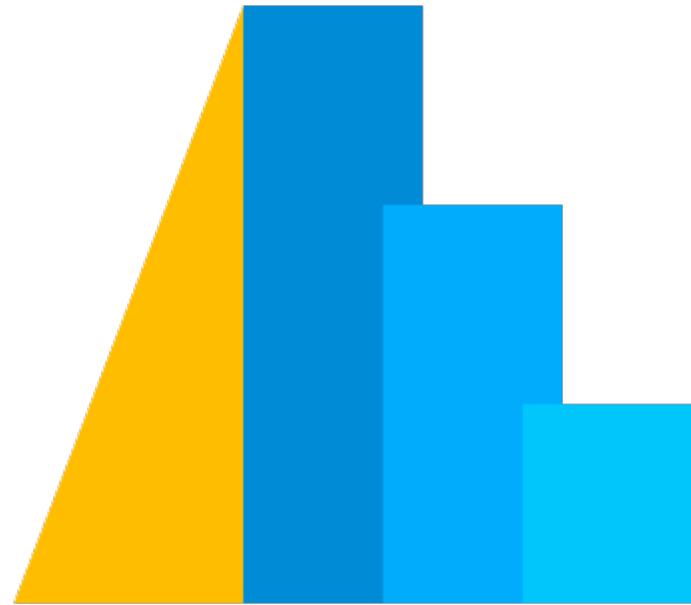
Outline

What is Altair and why should you care

Be creative and customize

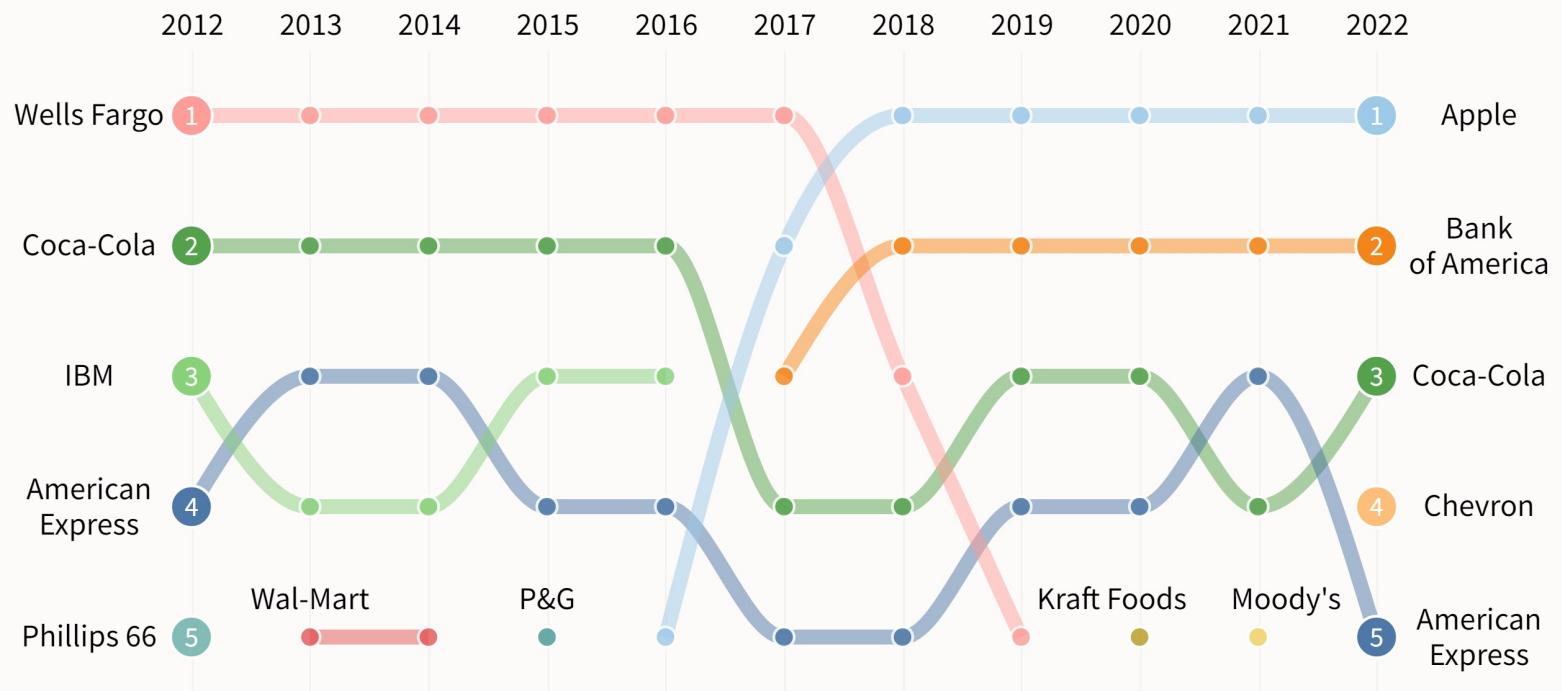
History, what's new, and what's coming

What stars have to do with it



Warren Buffett's Top 5 Holdings, 2012–2022

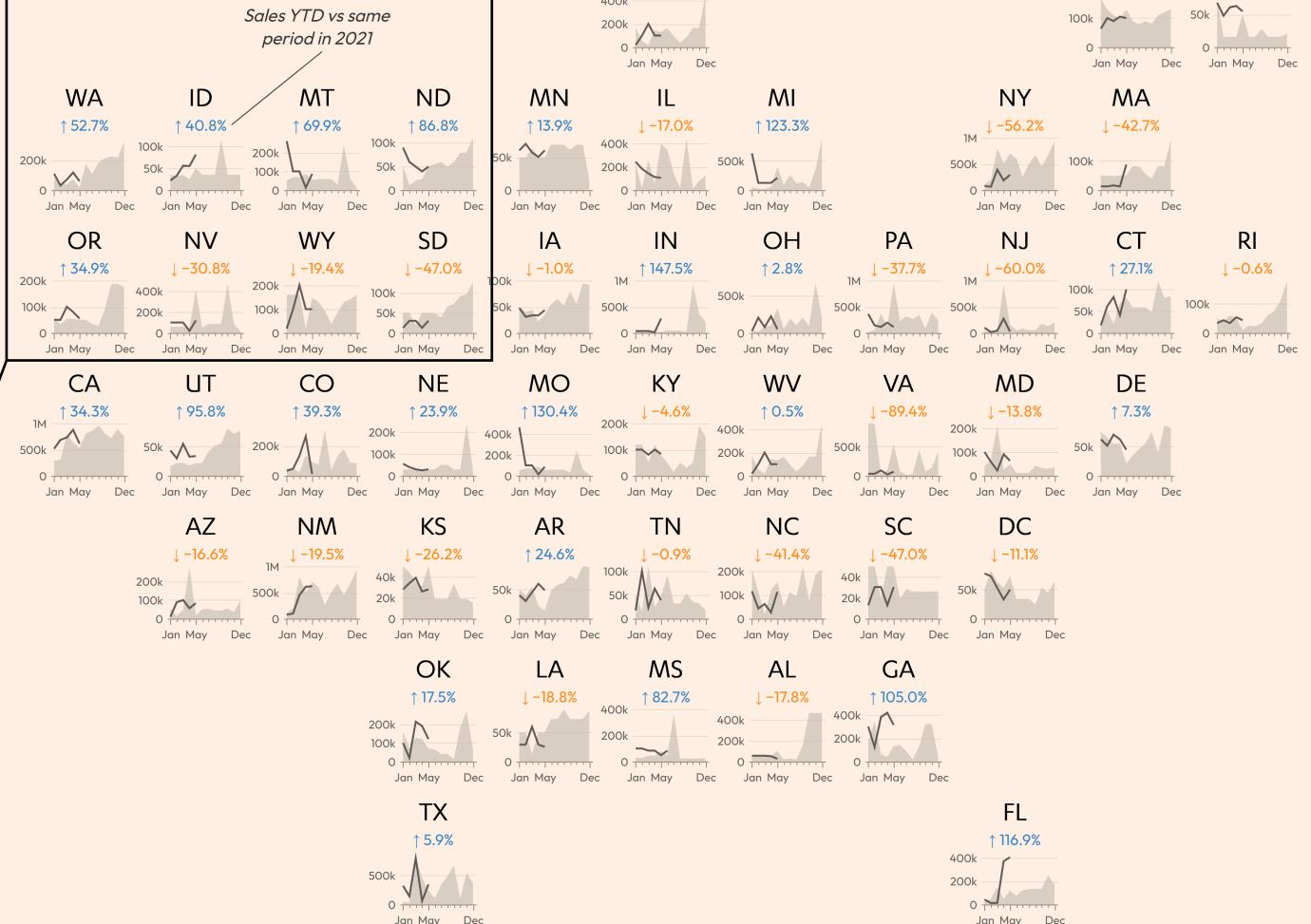
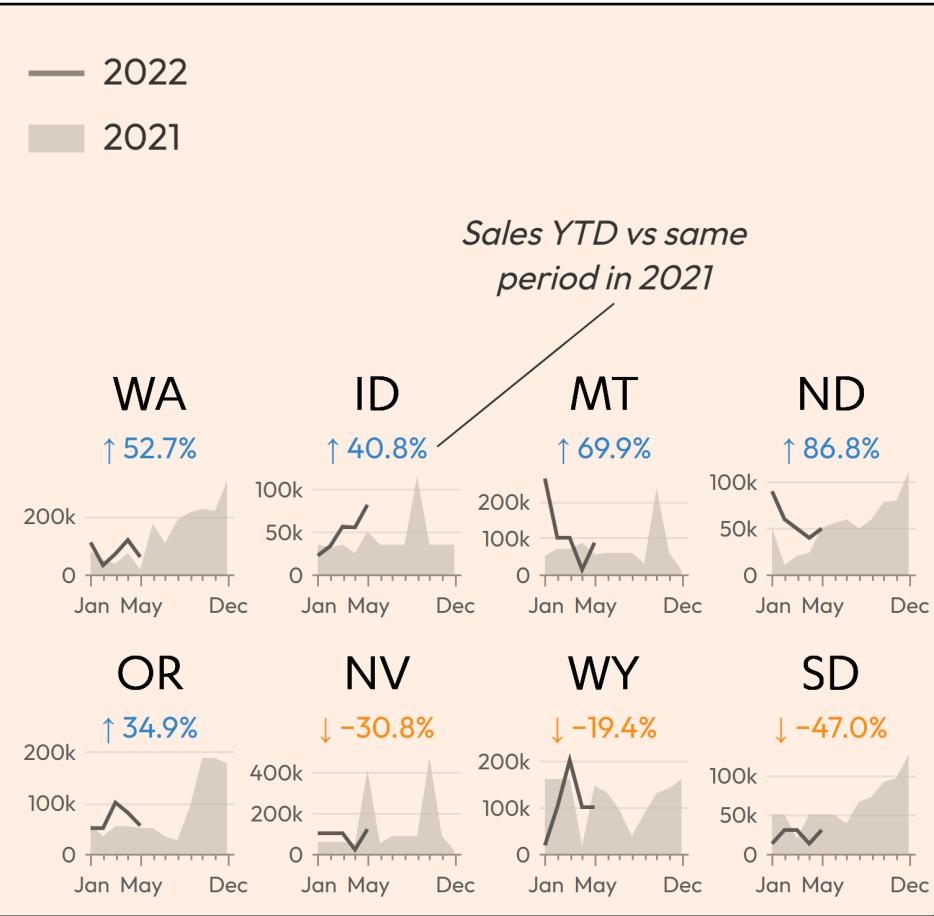
Although old-guard favorites such as Coca-Cola and American Express still form the core of the portfolio, Buffett's Berkshire Hathaway has taken a shine to names such as Apple and Bank of America. Hover over each point for the value of the holdings and the percentage of Berkshire's total portfolio.



Note: Data as of 30 June 2022 | Sources: Berkshire Hathaway Annual, Quarterly Reports, and 13F filings
Data collected and formatted by Sjoerd Tilmans: sjdataviz.com | Graphic: @shadfrgui

Sales Performance

Last updated: 2022-05-30



Graphic: @shadfrigui

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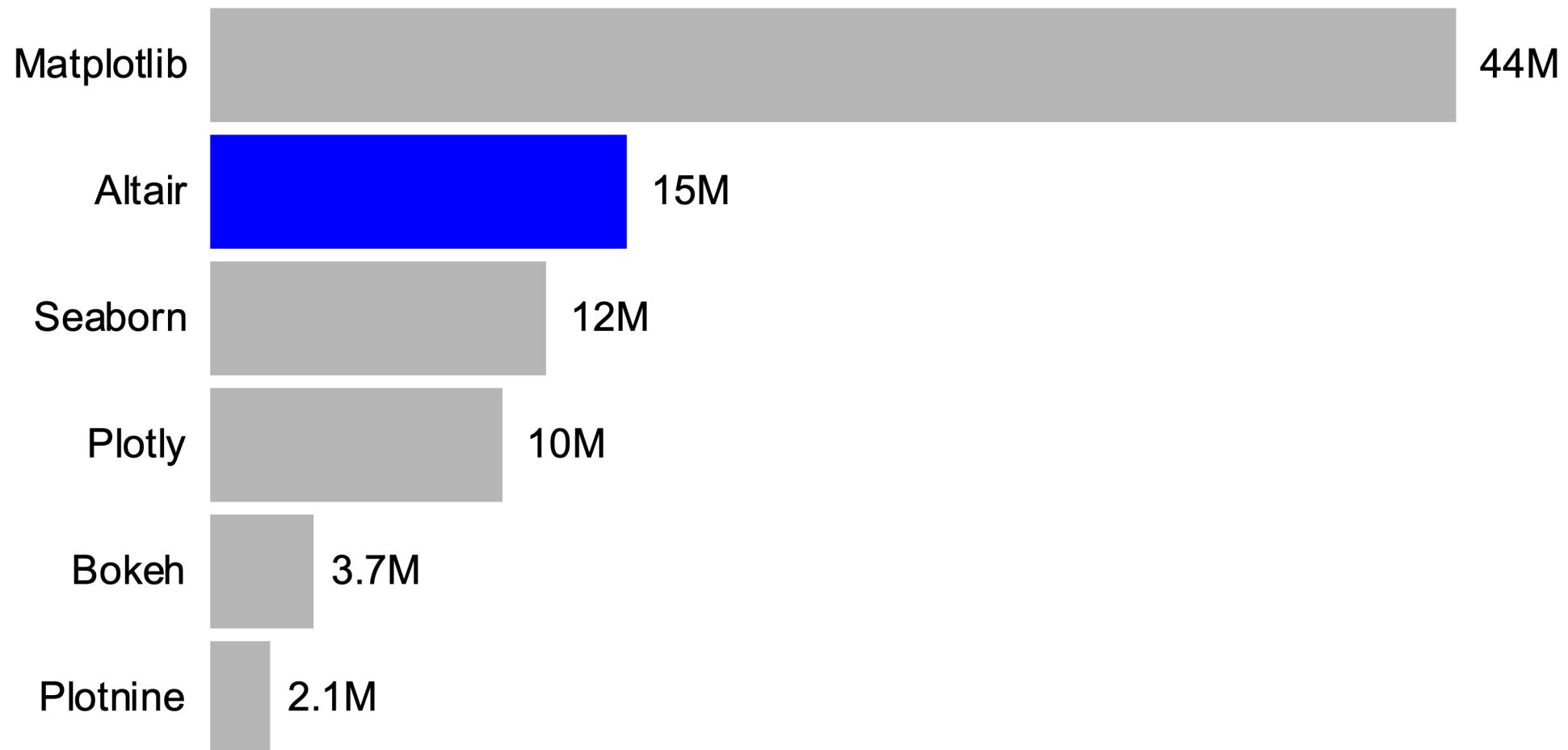
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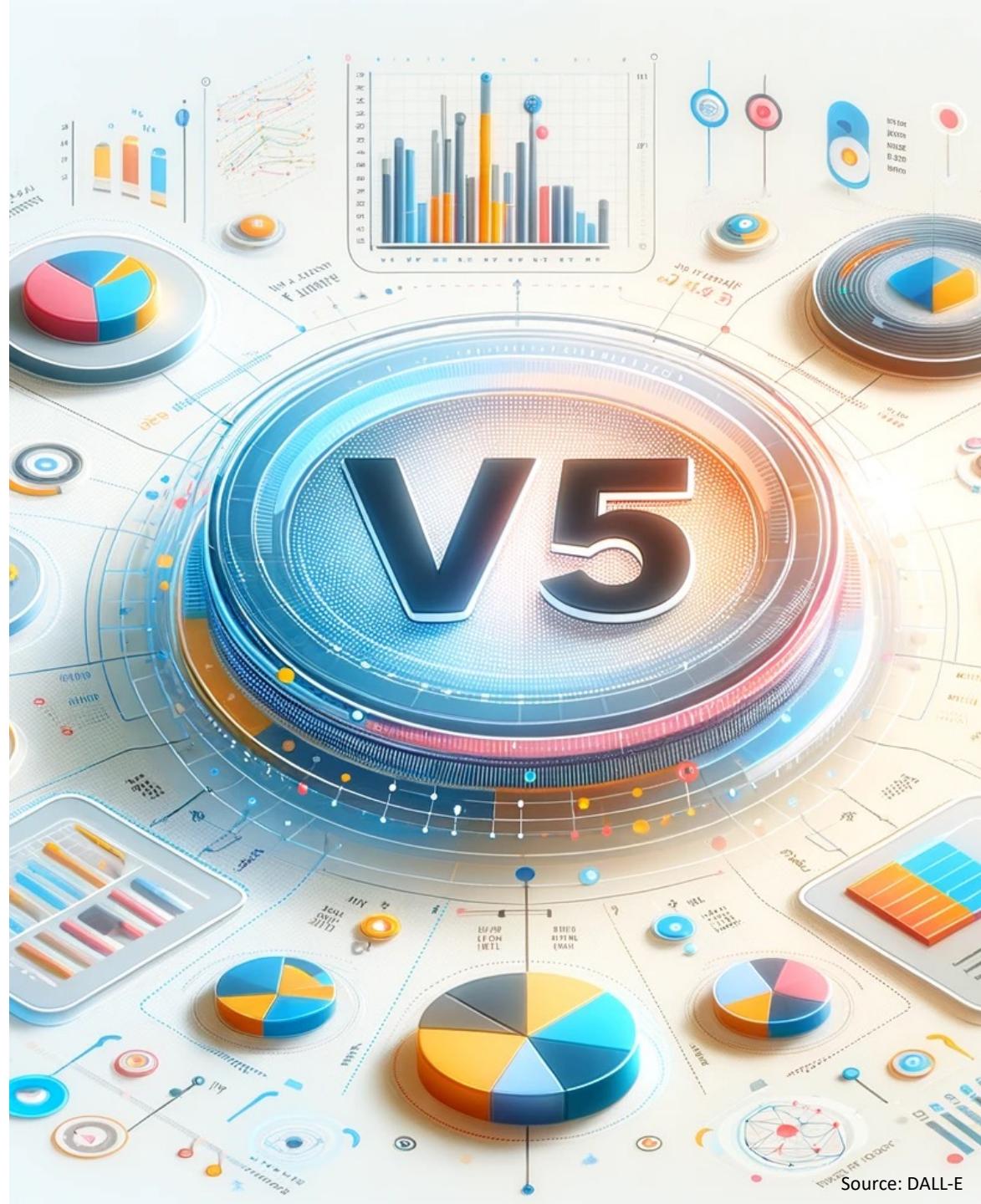


Monthly package downloads (PyPI)



New features

- Improved grammar for interactivity
- Significantly better error messages
- Simplified static image export
- DataFrame Interchange Protocol
(Arrow, Polars, ...)
- Access chart selections in Jupyter notebooks
- Simplified grouped bar charts
- Added type hints
- ...



Source: DALL-E

Revamped documentation

This website is for Vega-Altair v4. Go to the [main Vega-Altair homepage](#) for the latest release.

Altair
4.2.2
Search docs

GETTING STARTED

- Overview
- Installation
- Dependencies
- Development Install
- Basic Statistical Visualization

GALLERY

- Example Gallery

USER GUIDE

- Specifying Data in Altair
- Encodings
- Marks
- Data Transformations
- Bindings, Selections, Conditions: Making Charts Interactive
- Top-Level Chart Configuration
- Compound Charts: Layer, HConcat, VConcat, Repeat, Facet
- Scale and Guide Resolution
- Saving Altair Charts
- Customizing Visualizations
- Times and Dates in Altair
- Frequently Asked Questions
- Display Troubleshooting
- Altair Internals: Understanding the Library
- API Reference

Vega-Altair: Declarative Visualization in Python

Vega-Altair is a declarative statistical visualization library for Python, based on Vega and Vega-Lite, and the source is available on [GitHub](#).

The Vega-Altair open source project is not affiliated with Altair Engineering, Inc.

With Vega-Altair, you can spend more time understanding your data and its meaning. Altair's API is simple, friendly and consistent and built on top of the powerful Vega-Lite visualization grammar. This elegant simplicity produces beautiful and effective visualizations with a minimal amount of code.

Getting Started

- Overview
- Installation
- Dependencies
- Development Install
- Basic Statistical Visualization

Gallery

- Example Gallery

User Guide

- Specifying Data in Altair
- Encodings
- Marks

v4



v5

This website is for version 5. You can find the documentation for version 4 [here](#).

Vega-Altair Getting Started User Guide Examples API Release Notes About

Vega-Altair: Declarative Visualization in Python

Vega-Altair is a declarative visualization library for Python. Its simple, friendly and consistent API, built on top of the powerful Vega-Lite grammar, empowers you to spend less time writing code and more time exploring your data.

Getting Started

In the Getting Started section you can find installation instructions and a high-level overview of the main concepts.

Examples

The Examples gallery contains a selection of different visualizations which you can create with Vega-Altair.

User Guide

Check out the User Guides for in-depth information on the key concepts of Vega-Altair.

API

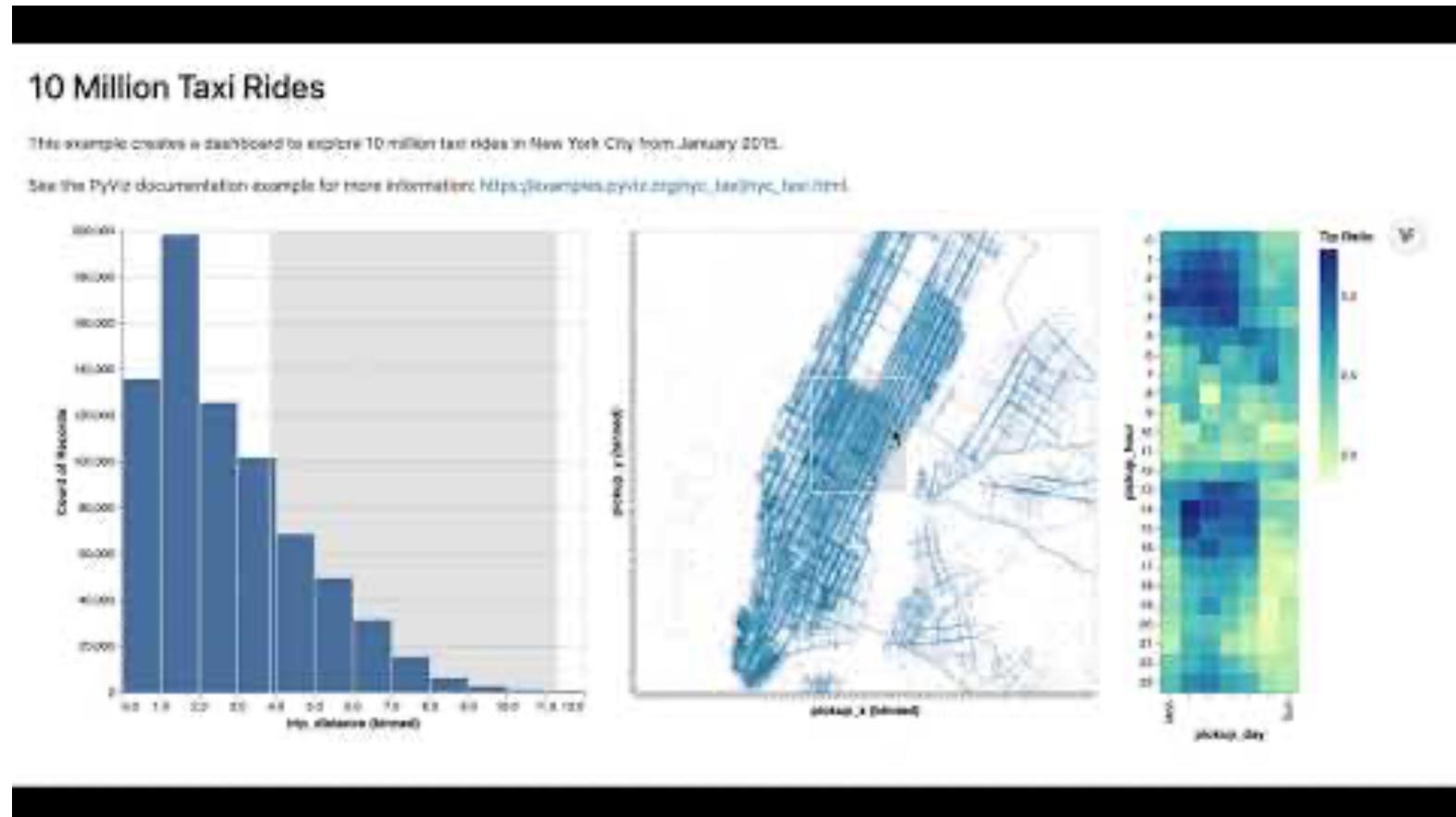
The API reference guide contains detailed information on all of Vega-Altair's methods and classes.

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Next >
Overview >

VegaFusion

- Transforms data in Python kernel
- Can push calculations to external SQL systems (Snowflake, DuckDB, ...)
- Integrated in Altair 5.1

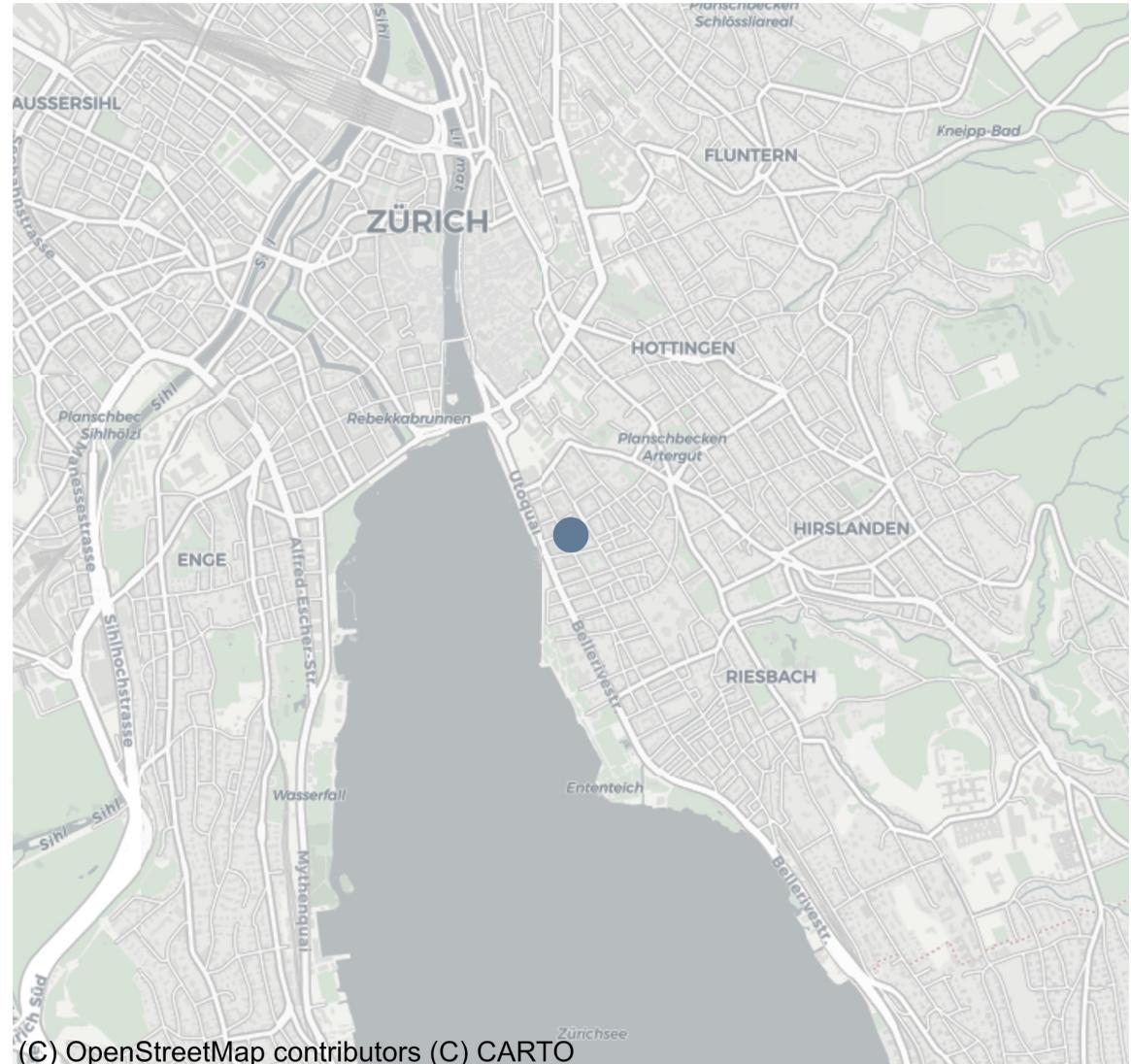


hex-inc/vegafusion

altair_tiles

Add map tiles such as from
OpenStreetMap to your
Altair charts

 altair-viz/altair_tiles

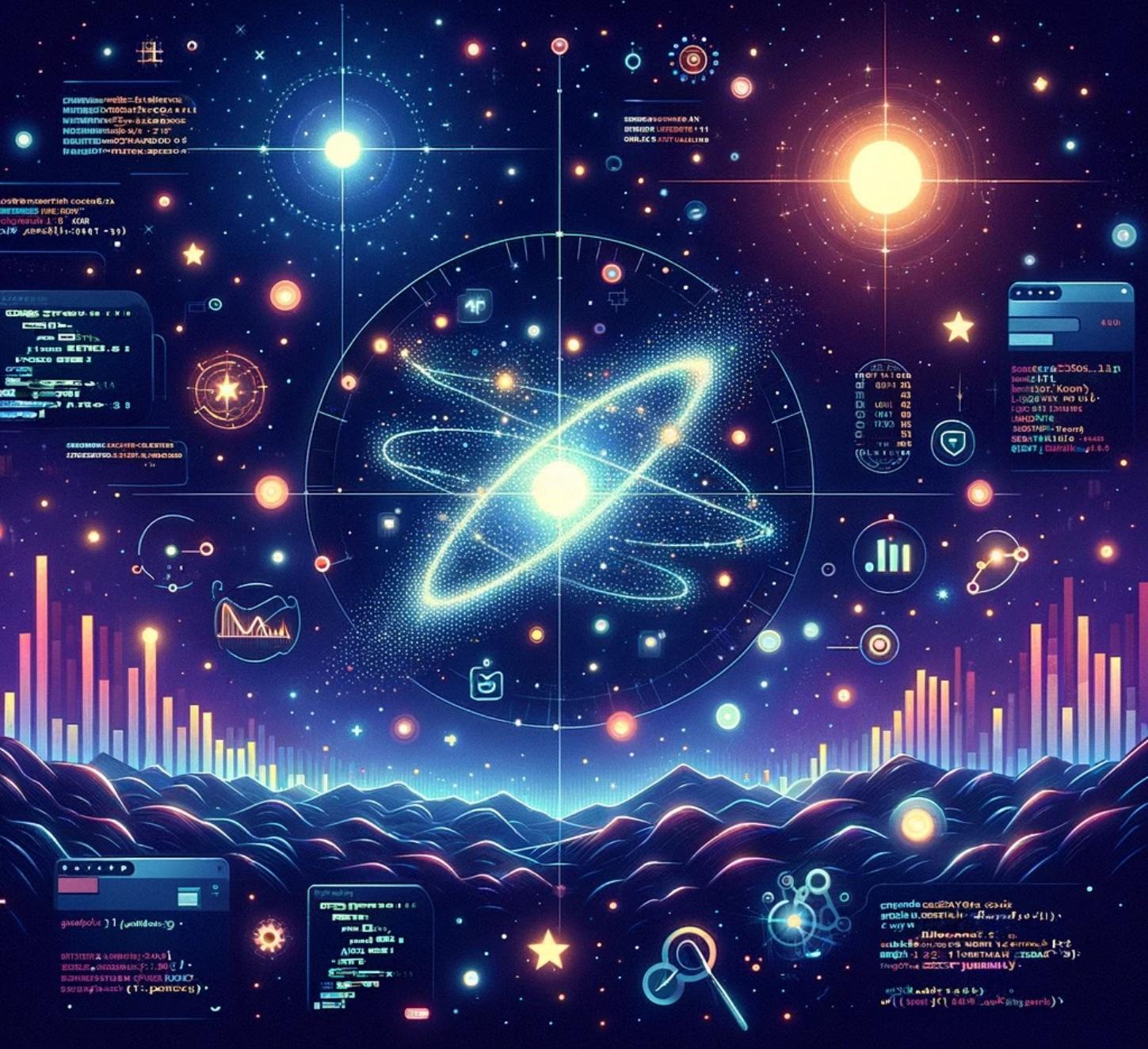


Roadmap

- Various ideas to improve syntax
- Simplify violin charts
- GPU accelerated rendering
- ...



We are looking for contributors



Source: DALL-E

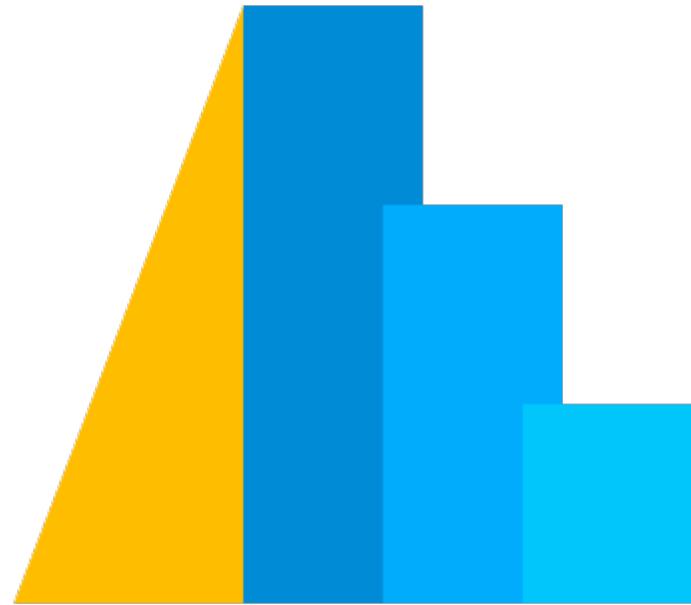
Outline

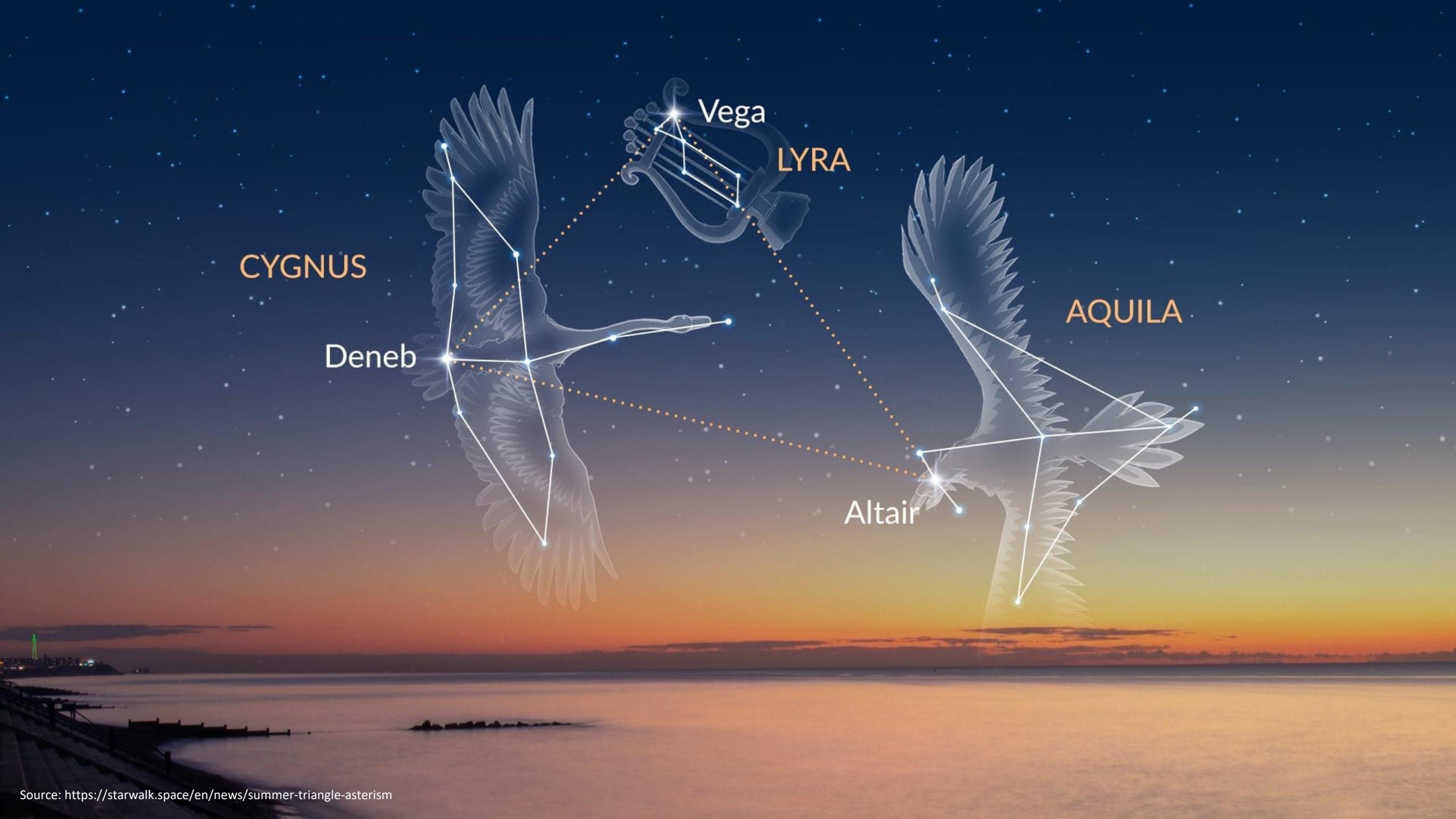
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CYGNUS

Deneb

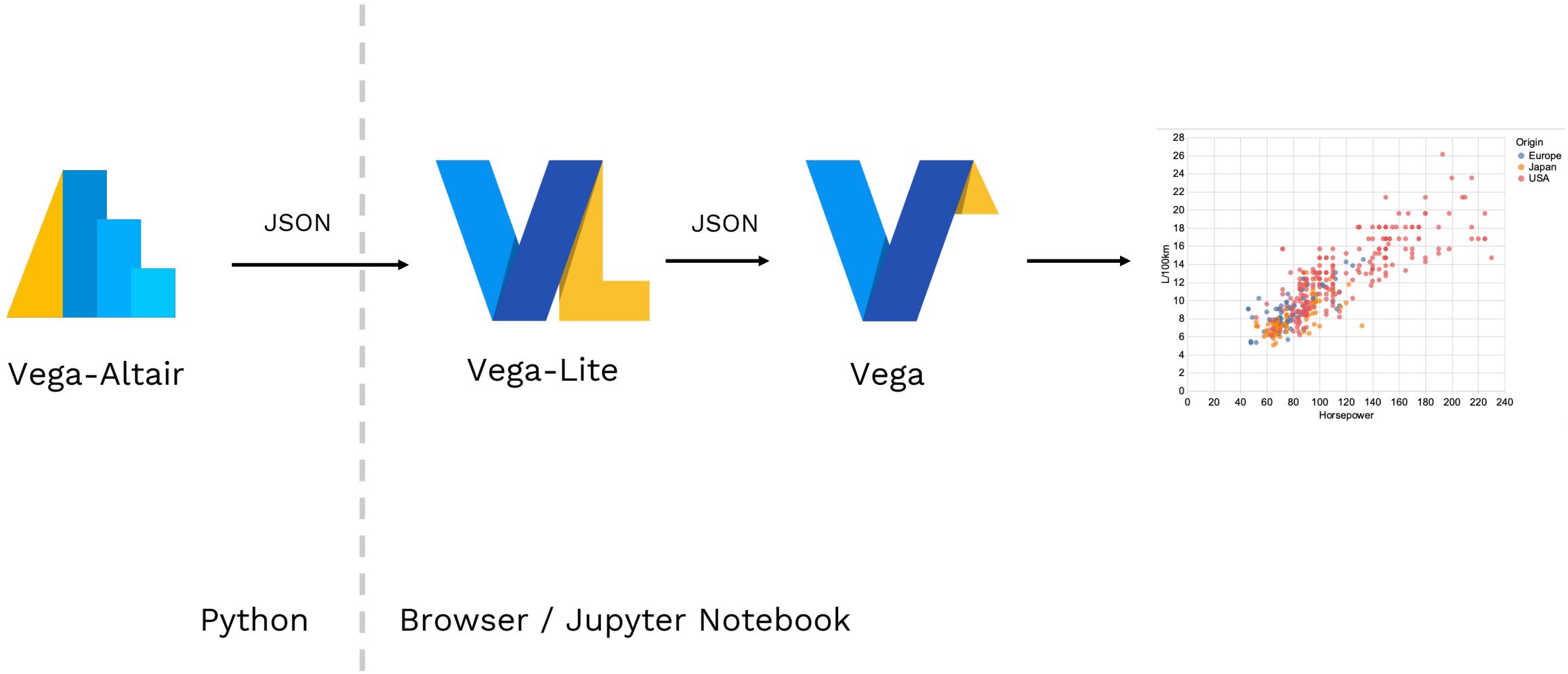
Vega

LYRA

AQUILA

Altair

Architecture



Outline

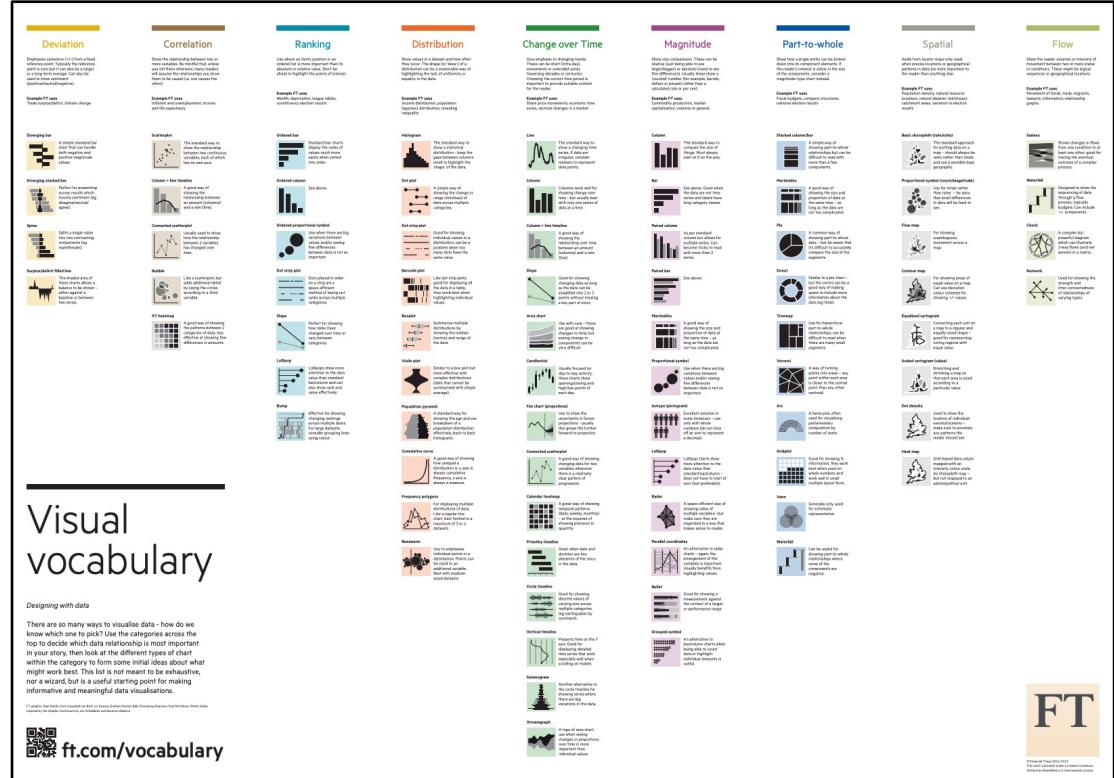
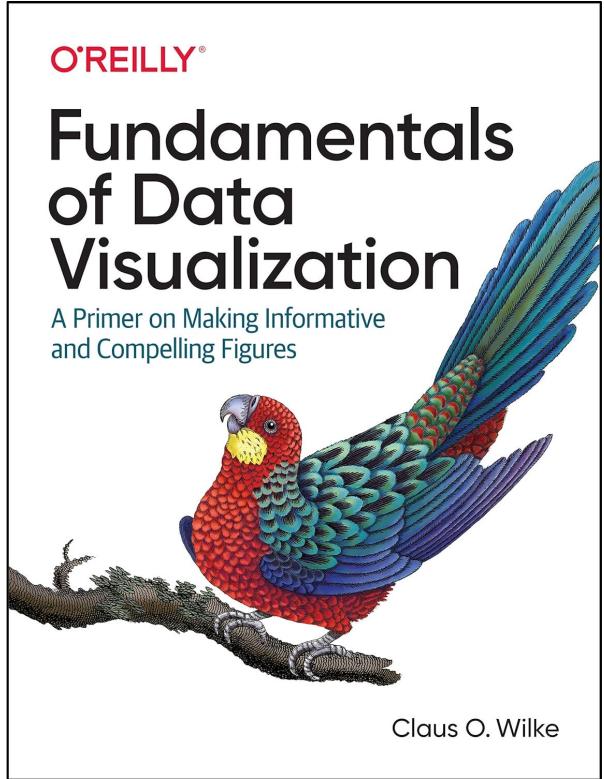
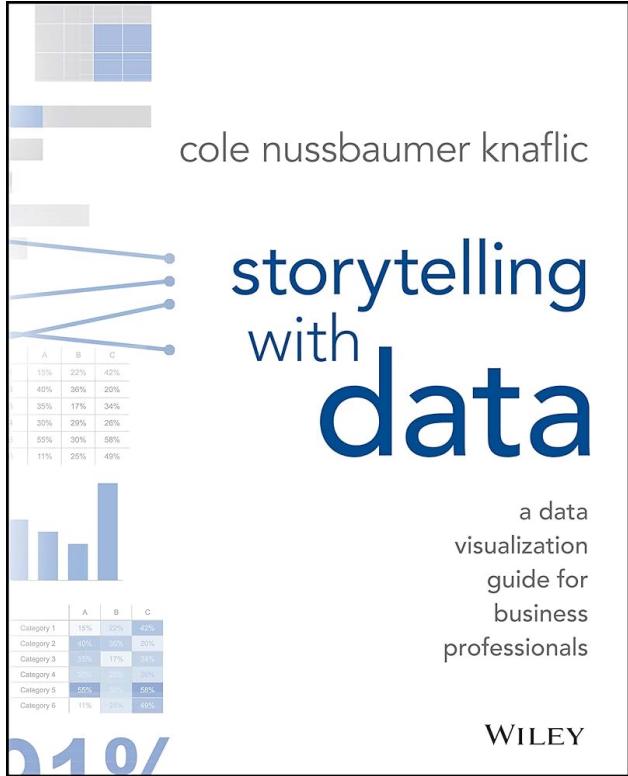
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To learn more

altair-viz.github.io



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