9a: Chart types

Spatial / Geospatial data

Recap: How to design viz idioms

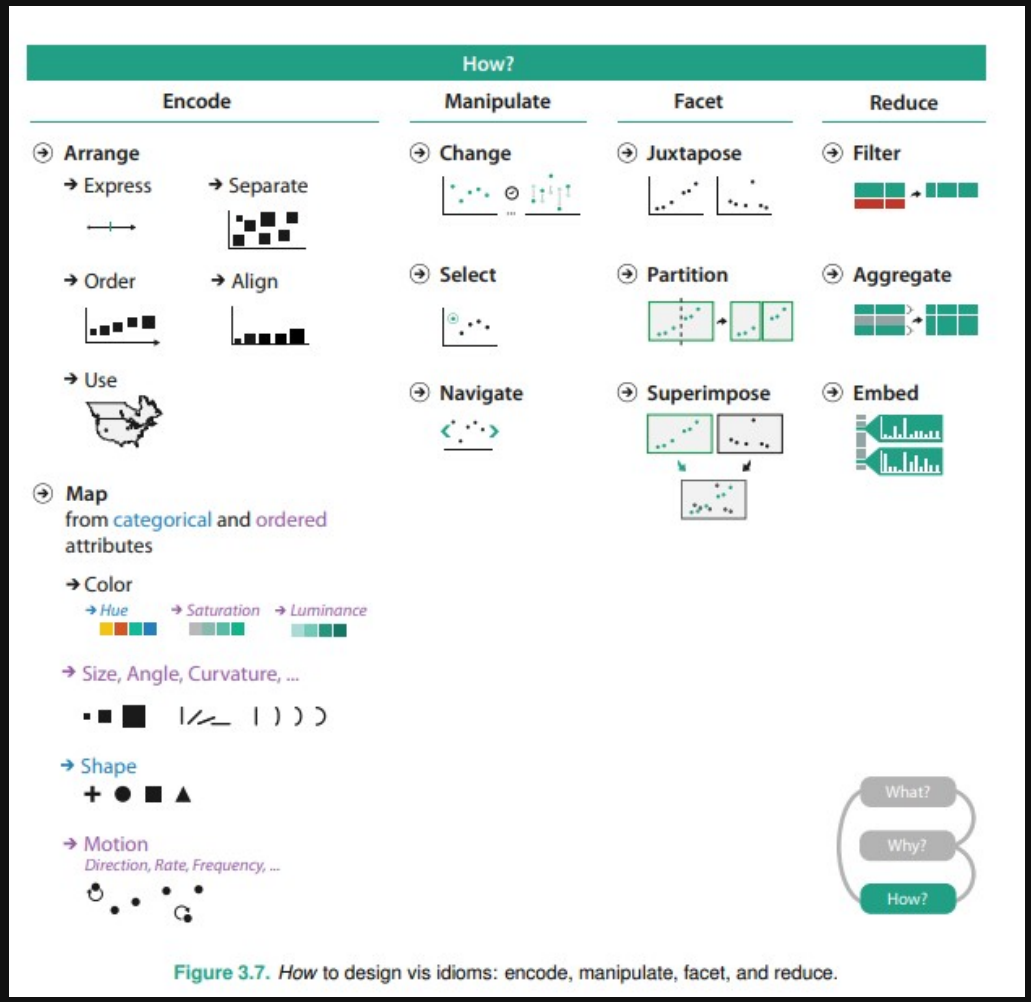


Figure 3.7. *How* to design vis idioms: encode, manipulate, facet, and reduce.

Recap: Data Types

- Tabular data
- Networks
- Geographic / spatial
- Fields
- Hierarchical

Spatial

Arrange Spatial Data

- **Use Given**
  - Geometry
    - *Geographic*
    - *Other Derived*

  - Spatial Fields
    - *Scalar Fields (one value per cell)*
      - *Isocontours*
      - *Direct Volume Rendering*

    - *Vector and Tensor Fields (many values per cell)*
      - *Flow Glyphs (local)*
      - *Geometric (sparse seeds)*
      - *Textures (dense seeds)*
      - *Features (globally derived)*

Geospatial data

GeoJSON / TopoJSON (GeoJSON spec) (TopoJSON spec)

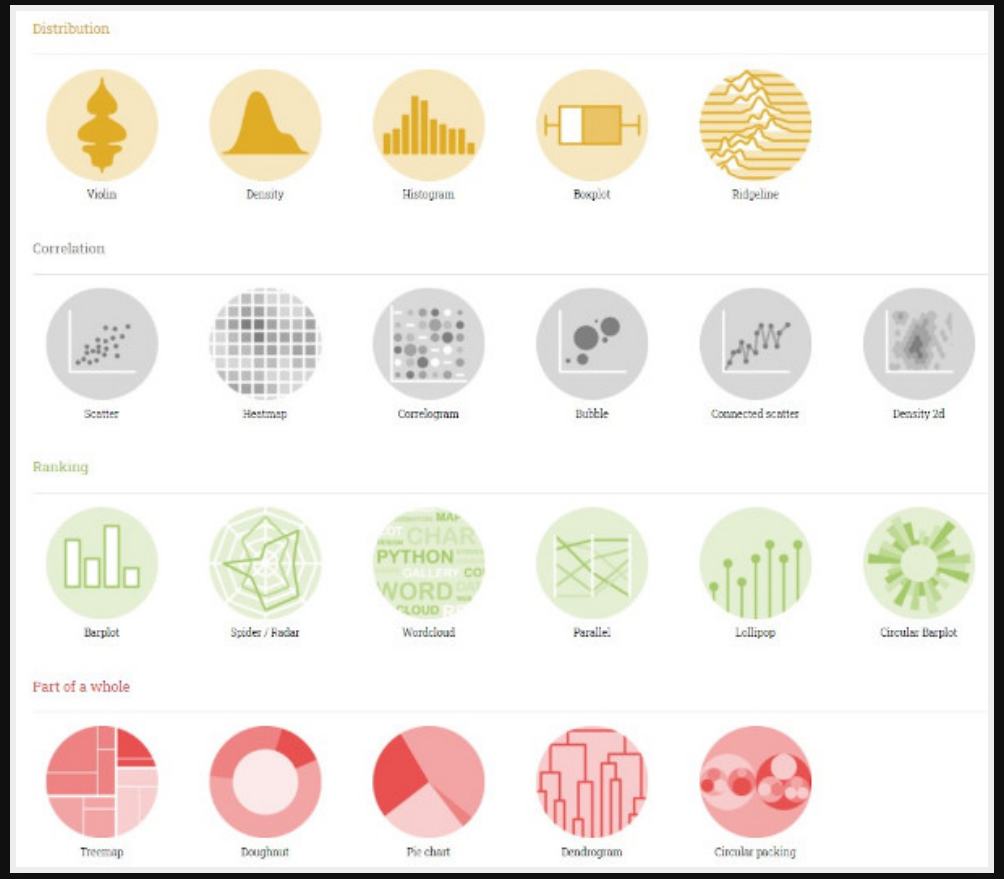
KML (spec)

Shapefile (SHP) (spec)

CityGML (spec)

There are a ton of GIS file formats.

D3 Graph Gallery



D3 Graph Gallery, by Yan Holtz

Geospatial (2D)

Libraries

Leaflet

Open Layers

Map Tiles

Open street map

Open map tiles

SLA OneMap API

Geospatial (2D)

Tools

Mapshaper

GeoJSON.io

QGIS

Platforms

Carto (formerly cartoDB)

ArcGIS, Esri

Google Maps API

Geospatial (3D)

Mapbox, MapboxGL

deck.gl

Cesium

Idiom: Map Markers (e.g. Leaflet)

What: Data	Geographic geometry data. Points, polygons, etc. Additional qualitative / quantitative fields.
How: Encoding	Area and point marks on a geographic map. Often allows for zoom, pan and rotate functions.
Why: Task	Task: Lookup, compare values, find spatial trends
Scale	Color channel: If quantitative up to 8, if categorical up to 12.

D3 Graph Gallery - Leaflet

SG Dengue

Idiom: Choropleth Map

What: Data	Geographic geometry data. Table with one quantitative attribute per region
How: Encoding	Space: use given geometry for area mark boundaries. Color: sequential (or divergent) segmented colormap
Why: Task	Task: Lookup, compare values, find spatial trends
Scale	Color channel: If quantitative up to 8, if categorical up to 12.

D3 Graph Gallery - Choropleth Map

SG Population by Subzone vs OneMap Population Query

SG Elections

Telco transactions

Idiom: Hexbin Maps

What: Data	Geographic data: lat/lon points, quantitative count attribute.
How: Encoding	Encode Use given geographic data geometry of points, overlay on hexbin map depening on zoom value.
Why: Task	Task: Find spatial trends, esp at different zoom values
Scale	Color channel: Quantitative (up to 8)

D3 Graph Gallery - Hexbin Charts

SG Taxi Availbility, Yong Quan (repo)

Leaflet + D3.js, Tom Nightingale

Idiom: Isocontours

What: Data	2D spatial field; geographic data. Derived Geometry: set of isolines computed from field.
How: Encoding	Encode Use given geographic data geometry of points, lines, and region marks. Use derived geometry as line marks.
Why: Task	Task: Get a sense of spatial shape
Scale	Dozens of contour levels.

D3: Contour density maps

Mapbox - Isochrone Maps

Idiom: Vector Fields

What: Data	2D spatial field: geographic data. Each grid square - vector values (e.g. wind speeds, u and v)
How: Encoding	Encode vectors as arrow marks on a 2D spatial field
Why: Task	Task: Get a holistic sense of both direction and maginitude of the vectors. (e.g. wind speed and direction)
Scale	Hundreds of thousands of marks.

ObservableHQ - Vector Fields

3D Volume Rendering

What: Data	3D spatial field
How: Encoding	A model of how light rays are absorbed, emitted, and scattered by the medium.
Why: Task	Task: Find anomalies, inspect 3D structure

Volume Rendering in webgl, Will Usher

For 3D scientific viz, probably good to work with a 3D library, like three.js

3D Viz (examples)

One Map 3D, SLA Singapore, (Cesium - I think)

National Map Australia, (Cesium)

Urban City Visualization, (three.js)

Questions?

Chi-Loong | V/R