

# Visualization Practice Deep Dive

**From data structure to structure of views.**

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DATA101 — Visualization and Storytelling



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## Comparison Tasks: one-row cheat sheet

### Question → Best primary encoding → Avoid

Question

Best primary encoding

Avoid ordered / ranked

● avoid overloaded scale

Which is largest / smallest?

Ordered bars, sorted dot marks

Pie charts, unlabelled donut

Which changed most?

Paired bars, slope chart, dumbbells

Area fill without baseline labels

How different are all pairs?

Heatmap, matrix of deltas, clustered small multiples

Single 2D scatter unless pairs are continuous

Hover and click rows to compare rationale and trade-offs.

**Which is largest / smallest?**

A ranking task needs explicit baseline and stable ordering.

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## Comparison View Choice: few categories



DESIGN MOVE

**Sort before color. Keep scale constant across comparable panels.**

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## Comparison Anti-patterns (hard-fail)

### 1) BASELINE CONFUSION

Comparing percentages from incompatible denominators as if they were absolute counts.

### 2) AREA OVERLOAD

Stacked bars for comparison of small components create false visual hierarchy.

### 3) ZERO-ORDER SORTING

Alphabetical category order while task needs ranked or temporal order.



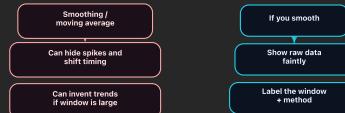


## Trend traps you can still catch in peer review

- Implicitly connecting non-equidistant timestamps.
- Smoothed lines that erase short-cycle oscillation.
- One shared y-axis for fundamentally different magnitudes.
- Axis clipping that deletes dip and recovery.

### REPAIR PATTERN

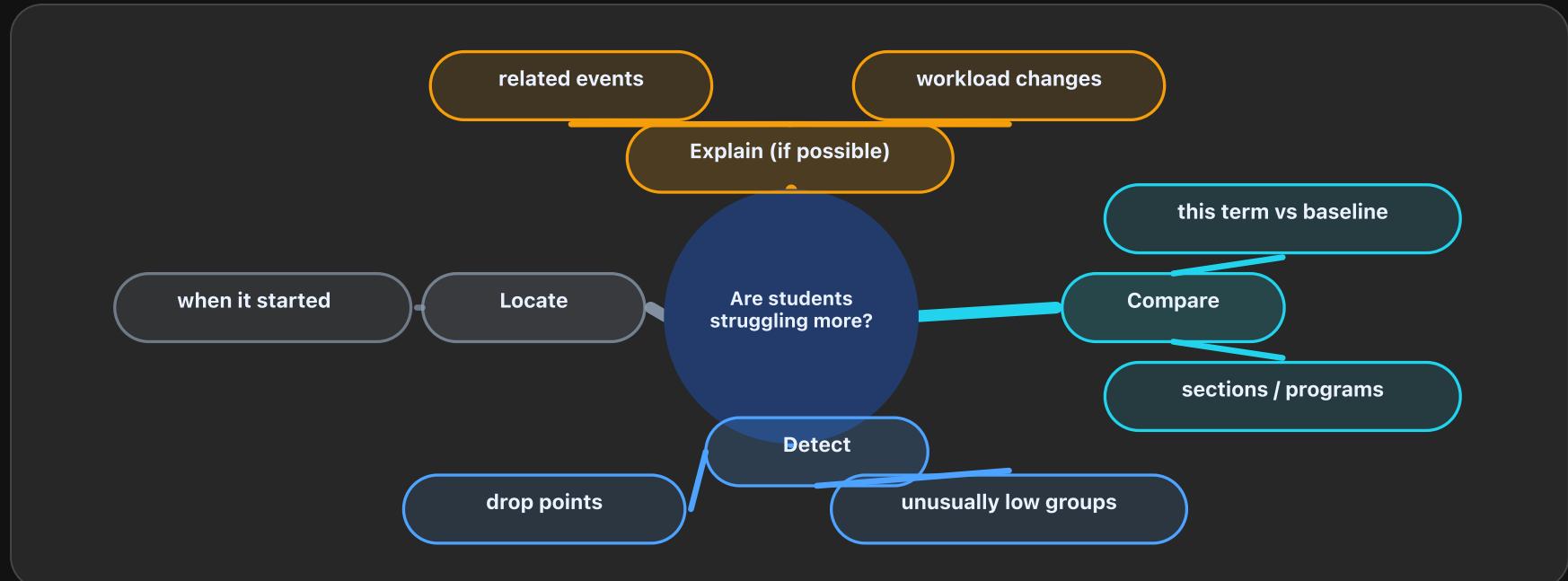
Show the raw line in light gray, then overlay modeled trend in bold.





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## Box and violin: micro-interactions on comparisons





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## What to show

MUST INCLUDE

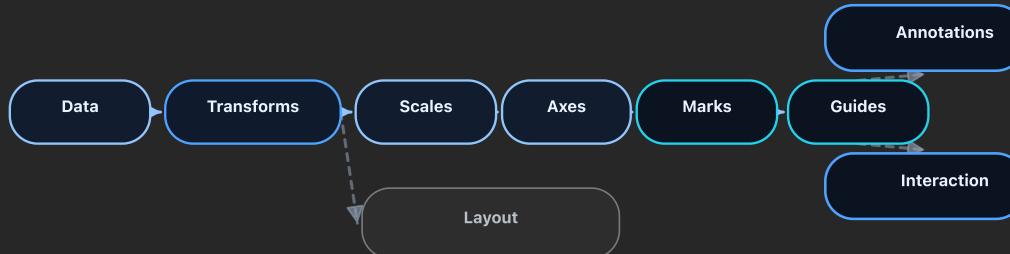
Current state KPI

MUST INCLUDE

Primary driver(s) of change

MUST INCLUDE

Context and comparison  
baseline



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## What to hide

### HIDE BY DEFAULT

Complex labels, raw IDs, secondary metrics, decorative effects, unused controls.

### REVEAL-ON-DEMAND

Methodology notes, outlier definitions, metadata lineage.

### REVEAL-ON-HOVER/CLICK

Secondary details and drill-down tables.







## Dashboard anti-patterns to remove

### ANTI-PATTERN

Three color scales for one logical value.

### ANTI-PATTERN

Unlabeled filters with implicit defaults.

### ANTI-PATTERN

Legend repetition across every panel.

### FIX

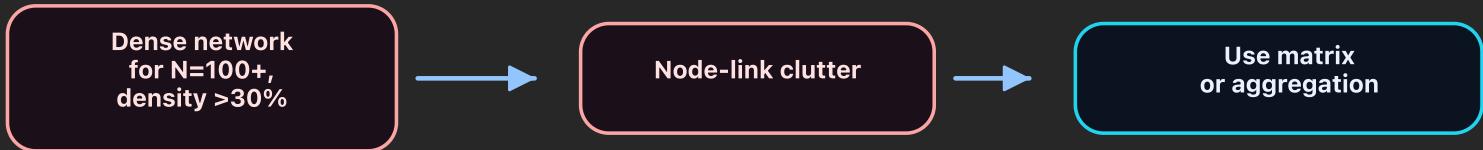
Single shared semantic scale + minimal legends + explicit defaults.



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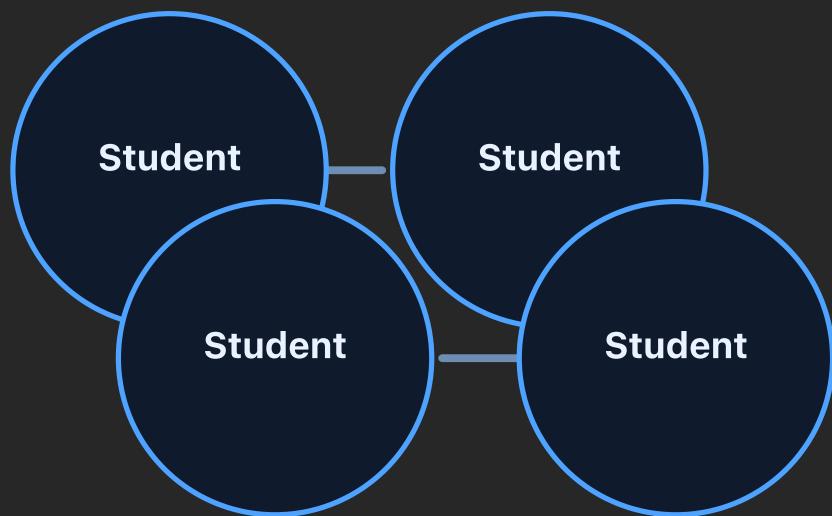
## Part 3: Network / Graph Data

Now shift from rows-as-observations to relationships-as-entities.



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## Network basics in one expression (interactive structure)





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## Node-link vs matrix selector

Question → Prefer node-link → Prefer matrix

Question	Prefer node-link	Prefer matrix
Need path trace	✓	*
Need cluster density	△	✓
Need clear node labels	✓	* (many nodes)
Need weighted connectivity overview	△	✓

Hover and click rows to compare rationale and trade-offs.

**Need path trace**

Path semantics are topological; matrix is edge-presence oriented.

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## Directed and signed graphs

Directed: who initiated action matters. Signed: relation can be positive/negative.

Visual consequences:

- Arrowheads are meaningful (not optional decoration).
- Symmetry assumptions break.
- Color and shape must encode polarity and intensity separately.

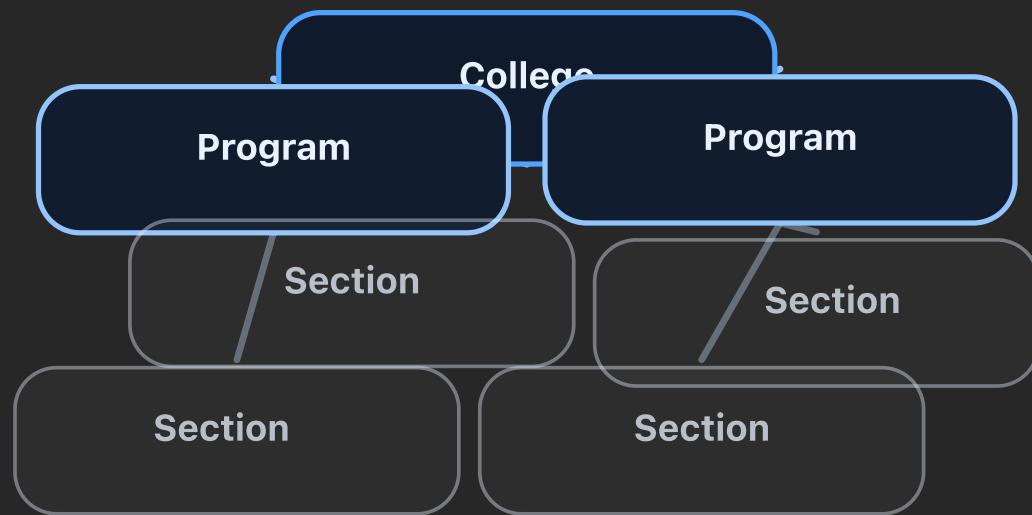
RULE

Never encode direction and intensity with one channel.

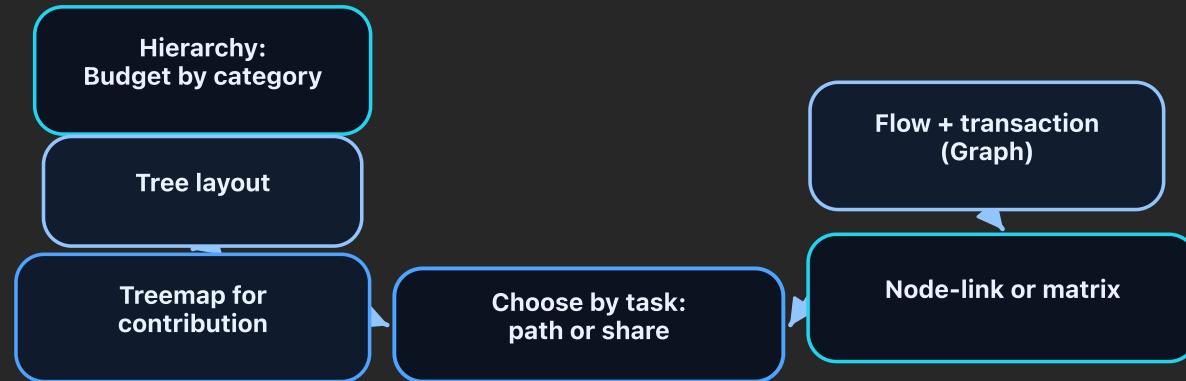


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## Hierarchy from graph data (interactive drill-down)



## Treemap in context with network task



## Map data model

### GEOMETRY

Points, lines, polygons, raster cells.

### JOIN KEYS

Region IDs, codes, coordinates, geohash levels.

### PROJECTION

Mercator, Albers, Equal-area variants.

### NORMALIZE

Per-capita, rate, density and standardization.

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## Choropleth: when it works

Use choropleth when asking about:

- Regional prevalence
- Spatial concentration
- Rate comparisons across territories

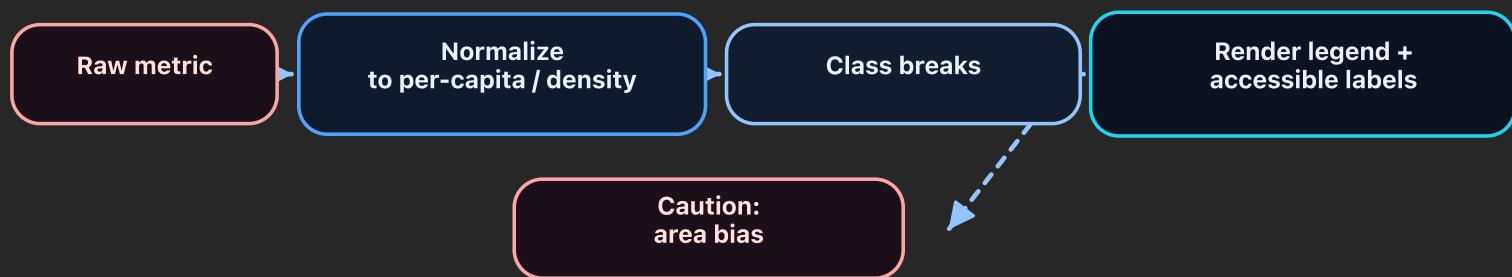
### DECISION SPLIT

Use only where region size is comparable and denominator is stable.



## Choropleth: color strategy

- Use sequential scales for rates.
- Use diverging scales for positive/negative deviation.
- Avoid rainbow and equal-interval bins when distribution is skewed.

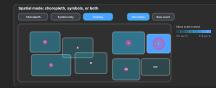


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## Spatial overlays and hybrid patterns

Useful combinations:

- Basemap + symbol bubbles + topographic reference.
- Basemap + choropleth + insets.
- Flow lines + symbol nodes for movement tasks.



### DECISION POINT

Ask: does each layer answer one non-overlapping question?

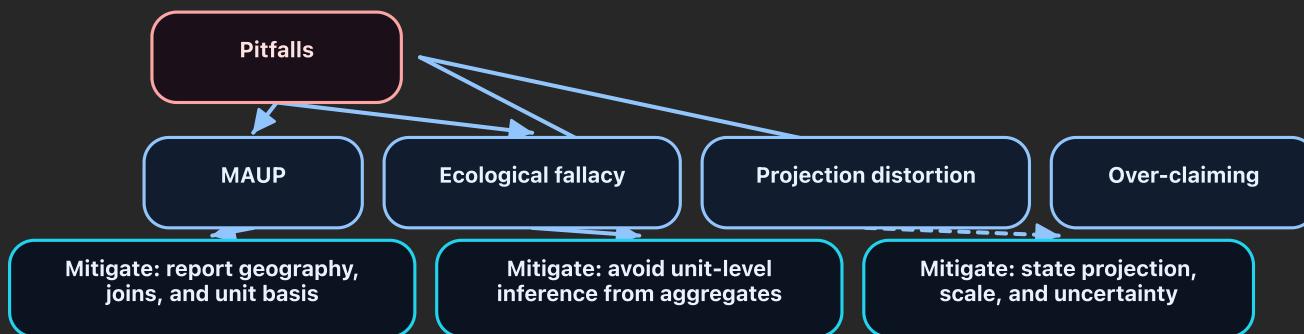
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## Spatial mini-checklist before publish

Are geometries valid and snapped?

Are boundaries explicit in caption?

Are values normalized with a defensible denominator?



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## Long Quiz: 50 points (all topics)

- Mixed format: multiple-choice + applied analysis.
- One sheet. Cite slide number and one line of justification per item.
- Total: 50 points.

### INSTRUCTION

No lookup. Write to a task, a data-shape, and a visual trade-off.







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## Quiz Part IV — Spatial (10 pts)

- (2 pts) A policy compares unemployment across provinces with uneven population. Why raw choropleth misleads and what correction is required?
- (2 pts) Two maps (choropleth + symbol) show opposite hotspots. Provide two technical causes (not “bad data”).
- (2 pts) Which projection type is safer for area-sensitive island comparisons: equal-area or mercator? defend with one sentence.
- (2 pts) You need counts + intensity on one map. Which layering order prevents false inference?
- (2 pts) Choose three map pitfalls and pair each with one mitigation sentence.



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## Quiz Part V — Integrated Case (2 pts)

A city reports: student enrolment, social referral graph, and clinic locations by district. Build a 3-view analysis plan.

(2 pts) Design the first-pass layout and interaction choreography for first 60 seconds: specify roles for three panels and one transition rule.

Overview:  
section trends

Brush a week  
range

Details:  
distributions by  
section

Lookup:  
student-level records  
(on demand)