

Visualization Design and Redesign

Maneesh Agrawala

**CS 448B: Visualization
Fall 2021**

1

Reading Response Questions/Thoughts

When can data visualizations be the wrong solution? (When should we opt for text over a graphic?)

How have data viz design principles changed over time, and why, especially as it seems like accessibility is more highly prioritized today? (e.g. Minard's chart is very info-dense, vs. simpler charts seen more often on outlets today)

What are some safeguards to reduce / prevent misleading visualizations, and / or ensure that a visualization is unbiased (or as Tufte says, "fail to tell the truth")?

2

Announcements

9

A2: Exploratory Data Analysis

Use **Tableau** or **Vega-Lite** to formulate & answer questions

First steps

- Step 1: Pick domain & data
- Step 2: Pose questions
- Step 3: Profile data
- Iterate as needed

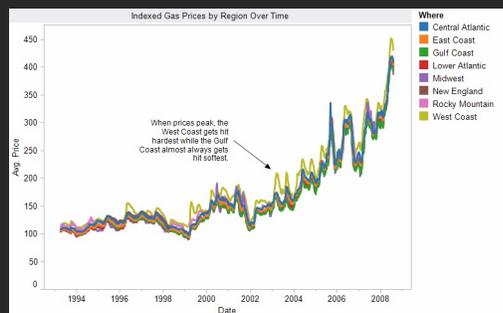
Create visualizations

- See different views of data
- Refine questions

Author a report

- Screenshots of most insightful views (8+)
- Include titles and captions for each view

Due before class on Oct 11, 2021



11

A1 Review

12

Design Considerations

Guides: Title, labels, legend, captions, source!

Expressiveness and Effectiveness

Express the facts and only the facts

Avoid unexpressive marks (lines? gradients?)

Use perceptually effective encodings that match data type

Don't distract: faint gridlines, pastel highlights/fills

The "elimination diet" approach – start minimal

Support comparison and pattern perception

Between elements, to a reference line, or to counts

Use reader-friendly units and labels

14

Design Considerations

Group / sort data by meaningful dimensions

Transform data (e.g., filter, log, normalize)

Are model choices (regression lines) appropriate?

Reduce cognitive overhead

Minimize visual search, minimize ambiguity

Appropriate size, aspect ratio, legible text

Avoid legend lookups if direct labeling works

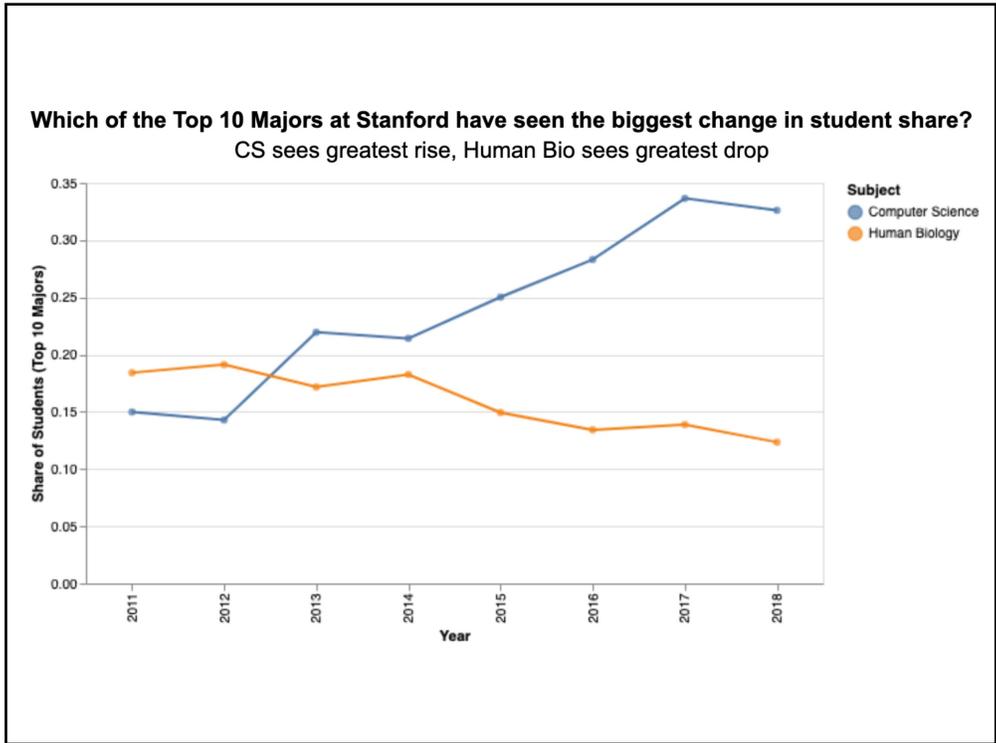
Avoid color mappings with indiscernible colors

Be consistent! Visual inferences should consistently support data inferences

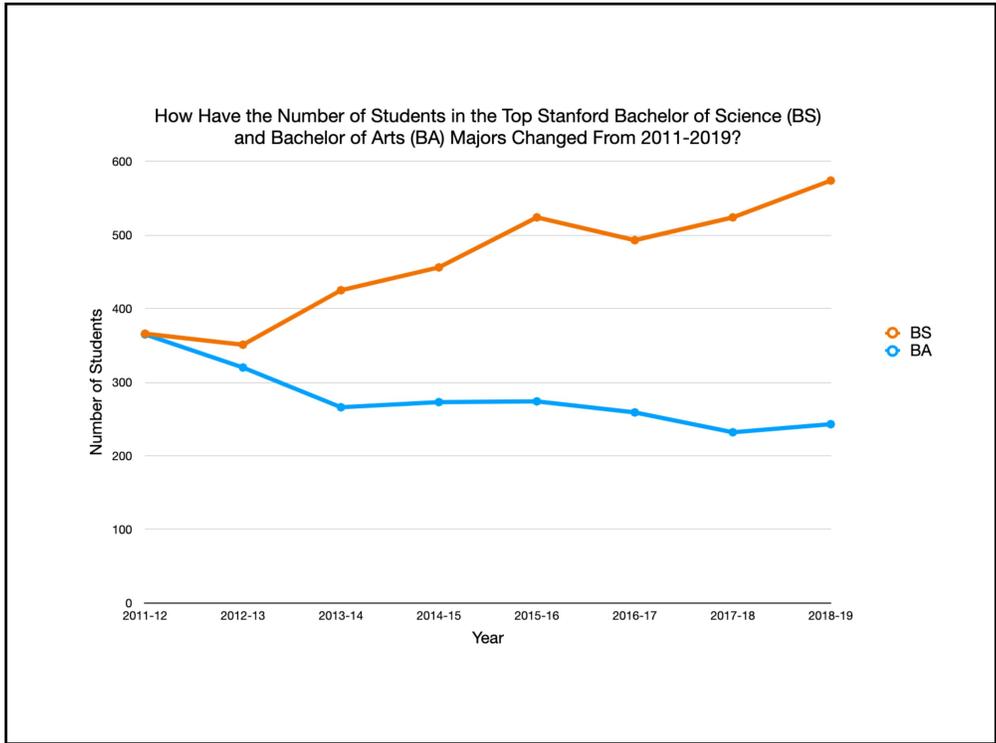
15

Line Charts

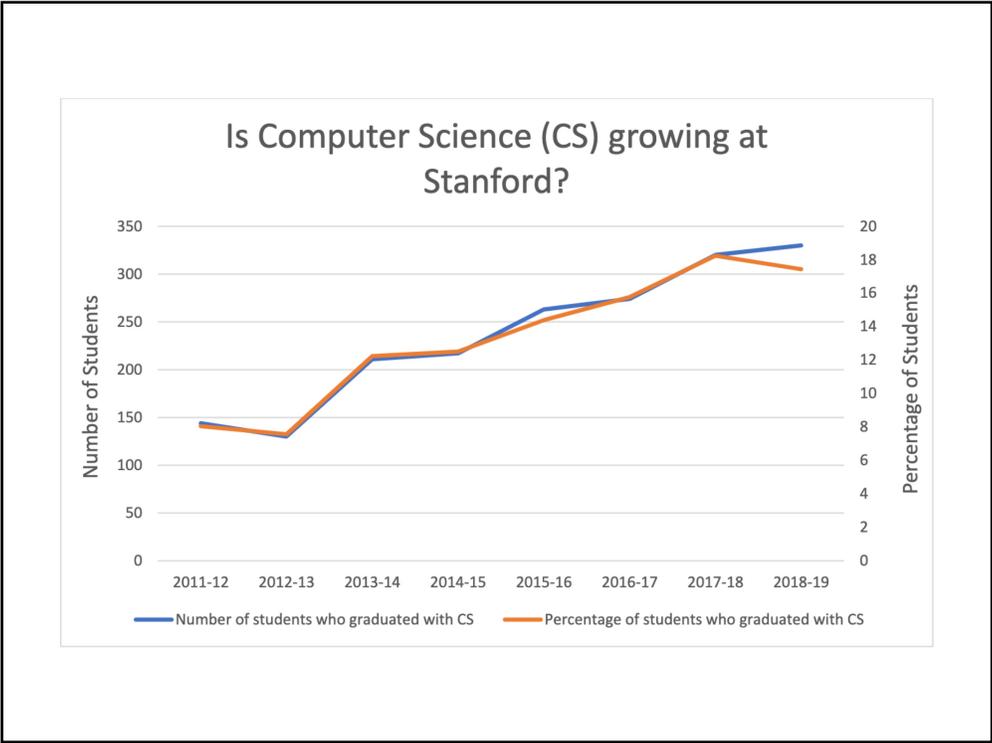
18



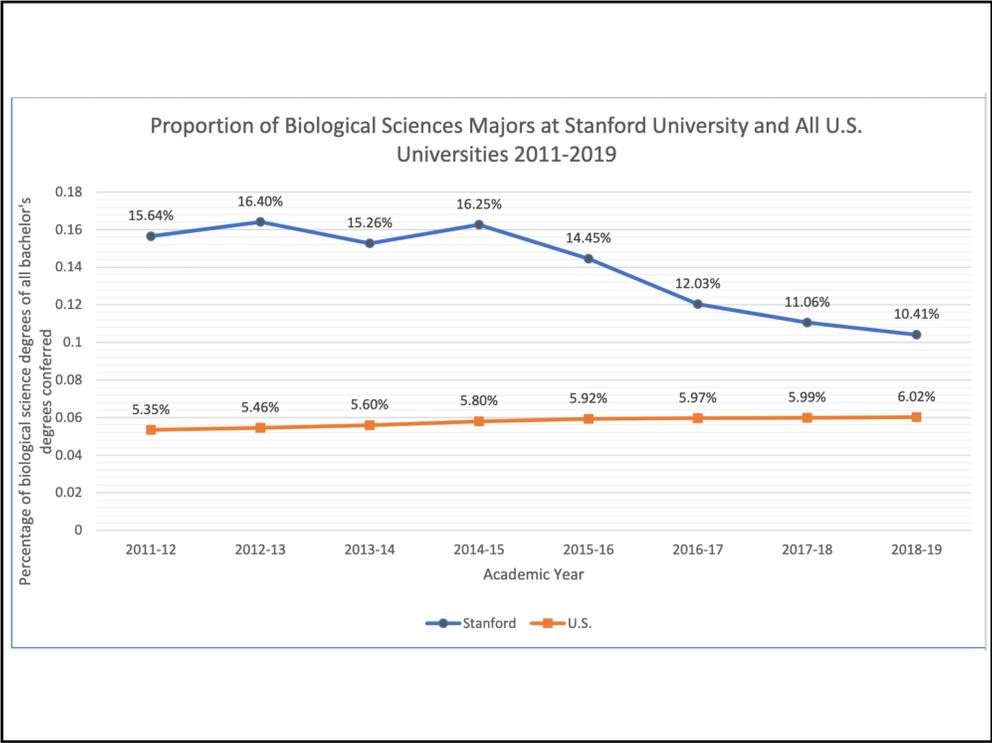
19



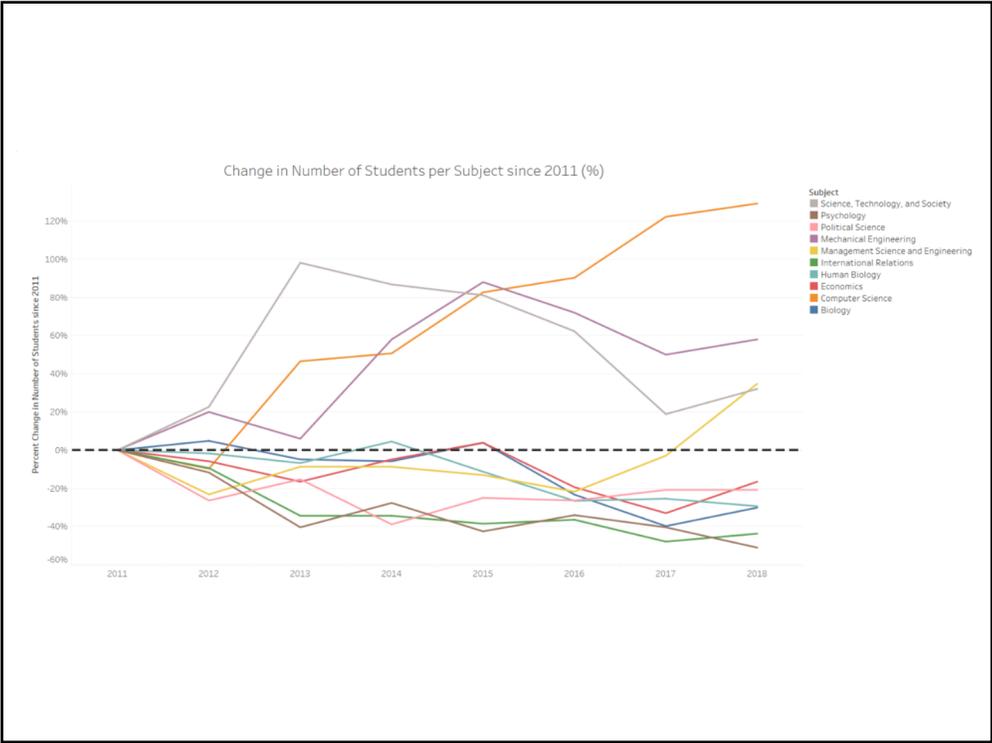
20



21



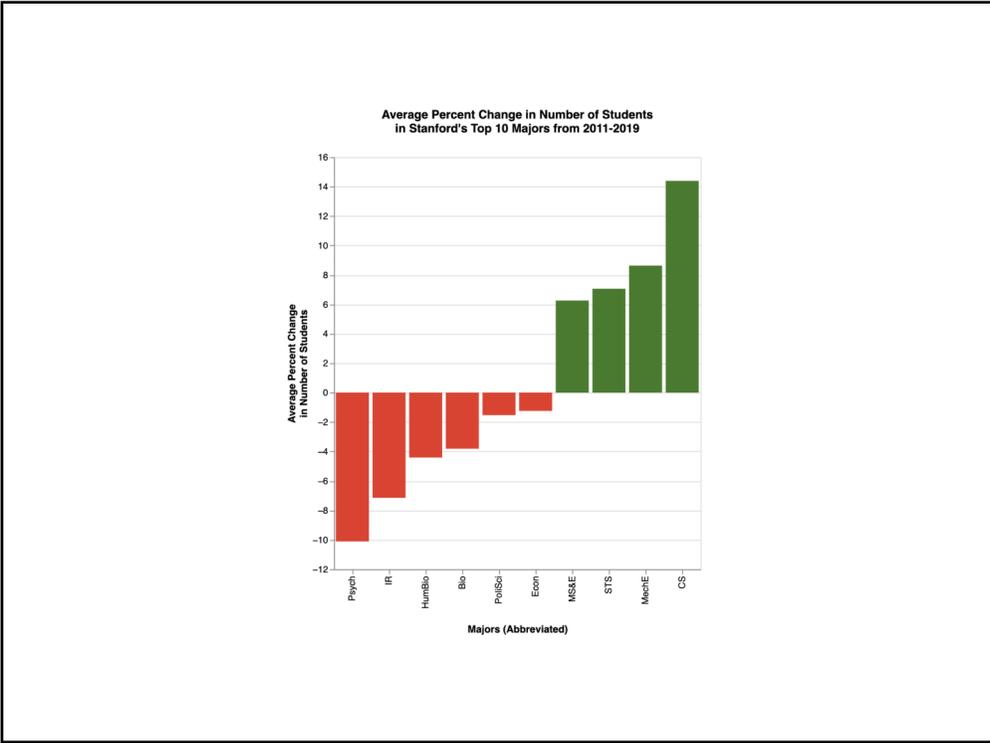
22



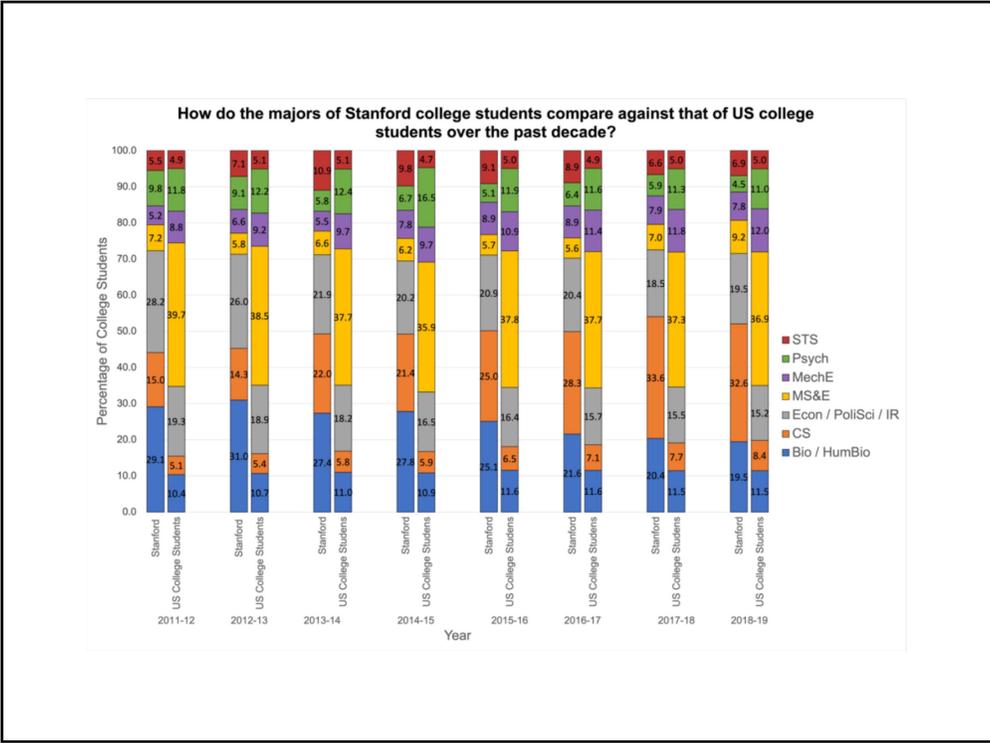
23

Bar Charts

24

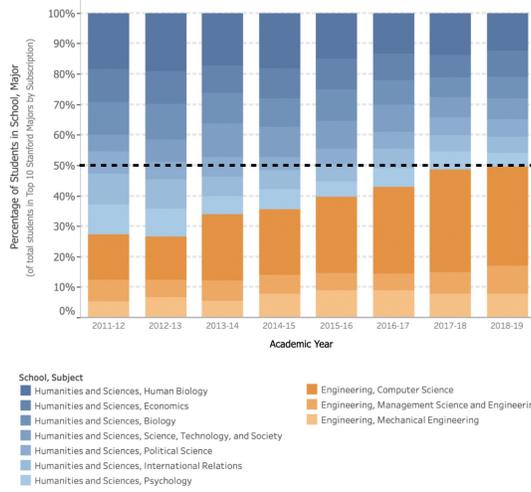


25



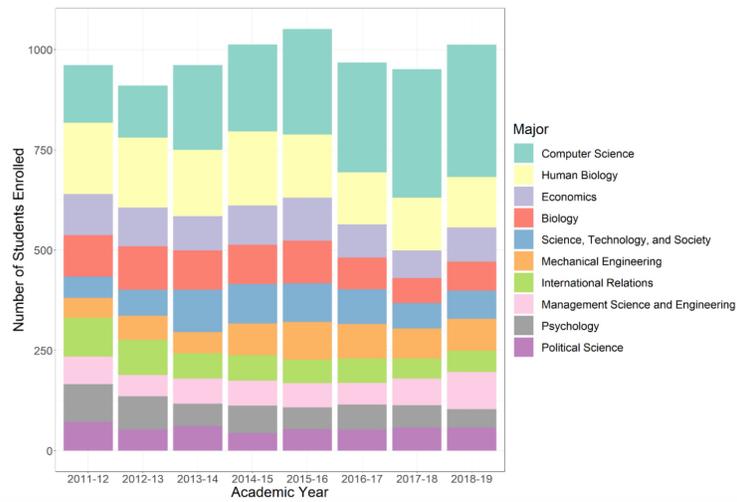
26

How has the Representation of the Schools of **ENGINEERING** vs. **HUMANITIES & SCIENCES** in the Top 10 Stanford Majors Changed Over Time?



27

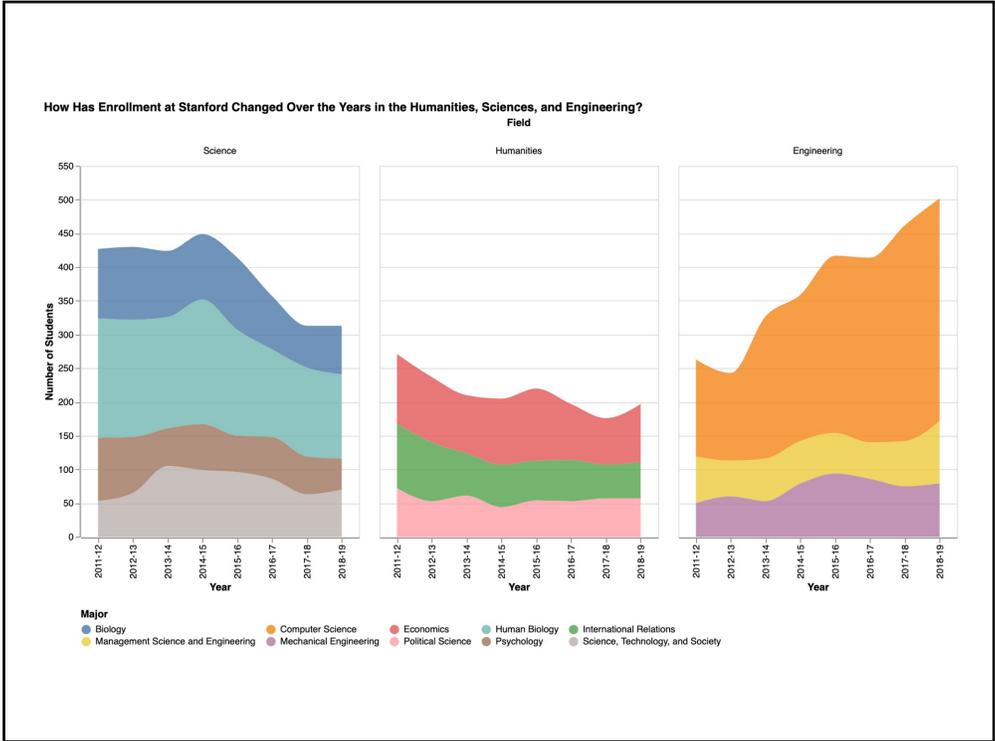
Number of Students Enrolled in the Top 10 Majors at Stanford from 2011-2019



28

Stacked Area Charts

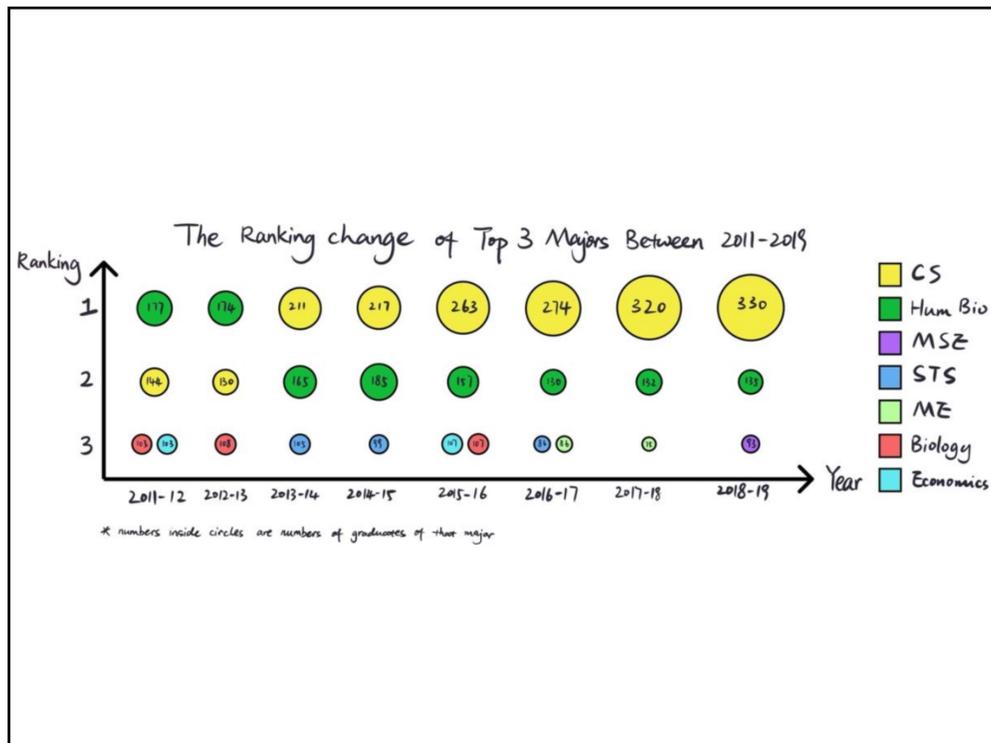
29



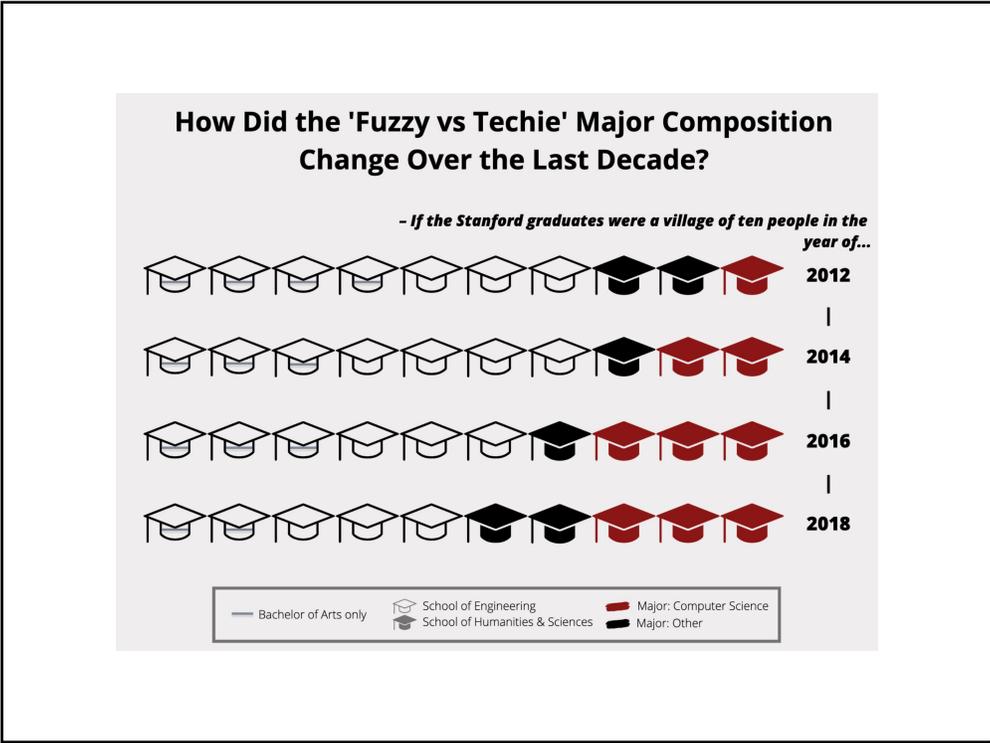
30

Other Chart Types

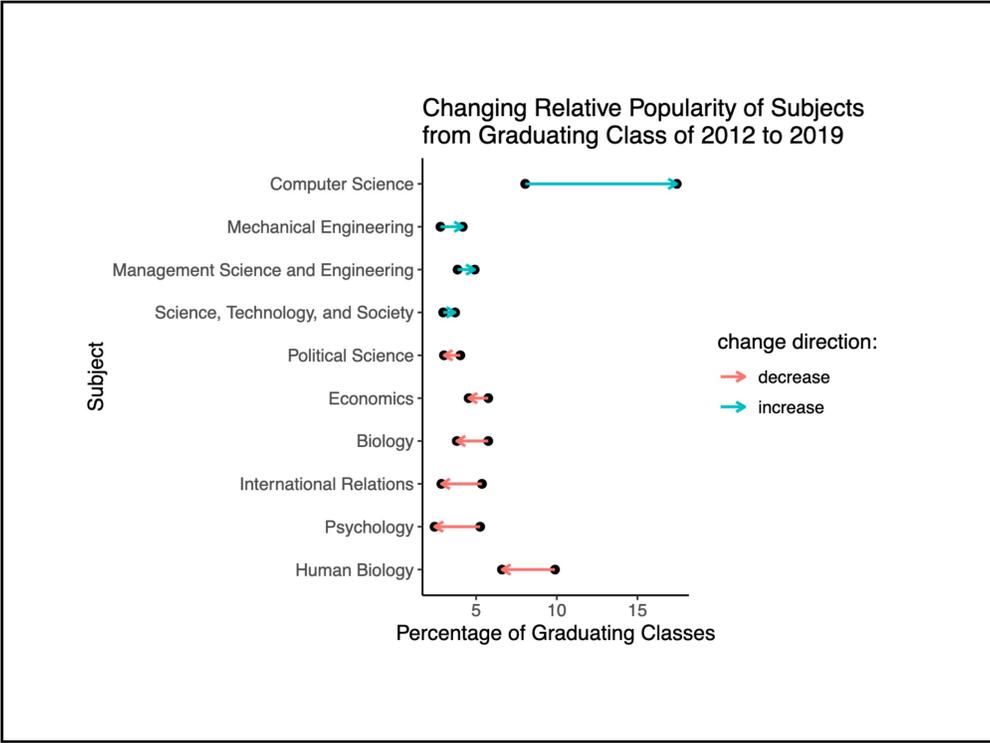
31



32



33



34



35