

Towards Auto-Grading D3.js Visualizations

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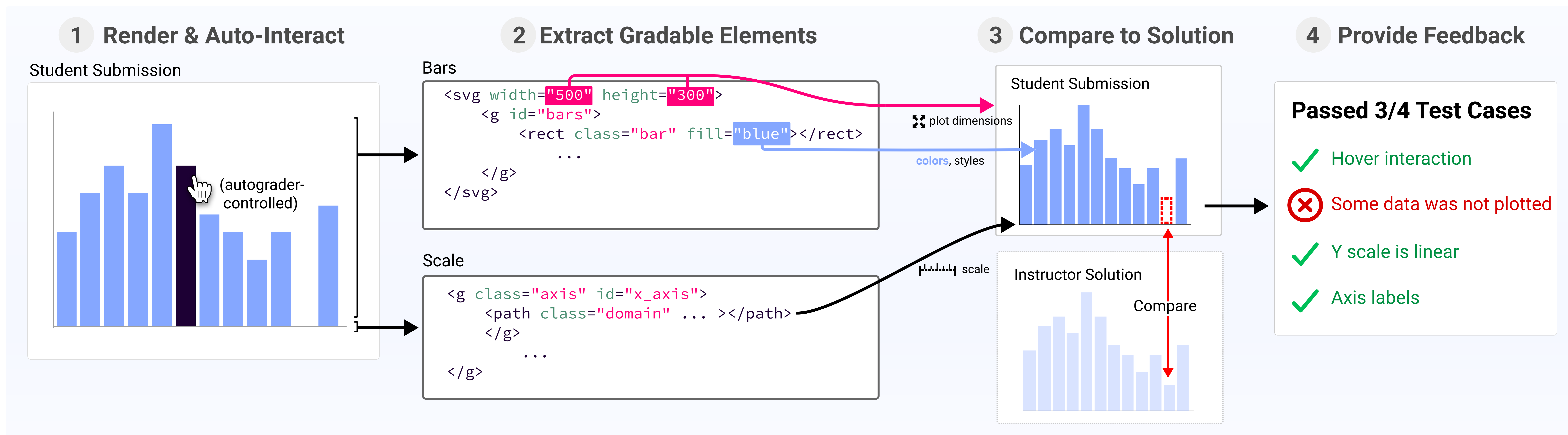
We present a first-of-its-kind **automatic grading** approach for D3 visualizations that **scalably** and **precisely** evaluates data bindings, visual encodings, interactions, and design specifications used in a visualization.

Why Auto-Grade?

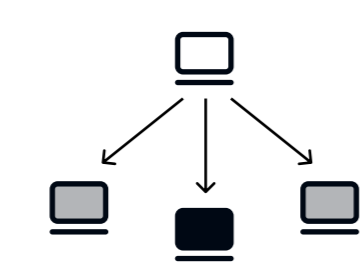
1. Ever-growing class sizes (e.g., 1000 students/class)
2. Manually grading interactions is tedious
3. Provides **frequent consistent** feedback to students while supporting design freedom
4. Preempts configuration issues via unified environment

Grading Interactivity & Design

1. Our auto-grader **automatically interacts** with (e.g., click, hover) and grades interactions of D3 visualizations.
2. We provide design freedom: Solutions are auto-generated from students' input colors, plot dimensions, etc.



Large-Scale Deployment



- Successfully deployed autograder in Georgia Tech's CSE6242 Data and Visual Analytics course
- Auto-graded submissions **1000+ students** on Gradescope
- Grading effectively "done" when students submit their work, as submissions are auto-graded immediately
- Far fewer regrade requests

Student Impact



1. Increased student-instructor interaction on qualitative visualization design aspects
2. Students receive frequent consistent feedback
3. Reduced configuration errors (e.g., missing libraries)
4. Clearer expectations (e.g., fewer questions like "would I lose points for ___?")

Ongoing Work



Our auto-grading method is **readily extendable** to other visualization platforms based on D3:

1. Vega-Lite
2. Observable Notebooks
3. Observable Plot