BRIDGES: Real-World Data, Assignments and Visualizations to Engage CS Students

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BRIDGES Workshop

BRIDGES to Improve CS Education through Engagement

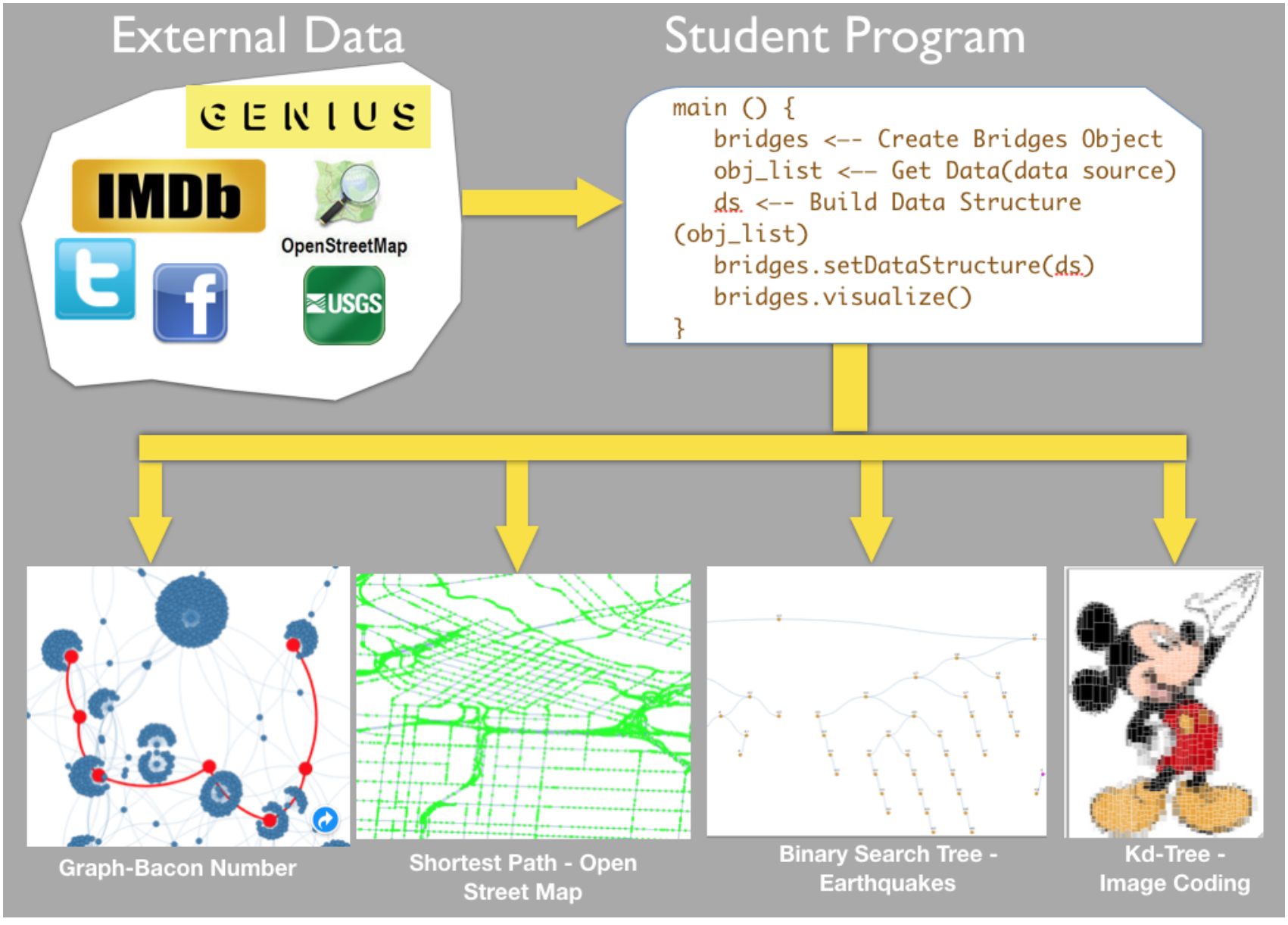
Motivation

Attrition rates in early foundational courses are high (40-60%), need to improve student engagement, and demonstrate the potential of Computer Science to incoming freshmen/sophomore students

BRIDGES' approach

- Bring real-world datasets into the classroom.
- Visualizations of *student generated* data structures, interactions, algorithm performance/complexity.
- Student output shared (with friends, family) via web link

BRIDGES provides engaging Input and Output



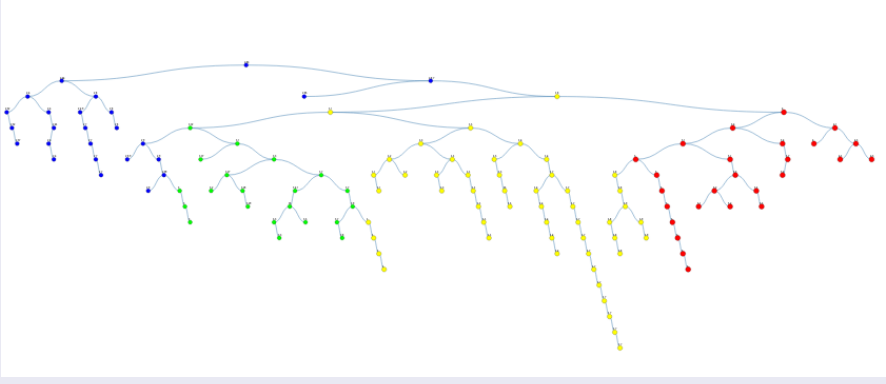
Available for students in Python, C++, and Java

BRIDGES in Data Structures Course

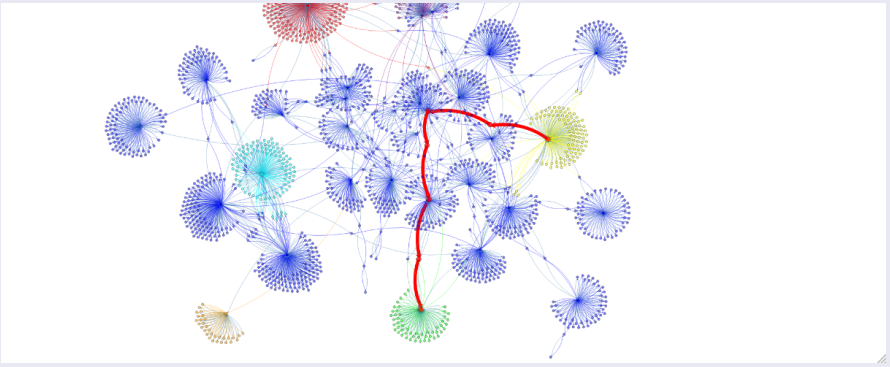
What is hard in a Data Structure course?

- Debugging is haaaard.
- I don't understanding what the data structure looks like!?
- Does any of this matter in the real world?

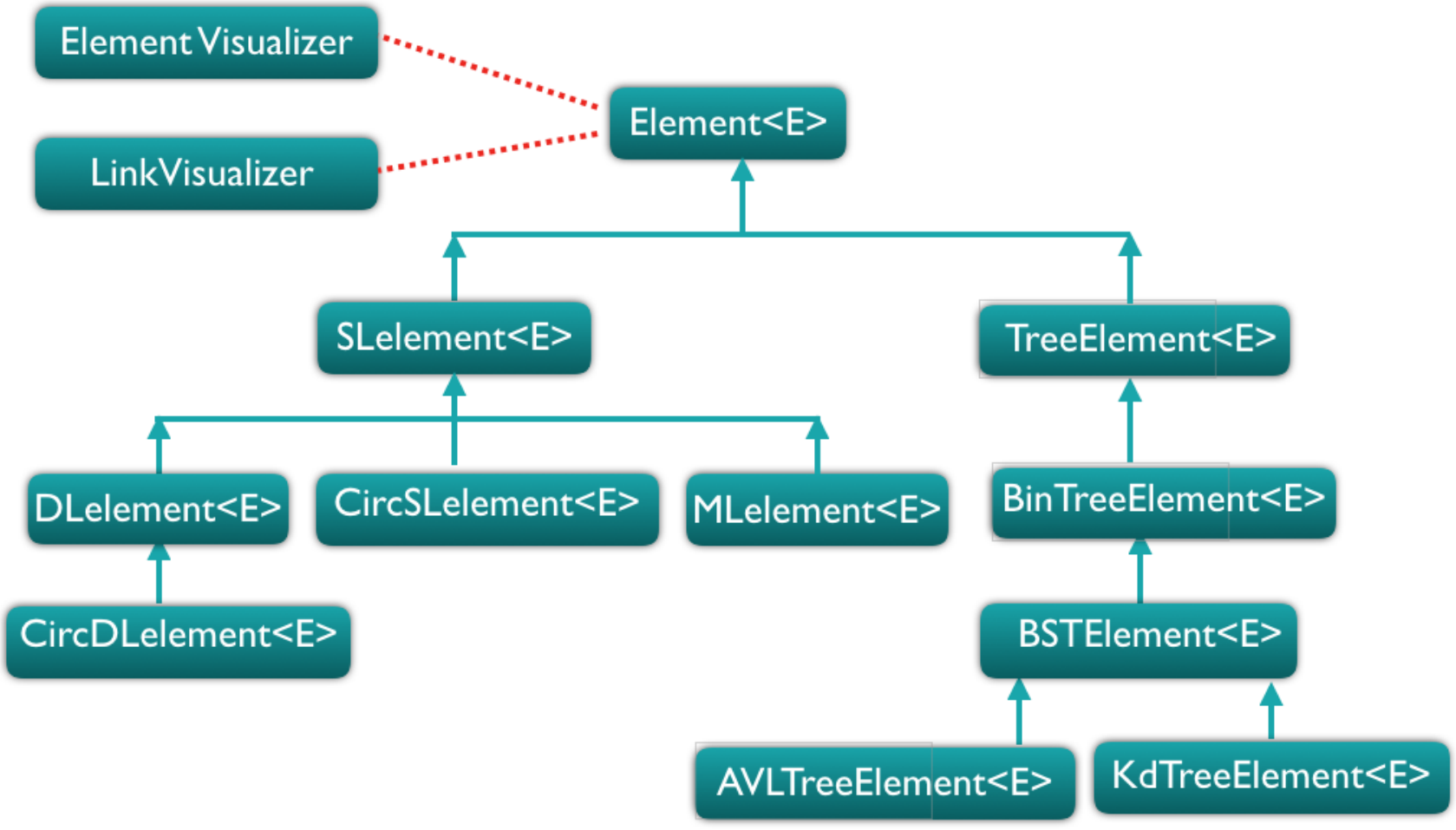
Indexing USGS Earthquake



Bacon Number [IMDB Data]



BRIDGES Element Hierarchy (Lists, Trees, Graphs)

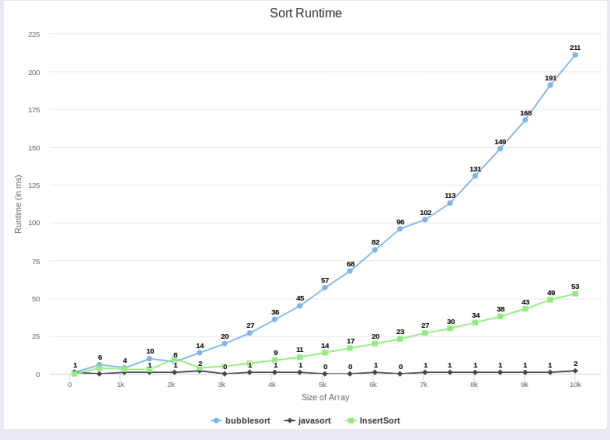


BRIDGES in Algorithms Course

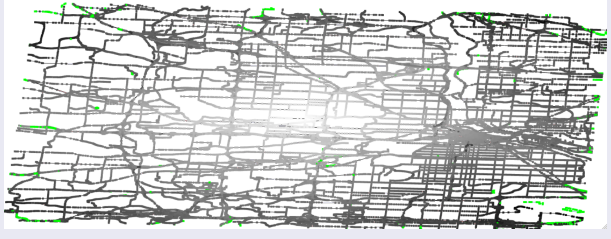
What is difficult in an Algorithm class?

- Complexity is confusing!
- I am never going to use any of these crazy things.
- Why is he still talking about complexity?

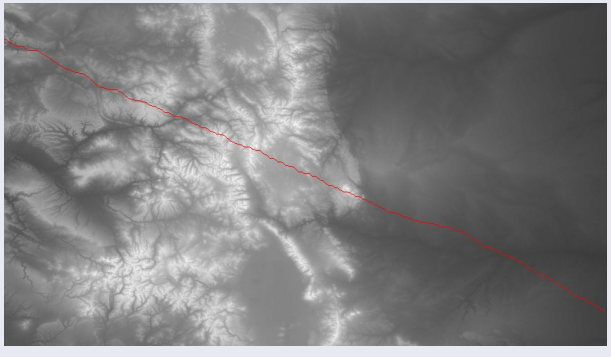
Sorting Benchmark



Shortest Path (OSM)



Mountain Path (DP)

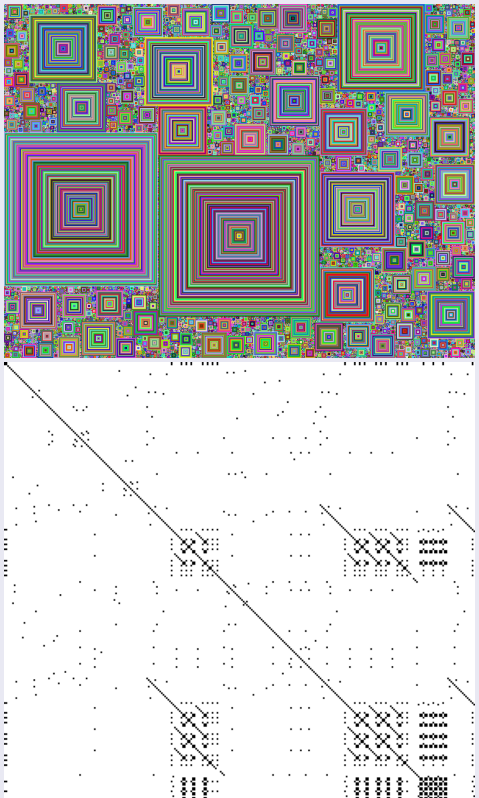


BRIDGES in CS1/CS2 Courses

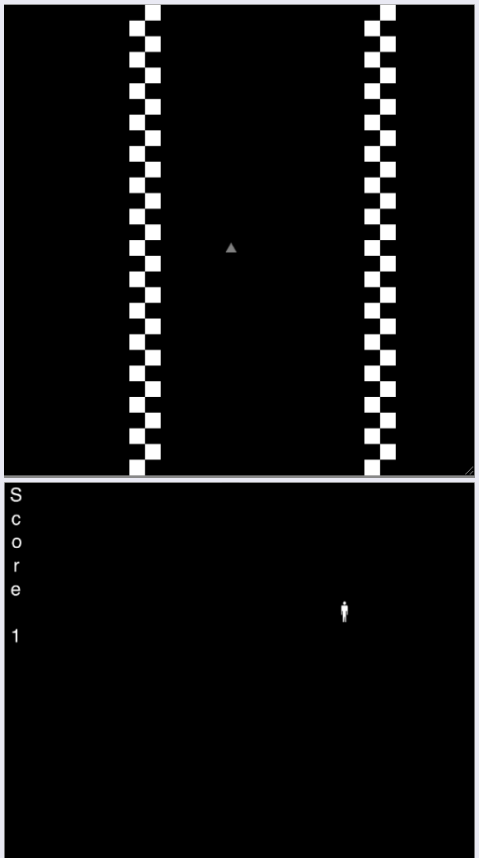
What is difficult in a CS1 course?

- Hello World is BOOOOOOOORING...
- We added two arrays of integers, I am soooo impressed...

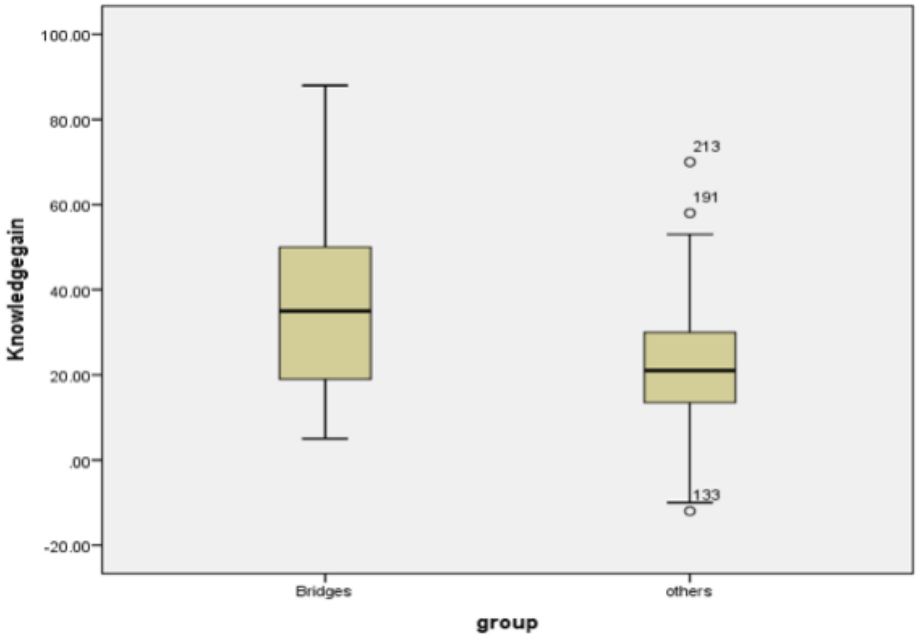
Graphical Patterns and Analysis



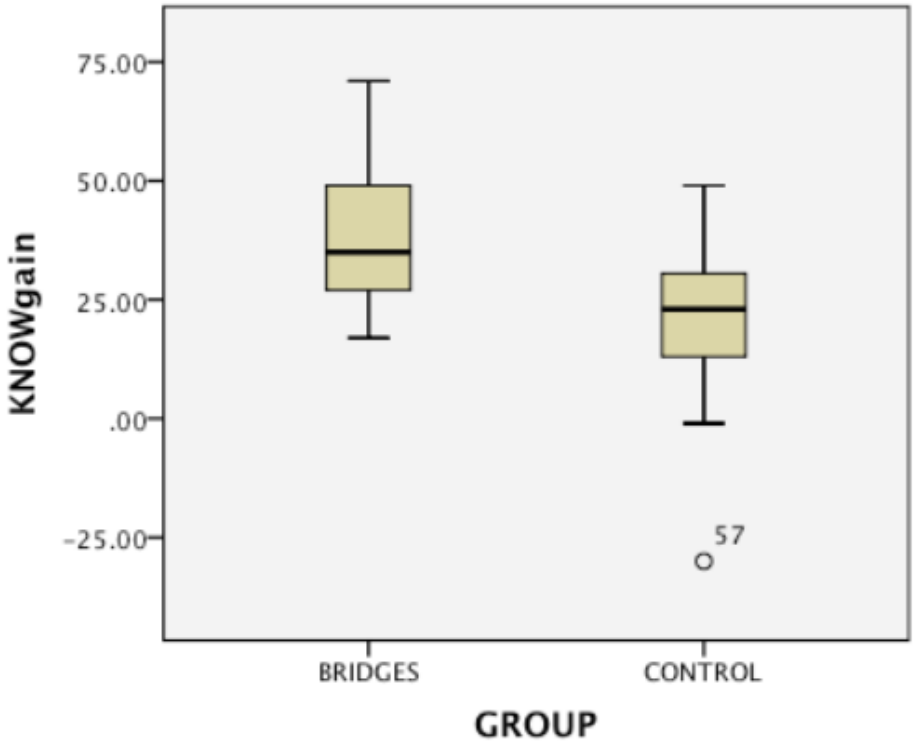
Games



Students in BRIDGES sections gained more knowledge



Fall 2014



Spring 2015

Students in BRIDGES sections progressed faster in CS

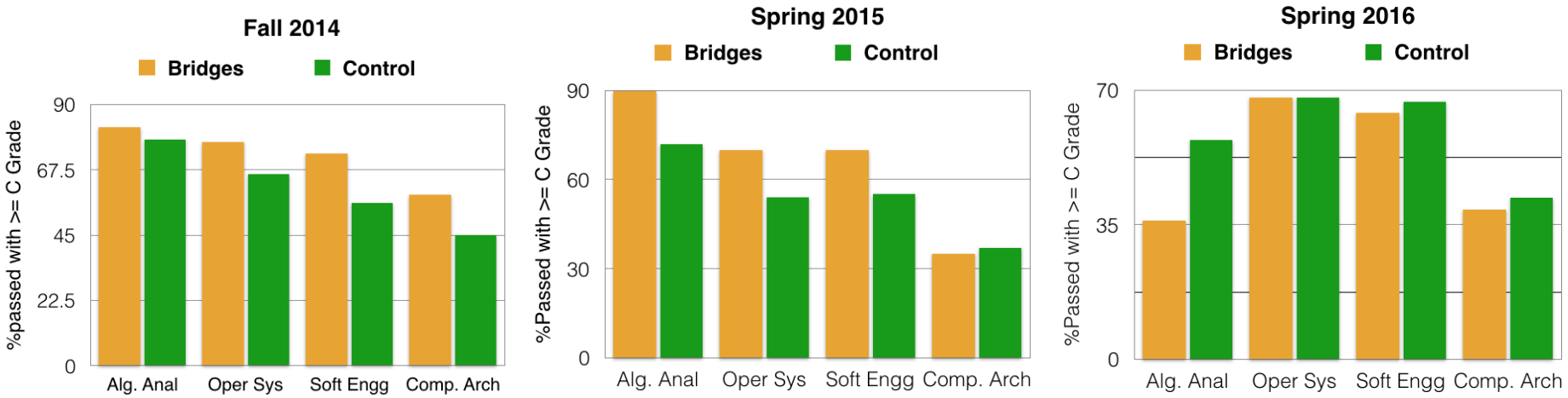
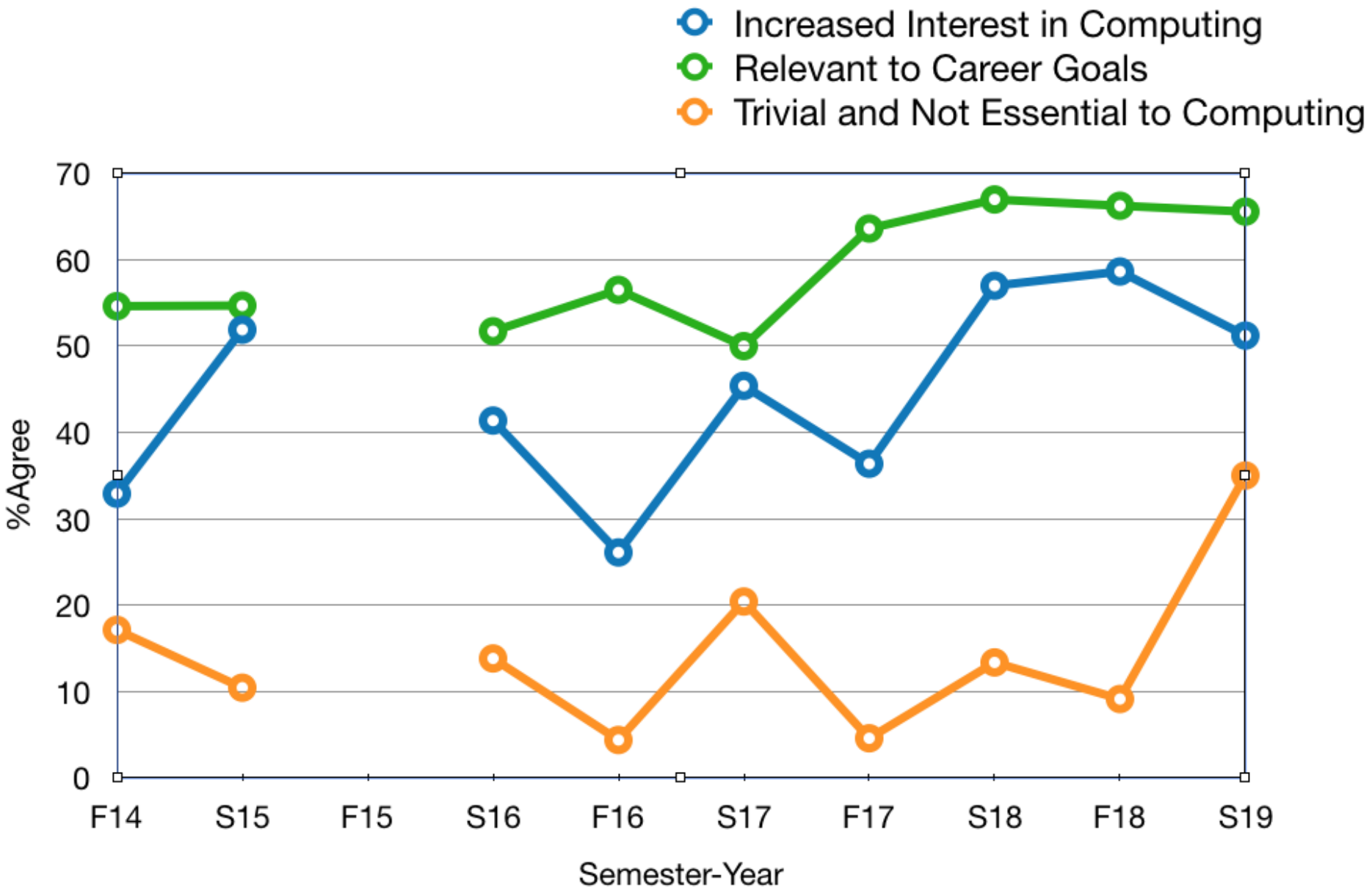


Figure: Comparing long-term student achievement between students who used the BRIDGES toolkit in the Data Structures course vs. Control group. The evaluation was performed with 3 cohorts of students (Fall 14, Spring 15, Spring 16). Analysis performed Spring 2019.

Students using BRIDGES appreciate CS better



Thank you!

Why adopt BRIDGES?

- Well tested: over 1000 students used BRIDGES
- Increased engagement
- A growing set of pre-designed assignment
- Support from the BRIDGES team
- Stipends available

How to adopt? Contact us!

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Support

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