Retaining and Engaging CS Majors Using BRIDGES
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BRIDGES Works!

Example Bridges Program

```java
BRIDGES bridges = new Bridges (assign_number, "user-name", "appl-id");

// retrieve maxElements USGS earthquake data records
List<EarthquakeUSGS> eq_list = bridges.getEarthquakeUSGSData (maxElements);

// adding earthquake data to BST tree using magnitude as key
BSTElement<double, EarthquakeUSGS> bst = new BST<double, EarthquakeUSGS> ();
for (i = 0; i < eq_list.size(); i++) {
  bst.insert(eq_list.get(i).getMagnitude(), eq_list.get(i));
}

// provide BRIDGES a handle to the data structure
bridges.setDataStructure(bst);

// visualize the tree
bridges.visualize();
```

Bridges Visualizations

- Binary Search Tree
- Color Grid Data Type
- Graph - OpenStreet Map (Minneapolis!)
- Graph - Bacon Number

Adopting BRIDGES

- **BRIDGES in use for 4 years, fully open source.**
- **Impact:** 1500 students at over 10 universities.
- **Call for Participation:** Faculty Stipends for using BRIDGES and collecting student feedback.
- **BRIDGES Expansion:** Algorithms, CS1, CS2, AP CSP
- **New datasets and assignments:** (Open Street Map, Lyrics (Genius) API, Guttenberg Book collection)
- **More Information:** Dr. Kalpathi Subramanian, krs@uncc.edu, http://bridgesuncc.github.io
While enrollment in CS programs has been increasing, retention of CS majors remains a concern. Results/Current Work

- **History:** We have used BRIDGES over the past 4 years in data structures and algorithms courses. Support for C++, Java, Python, Fully Open Source.

- **Impact:** To date, BRIDGES has impacted over 1300 students and used at over 10 universities.

- **Evaluation:** Detailed quantitative and qualitative analysis of student feedback (project surveys, pre/post knowledge tests, attitude surveys) has illustrated significant knowledge gains and the positive engagement of students using BRIDGES.

- **Current work:** Focused on expanding BRIDGES across the CS curriculum - Algorithms, CS1/CS2 and high school APCS courses.

- **New datasets and assignments** (Open Street Map, Lyrics (Genius) API, Guttenberg Book collection) provide potential for larger datasets that can be more applicable for algorithms courses for teaching complexity measures with engaging assignments.

- **Users/Opportunity:** Expand BRIDGES to more institutions and students; Looking for educators to partner with and use BRIDGES in the classroom

BRIDGES (Bridging Real-world Infrastructure Designed to Goal-align, Engage, and Stimulate) targets retention of CS majors at the sophomore level, a particular point of vulnerability in our CS degree program.

An example BRIDGES program

```java
Bridges bridges =new Bridges (assign_number, "user-name", "appl-id");

//retrieve maxElements USGS earthquake data records
List<EarthquakeUSGS> eq_list=bridges.getEarthquakeUSGSData(maxElements);

//adding earthquake data to BST tree using magnitude as key
BSTElement<Extent,EarthquakeUSGS> bst = new
    BST<Extent,EarthquakeUSGS> ();
    // insert elements into binary search tree
for (i=0; i < eq_list.size(); i++) {
    bst.insert(eq_list.get(i).getMagnitude(), eq_list.get(i));
}
    // provide BRIDGES a handle to the data structure
bridges.setDataStructure(root);
    // insert elements into binary search tree
    // provide BRIDGES a handle to the data structure
bridges.setDataStructure(bst);
    // visualize the tree
bridges.visualize();
```