SticiGui—What is it?

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Abstract: SticiGui `http://statistics.berkeley.edu/~stark/SticiGui` is a collection of online materials for teaching introductory Statistics. It includes a textbook with dynamic examples and exercises that change when students reload the chapters, an extensive glossary, and machine-graded assignments based on a "mastery model." SticiGui was developed over more than a decade, and represents approximately 6,500 hours of writing and programming. It has been used to teach courses of 60 to 400 students, and formed the basis of the first online course offered by UC Berkeley. I will describe the history, philosophy, technology, pedagogy, present use and planned development, and give a brief demonstration.

Outline

- What is SticiGui?

- the technology; server and client requirements

- the design philosophy

- the pedagogy

- mastery-based assessment

- the history

- technology gotchas

What is SticiGui?

Combination of content, tools and infrastructure for teaching introductory statistics.

Many of the tools could be re-purposed for teaching other subjects or creating dynamic online documents.

The Technology

- xhtml (190 files, 110,000 lines)

- css (400 lines)

- JavaScript (16 files, 4,500 lines)

- Java 1.1 (65 classes, 15,500 lines)

- data (34 files, 5,000 records)

- perl cgi (programs)

The Technology (contd.)

Virtually everything happens client-side to minimize bandwidth and maximize speed.

Fair amount of communication between Java and Javascript in the DOM. Fragile point.

Server logs homework submissions and allows grades to be queried.

No external libraries: everything coded from scratch, by hand.

Design criteria: what was I thinking?

- Maximize accessibility and portability.*

- Maximize interactivity, minimize technological barriers. No plug-ins, hidden menus or stat "package."

- Minimize bandwidth, maximize speed. Figures generated client-side.

- Easy to use in lectures. Free-standing.

- Maximize portability. Perl-cgi and static pages.

*Mostly compatible with screen readers. Working on tactile representation of graphics and MathML.

Infrastructure/tech requirements

- Modern browser (Firefox primary), with Java & Javascript enabled.

- basic webserver (Apache, etc.)

- perl cgi

Data structures and ideas

- document structure (footnotes, solutions)

- abstract data structures for problems

- "functional" correctness

- applets controlled through call-time parameters

- reveal functionality only after concepts introduced

Pedagogical goals

- Be circumspect consumers of information and arguments; know what questions to ask; analyze arguments.

- Know probability/numbers can model the world.

- Appreciate roles of Statistics: business, econ, law, politics, science and medicine.

- Know untutored intuition produces fallacies; hone logic skills.

- Know it's hard to define "probability" or infer causality.

- Prepare for more advanced courses.

Content

- Emphasis on topics that can be taught most effectively with interactive online tools.

- De-emphasize distribution tables, etc.

- Graphics, graphics, graphics: scatterplots, residual plots, histograms, special-purpose "calculators"

- Guided "experiences" as well as information.

- Examples/case studies from science and consulting: Determining whether targeted Web advertising works, employment discrimination and theft of trade secrets.

Mastery-based assessment

- different problems for every student

- practice problems and examples that change when page is reloaded. Back-and-forth between assignment and text.

- assignments can be submitted up to 5 times. Only last submission counts.

- credit if $\geq 85\%$ correct; bonus for 100%

- first 3 submissions: score only. 4th and 5th: what was missed.

- scores online immediately

History

- Started in January 1997

- Lecture notes first

- Slippery slope

- 1st fully online course: June 2007. 2nd iteration this summer.