Computers and the Teaching of Statistics

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In 1978, Brad Efron published a paper, *Computers and the Theory of Statistics: Thinking the Unthinkable*, about how computing has influenced the theory of statistics. Of course, he had in mind the revolutionary power of high-speed computers to perform calculations. I will talk about an other revolutionary aspect of computing: the idea of a computation as a transformation of inputs to outputs, the notion of "abstraction," the packaging of algorithms in ways that can be easily communicated and used, and the development of notation and languages to support this. For computer programmers, these are everyday, somewhat elementary ideas, but they have hardly made their way into mathematics or statistical education. This is unfortunate. By changing the "instruction set" we provide our students from "square-roots" and "sums" to higher level operations of "fitting" and "randomization" and "p-value" (among others), we can provide our students with greater insight into statistical reasoning and a greatly enhanced power to make use of sophisticated techniques. The syntax of R, in marked contrast to other commonly used statistics packages, provides strong support for bringing such computational abstraction to teaching statistics. I'll talk about the approaches I've taken to doing this in introductory statistics, and applications to teaching about confounding, experimental randomization, coverage and power.

References

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