Guidelines for Teaching and Learning Statistics using the Statistics Online Computational Resources: Taking Computer-Based Learning to the Next Step

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Summary

We will introduce the SOCR resource, describe the pedagogical utilization of the SOCR tools, conduct interactive activities to demonstrate their in-class use and introduce our collaborative working environment for development and exchange of tools and instructional materials.

Introduction

In this session, activities from the Statistics Online Computational Resources (SOCR) will be conducted with the participants in the same way they are introduced in our Introductory Statistics and Probability classes. Participants will also learn about the available SOCR tools, how to use them and how to contribute to these activities using the SOCR Wiki collaborative environment (http://wiki.stat.ucla.edu/socr). Many of the SOCR resources are dynamic and are readily adaptable as the activities for the specific classrooms. Until now, educators have adopted various applets, and many have created their own out of dissatisfaction with the existing applets. SOCRE **philosophy** is that to provide excellent science, technology, engineering, and mathematics (STEM) education for all undergraduate students and to involve instructors of diverse backgrounds to exchange ideas and interact in the development of educational materials. We do not distribute static instructional materials; instead we develop and extend the framework that allows instructors to custom-design activities and tools that fit their specific course, student population and topics covered.

The SOCR Interface for Teaching and Learning.

The time allotted to this breakout session will be split in three parts: first, attendants will be shown how the corresponding resources work in a classroom setting and how they were assessed in our classrooms; then the participants will acquire hands-on experience by working with assessment activities prepared by the organizers for the occasion and using the SOCR resources, and; finally, the presenters and the attendants will discuss the customization of the activities to diverse settings and directions for future work. Every participant will be able to create their own version of the activities via the SOCR Wiki collaborative environment, so that the improvements will instantly become permanent features of those activities on the SOCR web site freely available to anyone. We will provide means for participants that feel inclined to contribute to, adopt or work with the SOCR developers on specific resources that extend the current features and materials.

Examples SOCR Activities

We plan to demonstrate and describe in detail several different SOCR activities during this session. These include:

1. A **Distribution Activity** that shows how to interact with the SOCR Distributions to obtain probabilities, critical values and visualize the areas of interest for over 45 distinct distributions (http://wiki.stat.ucla.edu/socr/index.php/SOCR_EduMaterials_Activities_Distributions).
2. A **Central Limit Theorem** (CLT) Activity and Distribution Activity. The CLT activity (http://wiki.stat.ucla.edu/socr/index.php/SOCR_EduMaterials_Activities_CLT) illustrates the properties of the sampling distribution of the sample average and serves to motivate and build students' intuition.

3. A **Confidence Interval Activity** which demonstrates the empirical properties of the sample-size, confidence level, the size of the constructed confidence interval and the practical aspects of construction, utilization and interpretation of Confidence Intervals for statistical data analysis (http://wiki.stat.ucla.edu/socr/index.php/SOCR_EduMaterials_Activities_ConfidenceIntervals).
4. A **Cards and Coins Sampling Activity** showing a heterogeneous demonstration of sampling in different settings (coin tosses, card drawings, etc.) This activity also draws synergetic parallels between empirical and theoretical probability calculations (http://wiki.stat.ucla.edu/socr/index.php/SOCR_EduMaterials_Activities_CardsCoinsSampling).

As time permits we will go over other activities, educational materials and applet demonstrations (http://wiki.stat.ucla.edu/socr/index.php/SOCR_EduMaterials).