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Simulation-based virtual environments for practicing data-collection skills

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Engineers often have to make decisions based on noisy data, that have to be collected first (fi. fine-tuning of a pilot plant). In this case, there is a vast range of situations about which data could be collected, but only time and money to explore a few. Efficient data collection (i.e. optimal experimental design and sampling plan) is an important skill, but there is typically little opportunity to get experience. Classical textbooks introduce standard general purpose designs, and then proceed with the analysis of data already collected. To learn about optimal design and sampling you have to do in practice in a concrete context.

This talk explores a blended learning approach: after studying the theory of experimental design and sampling, the student can exercise on-line with virtual environments, that mimic a real situation of interest. Data can be easily collected, but this can be done in so many ways that before doing so, many nontrivial decisions must be taken, such as: which design or sampling is most appropriate, which and how many levels for each factor of influence, randomisation scheme, possible blocking, replication, ...

Once the data are collected, they can be transferred to a statistical software package, and the user can relate the quality of the analysis results to the data collection strategy used.

Two virtual experimentation environments will be shown:

- a production sampling problem on a soft drink conveyer belt
- a greenhouse experiment to compare the effect of different treatments on plant growth

Keywords

virtual data collection, experimentation and sampling plan, blended learning

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