



Seminar Series in Statistics and Data Science

24.11.2020, 14:15 @ Erling Sverdrups plass, Niels H. Abels hus, 8th floor
@ Zoom (ID: 620 7692 5571, Passcode: 019474)

Carla J. Ferreira: Bayesian History Matching of Complex Models

Abstract: In many scientific disciplines complex computer simulators are employed to help understand corresponding real-world physical processes. These models increasingly involve large numbers of unknown parameters, have a complex structure which can result in substantial evaluation time relative to the needs of the analysis, and need to be compared to observed data of various forms to generate reliable models to support decision-making. The correct analysis of such models usually demands a comprehensive exploration of the uncertain high dimensional input parameter space, that incorporates and respects the most important sources of uncertainty. This can be a difficult task, but it is essential for any meaningful inference or prediction to be made and hence represents a fundamental challenge. The challenge needs to be addressed considering the possible drawback of identifying only a partial subset of the input parameters consistent with observed data. Critically, these subsets will result in unjustifiable forecasts that are both biased and overconfident, which directly lead to sub-optimal decision making. A Bayesian statistical methodology is presented in order to identify the subset of the input space that could give rise to acceptable matches between model output and measured data. The approach involves the use of an iterative succession of emulators (stochastic belief specifications detailing beliefs about the complex model) embedded within a method to search high dimensional spaces while incorporating major sources of uncertainty.



Carla J. Ferreira
DNV GL

Carla J. Ferreira is a Senior Researcher at the Group Technology and Research in DNV GL. She received her PhD degree in Petroleum Engineering from the State University of Campinas in Brazil and was a Post-Doctoral fellow in Statistics at Durham University, United Kingdom. Her research focus was on the construction of fast statistical approximations (emulators) and uncertainty quantification of reservoir simulation models based on the Bayes linear approach. She is particularly interested in assessing the uncertainty of machine learning

combined with phenomenological knowledge models to ensure semi- or fully-, automated decisions are inherently safe.

Next seminar

08.12.2020 @ 14:15 **William R. P. Denault**
Norwegian Institute of Public Health

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