

S²C² Statistical Software Creation Circle

Tutorial Presentation

Proposal

Principal Scientist: Ernest Fokoue

Date: January 30th, 2021

Title: Discovering the Bayesian Paradigm for Statistical Machine Learning

Abstract/Brief Description: Abstract. This paper seeks to provide a thorough account of the ubiquitous nature of the Bayesian paradigm in modern statistics, data science and artificial intelligence. Once maligned, on the one hand by those who philosophically hated the very idea of subjective probability used in prior specification, and on the other hand because of the intractability of the computations needed for Bayesian estimation and inference, the Bayesian school of thought now permeates and pervades virtually all areas of science, applied science, engineering, social science and even liberal arts, often in unsuspected ways. Thanks in part to the availability of powerful computing resources, but also to the literally unavoidable inherent presence of the quintessential building blocks of the Bayesian paradigm in all walks of life, the Bayesian way of handling statistical learning, estimation and inference is not only mainstream but also becoming the most central approach to learning from the data. This paper explores some of the most relevant elements to help to the reader appreciate the pervading power and presence of the Bayesian paradigm in statistics, artificial intelligence and data science, with an emphasis on how the Gospel according to Reverend Thomas Bayes has turned out to be the truly good news, and in some cases the amazing saving grace, for all who seek to learn statistically from the data.

Desired Date of Tutorial: March 27, 2021

Estimated Amount of time requested: 4 hours in 4 separate 55 minutes segments

References:

- Fokoue, Ernest (2019), On the Ubiquity of the Bayesian Paradigm in Statistical Machine Learning and Data Science, Math. Appl. 8 (2019), 189–209 DOI: 10.13164/ma.2019.12
- E. Fokoue, Foundational aspects of the theory of statistical function estimation and pattern recognition, Bulletin of PFUR, Series Mathematics, Information Sciences, Physics, No. 3, 2008, pp. 40–54.
- E. Fokoue, Bayesian computation of the intrinsic structure of factor analytic models, Journal of Data Science 7 (2009), 285–311.
- E. Fokoue, Stable radial basis function selection via mixture modelling of the sample path, Journal of Data Science 9 (2011), 345–358.
- E. Fokoue, To Bayes or not to Bayes? That's no longer the question, Indian Bayesian Society Newsletter XV (2018), 2–5

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Note: This is an out-of-regular meeting tutorial. Proposals for 15 minutes or 30 minutes presentations follow the same format