Hopes and challenges in data science for cosmology

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Résumé

Surveys of the cosmic large-scale structure carry opportunities for building and testing cosmological theories about the origin and evolution of the Universe. With next-generation data, avancing the research frontier will require solving challenging and unique statistical problems, to unlock the information content of massive and complex data streams. It is therefore very timely to survey the landscape of data science and machine learning techniques, and to critically evaluate their usefulness for solving cosmological problems. In this talk, I will discuss some past successes and future promises, in applications such as speeding up models, going beyond approximations, finding the information content, and dealing with complex inference tasks. In doing so, I will present the outcomes of some recent methodological advances. I will then turn to the future and highlight some opportunities and challenges for the field.

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