

Second MODE Workshop on Differentiable Programming for Experiment Design



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Experiment design for 21st Century astronomy

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The recent increase in volume and complexity of astronomical data has fomented the use of machine learning techniques. However, the acquisition of labels in astronomy is, by construction, very expensive and time-consuming. In this context, experiment design tasks are aimed at optimizing the allocation of scarce labelling resources. The proper application of such methods will be crucial to ensure optimum scientific potential exploitation from the upcoming Vera Rubin Observatory Large Survey of Space and Time (LSST) – expected to start operations in 2024. This task needs to take into account not only the number of hours per night available in telescopes dedicated to the labeling task (knapsack constraints), but also a series of observational conditions which change the cost of each label from one night to the next. In this talk I will describe the astronomical data scenario and the challenges it poses for traditional experiment design strategies with the context of LSST. As a case study, I will describe efforts of developing a full adaptive learning pipeline for telescope time allocation, show how it impacts scientific results and discuss the challenges ahead.

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