

# Department of Experimental Statistics

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"Advancing Data Acquisition: A Novel Contrastive Mutual Information Estimator for Bayesian Optimal Experimental Design"

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The efficiency of data collection is crucial in many areas, including agriculture, engineering, and intelligent conversational systems. In this talk, Guo will present her recent work on optimizing the data collection strategy by developing advanced machine-learning techniques. The proposed approach centers around leveraging the power of deep neural networks and maximizing the information gained from data within the framework of Bayesian optimal experimental design (BOED). To measure the information gain, she will introduce an innovative contrastive mutual information (MI) estimator to serve as an information-rich criterion under the BOED framework. This new MI estimator addresses the drawbacks of existing estimators by eliminating the need for explicit probabilistic descriptions of the model or likelihood functions. The performance of the proposed method is evaluated by both numerical examples and real applications.