# Séminaire de Probabilités et Statistique

**Mardi 30 Mai 2023 à 14h00**

Laboratoire Dieudonné


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*Fusion Learning: Combining Statistical Inferences from Heterogenous Data Sources.*


Advanced data collection technology nowadays has often made inferences from diverse data sources easily accessible. Fusion learning refers to combining inferences from multiple sources or studies to make a more effective overall inference than that from any individual source or study alone. We focus on the tasks: 1) Whether/When to combine inferences? 2) How to combine inferences efficiently? 3) How to combine inference to enhance an individual or target study? We present a general framework for nonparametric and efficient fusion learning for inference on multi-parameters, which may be correlated. The main tool underlying this framework is the new notion of depth confidence distribution (depth-CD), which is developed by combining data depth, bootstrap and confidence distributions. We show that a depth-CD is an omnibus form of confidence regions, whose contours of level sets shrink toward the true parameter value, and thus an all-encompassing inferential tool. The approach is shown to be efficient, general and robust. It readily applies to heterogeneous studies with a broad range of complex and irregular settings. This property also enables the approach to utilize indirect evidence from incomplete studies to gain efficiency for the overall inference. The approach will be shown with simulation studies and real applications in aircraft landing performance tracking and in financial forecasting.