

LECTURE SERIES 2026

CAUSAL INFERENCE METHODS FOR REAL-WORLD DATA

01 JULY 2026
Wednesday

LECTURE

MEET & EAT *

Light lunch provided

Conference room – Maison des Sciences Humaines

11.00am - 12.00pm

12.00pm - 1.30pm



Scalable Causal Discovery for Statistically Efficient Causal Inference

ABSTRACT

Causal discovery methods can identify valid adjustment sets for causal effect estimation for a small set of target variables, even when the underlying causal graph is unknown. Global causal discovery methods focus on learning the whole causal graph and therefore enable the recovery of optimal adjustment sets, i.e., sets with the lowest asymptotic variance, but they quickly become computationally prohibitive as the number of variables grows. Local causal discovery methods offer a more scalable alternative by focusing on the local neighbourhood of the target variables, but they are restricted to statistically suboptimal adjustment sets.

In this talk, I will present two recent methods that combine the computational efficiency of local methods with the statistical optimality of global causal discovery methods. First, I will describe the Sequential Non-Ancessor Pruning (SNAP) framework (<https://arxiv.org/abs/2502.07857>). SNAP progressively identifies and prunes definite non-ancestors of the target variables during the causal discovery process. We show that the resulting subgraph is sufficient for identifying the causal relations between the targets and their efficient adjustment sets. Then, I will introduce Local Optimal Adjustments Discovery (LOAD) (<https://arxiv.org/abs/2502.07857>), a method for identifying optimal adjustment sets from local information. As a first step, LOAD identifies the causal relation between the targets and tests if the causal effect is identifiable by using only local information. If it is identifiable, it then finds the possible descendants of the treatment and infers the optimal adjustment set as the parents of the outcome in a modified forbidden projection. Otherwise, it returns the locally valid parent adjustment sets based on the learned local structure. For both methods, I will show that on our evaluation they outperform global methods in scalability, while providing more accurate effect estimation than local methods.



SPEAKER

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*Registration is required for those joining us onsite
for the Meet and Eat after the talk:
<https://survey.lih.lu/index.php/849629?lang=en>

Location:

Lecture:

Maison des Sciences Humaines
Room: Conference room

11 porte des Sciences
L-4366 Esch-sur-Alzette, Luxembourg

JOIN

Event number: 2786 092 6460
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