Master's Internship Position in Causal Inference

Title: Causal Inference and Transportability with Limited Access to Individual-Level Data

Period: 2025-2026

Context: In health technology assessment (HTA), population-adjusted indirect comparisons (PAICs) are increasingly employed to address differences in patient populations across clinical studies. Among these methods, Matching-Adjusted Indirect Comparison (MAIC) and Simulated Treatment Comparison (STC) are the most commonly applied techniques. Both allow researchers to estimate how the results of a clinical trial with individual patient data (IPD) might appear if conducted in the target population of another trial, for which only aggregate-level data (ALD) is available. MAIC relies on entropy balancing weights to adjust for population differences, while STC models the outcome-generating mechanism assumed to be consistent across trials. For example, consider two studies: one comparing treatments A and B (trial AB), and another comparing treatments B and C (trial BC), each conducted in different populations. If the interest lies in estimating the relative effect of treatment A versus C in the population of trial AB, one can standardize the results of trial BC (with IPD) to match the characteristics of trial AB (with ALD) using either MAIC or STC. An indirect comparison of A versus C is then made through the common comparator B, which is known as an anchored comparison. In contrast, if no common comparator is available and a direct comparison between A and C is made after adjusting for population differences, the result is an unanchored comparison, which is more susceptible to bias due to unmeasured confounding.

Project Objectives: The aim of this project is to develop novel methodological approaches to enhance the statistical efficiency of MAIC, and to evaluate these approaches using both simulation studies and real-world clinical trial data.

Tasks:

- Contribute to the theoretical development of new methodologies to improve MAIC.
- Design and conduct simulation studies to evaluate the finite-sample performance of proposed methods.
- Analyze anonymized data from pharmaceutical clinical trials for illustrative case studies.
- Assist in the preparation of scientific manuscripts and technical documentation.

Work Environment: The internship will be hosted by the Epiderme research team, affiliated with INSERM and based at Université Paris-Est Créteil (https://team-epiderme.com/). The project will be jointly supervised by:

- Dr. Marie-Félicia Beclin (Postdoctoral Researcher in Biostatistics)
- Dr. Antonio Remiro-Azocar (Statistical Methodologist, Novo Nordisk)
- Dr. Tat-Thang Vo (Junior Professor in Biostatistics, https://tatthangvo.com/)

Required Skills:

- Enrollment in the second year of a Master's program (MSc) in Statistics, Biostatistics, Data Science, or a related field.
- Proficiency in R, including experience with statistical and/or machine learning libraries.
- Familiarity with causal inference methods is an asset; otherwise, a strong willingness and motivation to learn causal inference and biostatistics is essential.
- Good command of English, particularly strong writing skills for scientific communication.

Internship Duration: 6 months

Application Process: Interested candidates should send a CV and motivation letter to mariefelicia.beclin@gmail.com and tat-thang.vo@u-pec.fr