



Postdoc Fellowship Position in Sanofi

Proposed Postdoc project title:

Confounding and causal inference in exposure-response and PKPD modeling: comparison of Artificial Intelligence approach (deep causal networks) with other causal modeling methodologies. Application to immuno-oncology compounds.

Contact names in Sanofi

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PROJECT DESCRIPTION

In the context of exposure response (or PKPD) analysis, confounding refers to the situation where the exposure and response are correlated, in the presence or absence of exposure effects, via factors (the confounding factors). In the context of immuno-oncology, such a situation is rather frequent: target mediated drug disposition (TMDD) naturally induces complex causal relationships between exposure and response. The consequence of this confounding effect is a bias in the true effect of exposure on the response. The aim of this work is to compare the new Deep Instrumental Variables Networks approaches with more traditional causal modeling approaches: instrumental variables, propensity scores, directional acyclic graphs. Our hypothesis is that the application of causal inference methodologies, in particular of Deep Instrumental Variables Networks methodology will enable to obtain unbiased estimates of causal relationship between exposure and response in particular in the context of immuno-oncology.

The assessment of the properties of the various methods, and their benchmark, will be first based on simulated data. Those data will be simulated using target mediated drug disposition PK models.

The method will be then applied to the estimation of Exposure-Response models for selected compounds in development.

ADDITIONAL INFORMATION

Skills Required

1. Expertise in statistics in general and knowledge in machine/deep learning and PKPD modeling.
2. Computing skills: R, Monolix, Python, SAS (ideally)
3. Good communication skills

Expected Qualification / Experience

PhD in Statistics with experience in machine learning methods and PKPD modeling.