

StatHarbor-005: Introduction to Causal Inference

Overall Objective:

This course is designed to provide participants with an understanding of causal inference, focusing on the use of Directed Acyclic Graphs (DAGs), identifying various types of biases, understanding targeted estimands, and exploring estimation methods like Inverse Probability of Treatment Weighting (IPTW) and G-computation.

Specific Objectives:

By the end of this course, participants will be able to:

- Construct and interpret Directed Acyclic Graphs (DAGs) for causal analysis.
- Identify and understand different types of biases that can affect causal inference.
- Define and utilize targeted estimands in causal studies.
- Apply estimation methods such as IPTW and G-computation in practical scenarios.

Prerequisite:

A basic understanding of statistical methods and principles.

Course Content:

1. Introduction to Causal Inference and DAGs: Understanding the basics of causal inference and the role of DAGs in illustrating assumptions and causal relationships.
2. Types of Biases in Causal Inference: Exploring confounding bias, selection bias, and measurement bias, and their impacts on causal analysis.
3. Targeted Estimands: Defining causal questions and identifying the targeted estimands in different study designs.
4. Estimation Methods - IPTW: Learning about Inverse Probability of Treatment Weighting, its application, advantages, and limitations.
5. Estimation Methods - G-Computation: Understanding G-computation, its methodology, and application in complex causal models.

Learning Process:

The course will be delivered online and requires active participation in reading materials and exercises. The duration of the course is three months, including weekly 2-hour sessions totaling 24 hours of instruction. These sessions aim to address participants' questions and promote an interactive learning environment. Practical exercises and case studies using statistical software will be provided to reinforce learning. Additional resources, such as video lectures and tutorial sessions, will be made available. The course will commence with an introductory test and conclude with a comprehensive assessment. Upon successful completion, participants will receive a certificate of achievement.