

Lucy D'Agostino McGowan, Malcolm Barrett, Travis Gerke

Causal Inference in R

Welcome

Part 1: Asking Causal Questions

- Chapter 1: What is a causal question?
 - Description, prediction, and explanation
 - Causal assumptions
 - Whole game example
- Chapter 2: Expressing causal questions as DAGs
 - Visualizing causal assumptions
 - DAGs in R: ggdag and dagitty
- Chapter 3: Preparing data to answer causal questions
 - Data wrangling with dplyr
 - Recognizing missing data: visdat, tidyr, mice
 - Working with multiple data sources
- Chapter 4: Observational data as causes and effects
 - Exploring and visualizing data and assumptions: skimr, ggplot2
 - Calculating summary statistics: gtsummary, tableone

Part 2: The counterfactual framework

- Chapter 5: Estimating counterfactuals
 - What is a counterfactual?
 - Target trials
 - Estimating the average treatment effect
 - Estimating treatment effects with other targets in mind
- Chapter 6 Building a propensity score models
 - Logistic regression
 - Choosing variables to include
 - Continuous and categorical exposures
- Chapter 7: Using the propensity score
 - Matching

- Weighting
- Weighting and matching with more complex exposures
- Chapter 8: Evaluating your propensity score model
 - Calculating the standardized mean difference
 - Visualizing balance via Love Plots, boxplots, and eCDF plots
 - Pruning, trimming, and stabilizing propensity scores

Part 3. Estimating causal effects

- Chapter 9: Incorporating propensity scores in generalized linear models
 - Using matched data sets
 - Using weights in outcome models
 - Estimating uncertainty
 - Estimating causal effects for complex exposures
- Chapter 10: Incorporating propensity scores in survival models
 - Preparing data for survival analysis
 - Pooled logistic regression
 - Confidence intervals for causal survival models
- Chapter 11: Sensitivity analyses
 - Quantitative bias analyses
 - Tipping point analyses: tipr, EValue
- Chapter 12: Other approaches to causal inference
 - G-computation
 - Targeted Learning
 - Instrumental variable analysis
 - Regression discontinuity
 - Difference-in-Difference