

INF511: Modern Regression I

Lecture Materials - Probability & Probability Distributions

Understanding probability provides us with a foundation to derive model parameter estimates and quantify uncertainties in our parameter estimates. Probability is therefore essential for null hypothesis testing, which seeks to understand whether we can be confident, within reasonable probability, that our data support or refute our hypotheses.

Probability basics

Joints, Marginals, and Conditionals

A quick example

What are the marginal probabilities of: $P(Tired)$, $P(Sitting)$, $P(Standing)$?

What are the conditional probabilities of: $P(Tired|Sitting)$, $P(Tired|Standing)$?

Law of Total Probability

A preview of Bayesian inference

Probability Distributions

Probability distributions define data likelihoods, they are used to construct confidence intervals for parameter estimates, and they are used to generate p -values used in null hypothesis testing.

First, let's define some critical terms

PMF's and PDF's

CMF's and CDF's

Continuous probability distributions

Uniform distribution, bounded

Normal (i.e., Gaussian) distribution, unbounded

Discrete probability distributions

Bernoulli distribution, binary

Poisson distribution, bounded positive