Statistical_Inference_Notes

Coursera Course by John Hopkins University

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Contents

Intro

Instructor's Note:
"*Statistical inference is the process of drawing conclusions about populations or scientific truths from data. There are many modes of performing inference including statistical modeling, data oriented strategies and explicit use of designs and randomization in analyses. Furthermore, there are broad theories (frequentists, Bayesian, likelihood, design based, . . .) & numerous complexities (missing data, observed and unobserved confounding, biases) for performing inference. A practitioner can often be left in a debilitating maze of techniques, philosophies and nuance. This course presents the fundamentals of inference in a practical approach for getting things done. After taking this course, students will understand the broad directions of statistical inference and use this information for making informed choices in analyzing data.*

All the best,

Brian Caffo"

Statistical inference help us extend beyond a small subset of data to give answers about a population.

Course Description:
"*In this class students will learn the fundamentals of statistical inference. Students will receive a broad overview of the goals, assumptions and modes of performing statistical inference. Students will be able to perform inferential tasks in highly targeted settings and will be able to use the skills developed as a roadmap for more complex inferential challenges.*"

GitHub Link for Lectures

Statistical Inference Lectures on GitHub

Course Book

The book for this course is located on LeanPub

Data Science Specialization Community Site

The site is created using GitHub Pages

Homework Problems

The homework problems are optional, they are a good opportunity to practice the skills covered in the course. There are also worked out solutions on youtube (linked to from the book)

Here's all four homeworks as interactive web pages (it's probably better to just keep up with them from the book):
* **HW 1**
* **HW 2**
* **HW 3**
* **HW 4**

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Probability & Expected Values

Probability mass functions

Probability densisty functions

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Conditional Probability

Bayes' rule

Independence

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Expected values

Expected values, simple examples

Expected values for PDFs

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Lessons with `swirl()`

Quiz 1

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Variability, Distribution, & Asymptotics

Introduction to Variability

Variance Simulation Examples

Standard Error of the Mean

Variance Data Example

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Binomial Distrubtion

Normal Distribution

Poisson

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Asymptotics and the Law of Large Numbers (LLN)

Asymptotics and the Central Limit Theorem (CLT)

Asymptotics and Confidence Intervals

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Lessons with `swirl()`

Quiz 2

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Intervals, Testing, & P-values

T Confidence Intervals

T Confidence Intervals Example

Independent Group T Intervals

A Note on Unequal Variance

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Hypothesis Testing

Example of Choosing a Rejection Region

T Tests

Two Group Testing

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P-Values

P-Value Further Examples

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Lessons with `swirl()`

Quiz 3

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Power, Bootstrapping, & Permutation Tests

Power

Calculating Power

Notes on Power

T Test Power

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Multiple Comparisons

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Bootstrapping

Bootstrapping Example

Notes on the Bootstrap

Permutation Tests

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Lessons with `swirl()`

Quiz 4

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