

AUA CS 108, Statistics, Fall 2019

Lecture 22

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Descriptive Statistics

Introduction

- ▶ Populations and Samples; Observation, Variable and Parameter; Statistics (numerical characteristic of a Sample)
- ▶ Sampling: Representative Sample; Sampling Methods (Systematic, Stratified, Cluster)
- ▶ Types of Variables (Features)
- ▶ Measurement Levels

Univariate Data: Graphical Summaries

- ▶ Frequency and Relative Frequency Tables
- ▶ BarPlot, Frequency Polygon
- ▶ Empirical Distribution Function
- ▶ Frequency, Relative Frequency and Density Histograms
- ▶ Stem-and-Leaf Plots

Univariate Data: Numerical Summaries

- ▶ Order Statistics (Ranks)
- ▶ Statistics for the central tendency
 - ▶ The Sample Mean, Trimmed Mean, Weighted Mean, Winsorized Mean
 - ▶ The Sample Median
 - ▶ The Sample Mode
- ▶ Statistics for the Spread/Variability
 - ▶ Deviations (from the Mean, from the Median), Absolute Deviations
 - ▶ The Range
 - ▶ The Sample Variance and Standard Deviation (with n or $n - 1$ in the denominators)
 - ▶ Properties of the Sample Variance
 - ▶ The Mean Absolute Deviation (MAD) from the Mean or Median

Univariate Data: Quantiles and BoxPlots

- ▶ Sample Quartiles
- ▶ The InterQuartile Range, IQR
- ▶ BoxPlot
- ▶ Outliers (BoxPlot Method)
- ▶ Sample Quantiles
- ▶ Theoretical Quantiles

Bivariate Data: Graphical and Numerical Summaries

- ▶ ScatterPlot
- ▶ Q-Q Plot (Data vs Data, Data vs Distribution, Distribution vs Distribution)
- ▶ Sample Covariance and the Correlation Coefficient
- ▶ Properties of Sample Covariance and Correlation Coefficient

Probability Refresher

- ▶ R.V.s and their main characteristics
- ▶ Important Discrete and Continuous Distributions

Convergence of Random Variables

- ▶ Convergence a.s.
- ▶ Convergence in Probability
- ▶ Convergence in Quadratic Mean
- ▶ Convergence in Distributions
- ▶ Examples