



A-Z Statistics for Machine Learning, AI & Data Science

Course Instructor:

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Module 01: Introduction to Statistics & Descriptive Statistics

1. Introduction to Statistics in Data Science
2. Importance of Statistics in DS & ML
3. Types of Data: Numerical (Discrete & Continuous), Categorical, Ordinal, Nominal
4. Levels of Measurement: Nominal, Ordinal, Interval, Ratio
5. Measures of Central Tendency: Mean, Median, Mode
6. Measures of Dispersion: Range, Variance, Standard Deviation, Interquartile Range, Coefficient of Variation
7. Measures of Shape: Skewness & Kurtosis
8. Data Visualization: Histograms, Box Plots, Scatter Plots, Bar Charts, Pie Charts, Line Charts
9. Identifying and Handling Outliers

Module 02: Probability Theory & Random Variables

1. Fundamentals of Probability
2. Types of Events (mutually exclusive and non-exclusive, independent events, dependent events)
3. Probability Rules: Addition, Multiplication, Complement
4. Conditional Probability
5. Bayes' Theorem
6. Random Variables: Discrete vs. Continuous
7. Probability Mass Function (PMF) & Probability Density Function (PDF)
8. Expectation, Variance, and Standard Deviation of RVs

Module 03: Continuous Distributions & Sampling Methods

1. Normal Distribution: Properties, Standard Normal, Z-Scores
2. Core distributions for real life and modelling: Binomial (success/failure), Poisson (rare events), Exponential (time until event), Geometric (first success)
3. Some useful continuous distributions: Uniform distribution, Log-normal, Gamma (waiting time, widely used in Bayesian stats), Beta
4. Law of Large Numbers
5. Central Limit Theorem and Its Importance
6. Sampling Methods: Simple Random, Stratified, Systematic, Cluster Sampling
7. Sampling Bias and How to Avoid It
8. Bias-Variance Tradeoff
9. Student's t-distribution, Chi-square distribution, F distribution

Module 04: Inferential Statistics & Hypothesis Testing

1. Sample vs. Population
2. Margin of Error and Confidence Intervals
3. Hypothesis Testing: Null & Alternative Hypothesis
4. Type I & Type II Errors
5. Significance Levels and P-values
6. One sample T-test
7. Two sample T-tests
8. Measures of relation: Correlation test and
9. Chi-square test
10. ANOVA
11. Assumptions Behind Statistical Tests
12. Effect Size and Statistical Power
13. Multiple Comparisons and Bonferroni Correction

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