אוניברסיטת
בן-גוריון בנגב

The Department of Mathematics
2018–19–A term

Course Name Statistical methods for big data

Course Number 201.1.9131

Course web page
https://www.math.bgu.ac.il//en/teaching/fall2019/courses/statistical-methods-for

Lecturer Dr. Luba Sapir, <lsapir@post.bgu.ac.il>, Office 109-

Office Hours https://www.math.bgu.ac.il/en/teaching/hours

Abstract

Requirements and grading[1]

Course topics

1. Review of probability: a. Basic notions. b. Random variables, Transformation of random variables, Independence. c. Expectation, Variance, Covariance. Conditional Expectation.

2. Probability inequalities: Mean estimation, Hoeffding?s inequality.

3. Convergence of random variables: a. Types of convergence. b. The law of large numbers. c. The central limit theorem.

4. Statistical inference: a. Introduction. b. Parametric and non-parametric models. c. Point estimation, confidence interval and hypothesis testing.

5. Parametric point estimation: a. Methods for finding estimators: method of moments; maximum likelihood; other methods. b. Properties of point estimators: bias; mean square error; consistency c. Properties of maximum likelihood estimators. d. Computing of maximum likelihood estimate

6. Parametric interval estimation a. Introduction. b. Pivotal Quantity. c. Sampling from the normal distribution: confidence interval for mean, variance. d. Large-sample confidence intervals.

---

[1]Information may change during the first two weeks of the term. Please consult the webpage for updates

7. Hypothesis testing concepts: parametric vs. nonparametric a. Introduction and main definitions. b. Sampling from the Normal distribution. c. p-values. d. Chi-square distribution and tests. e. Goodness-of-fit tests. f. Tests of independence. g. Empirical cumulative distribution function. Kolmogorov-Smirnov Goodness-of fit test.

8. Regression. a. Simple linear regression. b. Least Squares and Maximum Likelihood. c. Properties of least Squares estimators. d. Prediction.

9. Handling noisy data, outliers.