

Nonparametric Statistics - Final Overview

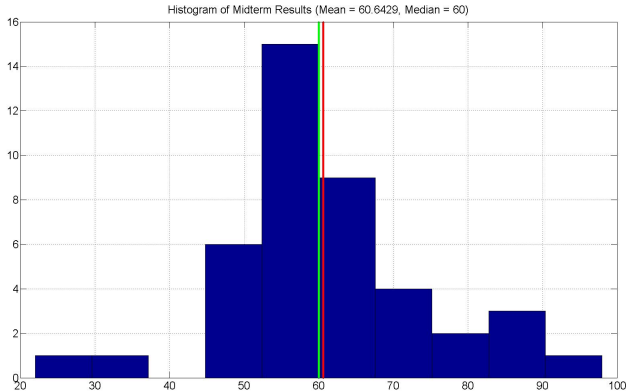
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STAT W4413: Nonparametric Statistics - Lecture 18

- 30% Homeworks.
- 25% midterm exam (in class):
 - Results: Mean = 61 Median = 60
- 45% final (in class):
 - **Thursday, May 12, 7:10PM-10:00PM, Schermerhorn 614**
- Exams are closed-book, closed-notes.
- An Important Note: no make-up exams will be given.
- The final letter grade depends on your performance in homeworks, midterm, and final exam.

Midterm Results



Material for the Final Exam

- ① Lecture 10 Goodness of Fit Tests for Categorical Random Variables
- ② Lecture 11 Goodness of Fit Tests for Real Valued Random Variables
- ③ Lecture 12 Two Sample Problem
- ④ Lecture 13 How to use “Goodness of fit Test” **Eg**
- ⑤ Lecture 14 Two Sample Problem: Permutation Test
- ⑥ Lecture 15 k -Sample Test
- ⑦ Lecture 16 Block Design Tests
- ⑧ Lecture 17 Bootstrap Methods

Lec10

- Visual Analysis of Goodness of Fit pp-plot vs. qq-plot (these plots are for both categorical and continuous random variables).
- χ^2 -test and examples of use. **HW, 模拟考**
- Composite null hypothesis. **Eg**

Lec 10 两个例子会算

Lec11

Lec11 P9 P11 P14

会背会算记分布

- Kolmogorov-Smirnov test, Cramer-Von Mises and Anderson-Darling test.

双重MAX, N阶乘

- Lilliefors test for composite null hypothesis

Lec12

- Parametric two sample tests
- Weaknesses of parametric tests
- Nonparametric test for the location (shift) problem

- Rank and order statistics

- Wilcoxon rank-sum test

笔记本, **when to use what test**

BF检验 (作业), P13

问题定义,

P6算例

Z-test~Norm Pg8;

ParVSNonpar

考算例, P24, 1/阶乘 由来

**最后两页PPT
优缺点!!**

Lec13

PP_QQ图
定义，图解
Pg7

- Example with χ^2 -test: Derive the ML for the probability of success in a sample from Binomial distribution.
- KS test vs. Lilliefors test: Why KS test is misleading?

**Si no se nada de los parameters , Lilliefors;
Else, KS (otherwise KS has large P-VAL)**

Two Sample Problem: Permutation Test

L14 • H_0 and H_1 of the one sided location (shift) problem,

- derivation of p-value, **Pg8~9**

**# permutation for
a given data set P5**

- the steps of the test, **Steps: P10**

- comparing different test statistics

Abs, Ratio??? eg P19

- two-sided location (shift) test

***Perm Test要求
Exchangeable***

- one-sided domination problem **!!! 分部积分**

- two-sided domination problem

RD P31 PPT 页尾问题

- scale problem *Can you explain what the permutation test looks like with this new statistic?*

- scale problem: unequal shifts and the problem of nonexchangeable datasets **PG33, USE MC 模拟; TILL PG43 CI**

Lec15

P10, 证明

P14, 背

P15, 引理

- pairwise T -test vs. ANOVA to test equality of k means
- what is the difference between ANOVA and Kruskal-Wallis statistics?
- k -sample permutation test

P34, 会算

P37, 会算

P39, 对比

Lec16

P5表~P6的1式

Pg9 $H_0 H_1$

Pg13 会算

- parametric two-way ANOVA (idea behind the test)
- permutation test **Pg18 算例**
- Friedman's statistics

L17 • Bootstrap estimates of standard errors vs. asymptotic standard errors **P6 SE** **P10~12 两类Boot**

- Bootstrap confidence intervals
- Bootstrapping regression models
- Bootstrapping regression models with heteroskedasticity **P13**
- Permutation tests vs. Monte Carlo tests vs. Bootstrap tests **P14**
- Sources of approximation error - bias/variance trade-off **P15**
- Parametric vs. nonparametric bootstrap
- Bootstrap for dependent data **P29 data sufficiently dense from population**

Format of the Final Exam

1. Question about a simple derivation from the lecture with hints.
2. A series of short questions about general understanding of different tools and methods discussed in the lecture.
3. Theoretical question two parts:
 - (i) an easy question like the ranks Problem 2 (a) or (b) in practice final.
 - (ii) slightly more difficult question like Problem 2 (c) in practice final.
4. Question which utilizes one or two test from the lecture but you do not have to memorize the test statistics.