

National Cheng Kung University

Modular Course 2022 Summer Program

從資料分析經分類到學習演算法

From data analysis over classification to learning algorithms

Instructor	Affiliation	Graduation (Ph.d.)
Brice Franke	Université de Bretagne Occidentale (Brest) Département de Mathématiques	Georg-August Universität Göttingen (德國哥廷根大學)
Course Type	Course Credit	Student Size (Maximum)
Lecture + Recitation	1	25

Student Background

Students from all college are welcome

Prerequisite : Elementary matrix algebra. It is recommended to take the summer Modular Course entitled “Linear Algebra behind Computer Graphics” in advance.

Difficulty

Challenging Medium Well Medium Entry Level (Basic)

Format of The Course

Lecture 100%

Grading Policy

In class exam 100 %

Note:

On day 1, 2, 3 and 4, an in-class quiz (possibly in the form of recitation) will be given to students from 17:00-17:40. Each counts 12.5% of the total final score. (12.5% x 4=50%)

In addition, on Day 5, there will be a take home exam which must be turned in before a preset due-day.

Code of Conduct for The Course

None

Course Description

We outline some underlying basic ideas for modern data analysis. Starting from a data frame we aim to develop some elementary and intuitive geometric ideas, which can be used to reduce the complexity of the data frame or to fill missing data in another data frame. With the progress of modern computer, these relatively old mathematical tools have become a strong tool for interpreting large quantities of data and are one of the starting points of the field called machine learning.

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Timetable and Syllabus

Peroid	Timetable	Syllabus
8/1(MON)	14:00 - 17:40	some matrix algebra and elementary statistics of data frames
8/2(TUE)	14:00 - 17:40	principal component analysis and factor analysis
8/3(WED)	14:00 - 17:40	Regression of all kinds
8/4(THU)	14:00 - 17:40	Classification and non-supervised learning
8/5(FRI)	14:00 - 17:40	First principles on machine learning

Goal of the Course

1. Understanding the mathematics underlying data analysis, e.g. geometric principles and other basic methods
2. Classification algorithms
3. Linear and nonlinear regression, generalised regression analysis
4. Decision trees, random forest, perceptron, neuronal networks

The Importance, Cross-Over Disciplinary and Contemporary of The Curriculum

This is an interdisciplinary course connecting mathematics, statistics, and computer sciences. Students can learn elementary mathematical analysis, matrix algebra and geometry and then apply to modern statistics and computer sciences. In particular, applications to machine learning algorithms will be more focused.

Remarks

References :

Probabilité analyse des données et statistiques (Gilbert Saporta)