STAT5330: 統計計算 (Statistical Computing)

Lecture: Thursday 8-11am
綜合三館 837

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Website: NTHU eeclass 數位學習平台 https://eeclass.nthu.edu.tw/

Course Topics:

This course covers modern computational methods and practices for statistical analysis. Topics include random number generation, Monte Carlo simulation, Bayesian inference, optimization, Gaussian process, visualization, and data management. A tentative schedule is following:

week	Topic	HW/Lab
1	Introduction	R introduction
2	Lecture 1: Random number generation	R markdown
3	Lecture 2: MCMC Methods: Gibb sampling and Metropolis algorithm	**Hw1**
4	Lecture 3: Distribution and Expectation	
5	Lecture 4: Monte Carlo methods in statistical inference	**Hw2** R ggplot
6	Lecture 5: Bayesian inference	
7	Midterm (open book 上機考試)	
8	Lecture 6: Resampling methods	**Hw3**
9	Lecture 7: Optimization & EM	R shiny
10	Lecture 7: Optimization & EM	**HW4**
11	Lecture 8: Gaussian process and its application	R package
12	Lecture 8: Gaussian process and its application	**HW5**
13	Lecture 9: Introduction to SQL	
14	Lecture 10: Topics on Learning (TBD)	**HW6**

15	Lecture 10: Topics on Learning (TBD)	
16	No class	
17	Final: R Shiny/package Demo Show	
18	Final: R Shiny/package Demo Show	

Grading: HW 60%; Midterm 30%; Final Demo 10%. (HW and Final 皆為個人作業)

References:

- The Elements of Statistical Learning (2009), Hastie, Tibshirani and Friedman, Springer.
- Bayesian Data Analysis (2004), Gelman, Carlin, Stern and Rubin, Chapman & Hall.
- Convex Optimization (2004), S. Boyd and L. Vandenberghe, Cambridge University Press.
- R For Data Science (2017), Wickham and Grolemund. https://r4ds.had.co.nz/

Requirement: This course is designed for graduate students in statistics. Mathematical statistics is required for taking this course.