BME 5096-01 Machine Learning

Fall 2022

Course Directors

Dr. Xiaowei Zhan (Xiaowei.Zhan@UTSouthwestern.edu)

Dr. Tao Wang (Tao.wang@utsouthwestern.edu)

Dr. Bo Li (Bo.Li@utsouthwestern.edu)

Dr. Jian Zhou (Jian.zhou@utsouthwestern.edu)

Time and Location

16 weeks starting on Aug 16, 2022, Tu/Thu, 10:30 am-12:00 pm

ZOOM Link or In-person

The course can be accessed in D2L at this link: https://d2l.utsouthwestern.edu/d2l/home/49760

Course Contents

- Introduction to methods for hypothesis testing and statistical inference, and statistical learning methods for prediction and classification.
- In the first five weeks, the course will cover how to analyze different types of data, including analysis methods for continuous, categorical, and survival. Upon completion of the first ten weeks, students should be able to think critically about data and apply appropriate statistical inference procedures to draw conclusions from such analyses.
- In the last three weeks, the course will discuss deep learning, Bayesian statistics, causal inference and computational approaches for predictive modeling and data mining.

Week	Instructor	Topic	Date
1	All course directors	Opening seminars	16-Aug
1	Yang Xie	Overview, model evaluation & assign projects	18-Aug
2	Xiaowei Zhan	Linear model	23-Aug
2	Xiaowei Zhan	Linear model lab	25-Aug
3	Xiaowei Zhan	Generalized linear model	30-Aug
3	Xiaowei Zhan	Generalized linear model lab	1-Sep
4	Bo Li	MLE/EM/Imputation	6-Sep
4	Bo Li	MLE/EM/Imputation lab	8-Sep
5	Xiaowei & Tao	Summary and review of statistical analysis in practice & Individual Presentation	13-Sep
5	Hong Zhu	Survival analysis	15-Sep
6	Bo Li	Bayesian statistics	20-Sep
6	Bo Li	Bayesian statistics lab	22-Sep
7	Yunan Wu	Causal inference	27-Sep
7	Chao Xing	Causal inference – Mendelian randomization	29-Sep
8	Mid-term	Semi-semester review & office hour	4-Oct
8	Mid-term	Mid-term exam	6-Oct
9	Xiaowei Zhan	Unsupervised learning	11-Oct
9	Xiaowei Zhan	Unsupervised learning lab	13-Oct
10	Tao Wang	Supervised – I	18-Oct
10	Tao Wang	Supervised – I discussion	20-Oct
11	Tao Wang	Supervised – II	25-Oct
11	Tao Wang	Supervised – II discussion	27-Oct
12	Lin Xu	Overview of genomic data analysis	1-Nov
12	Shidan Wang	Overview of image data analysis	3-Nov
13	Jian Zhou	Deep learning I	8-Nov
13	Jian Zhou	Deep learning II	10-Nov
14	Jian Zhou	Deep learning III	15-Nov
14	Jian Zhou	Deep learning IV	17-Nov

15	Wenhao Zhang	Neural computation	22-Nov
15		Thanksgiving break	24-Nov
16	All	Group Presentation	29-Nov
16	Gaudenz Danuser & Milo Lin	Final Seminars	1-Dec

Reference Books

1. Trevor Hastie, Robert Tibshirani and Friedman, Jerome. The elements of statistical learning (Second Edition). Springer-Verlag, 2009.
   (Book download link: http://statweb.stanford.edu/~tibs/ElemStatLearn/)
2. Kutner, Michael H. Applied linear statistical models. Vol. 4. Chicago: Irwin, 1996.
3. McCullagh, Peter, and John A. Nelder. Generalized linear models. Vol. 37. CRC press, 1989.
4. Klein, John P., and Melvin L. Moeschberger. Survival analysis: techniques for censored and truncated data. Springer Science & Business Media, 2005.
5. Pepe, Margaret Sullivan. The statistical evaluation of medical tests for classification and prediction. Oxford University Press, USA, 2003.
6. Kevin P. Murphy. Probabilistic Machine Learning: An introduction. MIT Press. 2022