

科目ナンバリング		G-LAS12 80010 LE10									
授業科目名 <英訳>		Statistical Learning Theory Statistical Learning Theory				担当者所属 職名・氏名		情報学研究科 教授 情報学研究科 講師		鹿島 久嗣 竹内 孝	
群	大学院横断教育科目群			分野(分類)	統計・情報・データ科学系			使用言語	英語		
旧群		単位数	2単位	週コマ数	1コマ	授業形態	講義（対面授業科目）				
開講年度・ 開講期	2025・前期		曜時限	月1		配当学年	大学院生	対象学生	理系向		
（情報学研究科の学生は、全学共通科目として履修登録できません。所属部局で履修登録してください。）											
【授業の概要・目的】											
This course will provide a in-depth exploration of the foundational theory and practical applications of statistical machine learning, which plays a significant role in statistical data analysis and data mining. We will primarily focus on supervised and unsupervised learning, with an emphasis on supervised learning. The course will cover essential theoretical concepts such as maximum likelihood estimation and Bayesian inference, as well as introduce the concept of Probably Approximately Correct (PAC) learning. Throughout the course, you will gain familiarity with various probabilistic models and predictive algorithms, including logistic regression, perceptrons, and neural networks. Additionally, we will touch upon advanced topics like semi-supervised learning, transfer learning, and sparse modeling, providing you with insights into the latest developments in the field of machine learning. In addition, opportunities for hands-on data analysis exercises will also be provided.											
【到達目標】											
Understanding basic concepts, problems, and techniques of statistical learning and some of the recent topics.											
【授業計画と内容】											
1. Statistical Machine Learning - Introduction to machine learning: historical perspective, basic concepts, and applications - Regression and classification: linear regression, logistic regression, and neural networks. - Inference framework and statistical learning theory: maximum likelihood estimation, regularization, Bayesian inference, Vapnik-Chervonenkis theory - Model selection: performance measures, cross-validation, hyper-parameter selection 2. Advanced topics - Semi-supervised learning - Transfer learning - Sparse modeling - Deep neural networks - Graph learning											
【履修要件】											
特になし											
【成績評価の方法・観点】											
Reports and/or final exam.											
----- Statistical Learning Theory(2)へ続く↓↓↓											

Statistical Learning Theory(2)
[教科書]
授業中に指示する
[参考書等]
(参考書) Hastie, Friedman, Tibshirani 『The Elements of Statistical Learning』 (Springer) Shai Shalev-Shwartz and Shai Ben-David 『Understanding Machine Learning: From Theory to Algorithms』 (Cambridge University Press)
[授業外学修 (予習・復習) 等]
Basic knowledge about probability and statistics
[その他 (オフィスアワー等)]
[主要授業科目 (学部・学科名)]