

SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COLLEGE OF DESIGN AND ENGINEERING

Website: <https://cde.nus.edu.sg/ece>

Area: Signal Analysis & Machine Intelligence

Host: Associate Professor Vincent Tan

Lecture seminar

TOPIC	:	Introduction to Linear Regression Models
SPEAKER	:	Dr Songtao Lu Senior Research Scientist IBM Thomas J. Watson Research Center, USA
DATE	:	Thursday, 2 February 2023
TIME	:	10.00AM to 11.00AM
VENUE	:	E5-03-21 Block E5, College of Design and Engineering, NUS

ABSTRACT

Regression models play a key role in machine learning techniques and have wide applications in the fields of learning from data, including data analytics, finance, engineering, management, etc. In a typical scenario, there is a set of training data, for example, advertising data, in which we observe the outcome (such as sales) and feature measurements (such as advertising budgets for TV, radio, and newspaper media) for a set of objects (such as people or cities). The main goal of the regression is to build a prediction model which will enable us to predict the outcome for unseen objects. This lecture will mainly focus on introducing linear regression, a simple and fundamental model of supervised learning, which assumes that the relationship between the outcome and features is linear. The main content will cover the following four major components, and each of them includes both theoretical study and numerical justification/illustration (on real data sets). 1) first, the linear regression model description will be introduced, including model assumptions, regression formulas, and model parameters. 2) next, using the residual sum of squares (RSS) as a measure for quantifying the regression errors, the least squares method will be presented for minimizing RSS with respect to the model parameters/coefficients. 3) then, the mean and variance of the least squares coefficient estimates will be respectively quantified, which will be useful for evaluating the accuracy or quality of the obtained linear regression models. 4) finally, before applying the linear regression model to analyze the real-world data, multiple potential issues (such as nonlinearity of data, outliers, collinearity) will be discussed, which are mostly related to the linear regression assumptions on model errors.

BIOGRAPHY

Songtao Lu is currently a senior research scientist with the mathematics of artificial intelligence (AI) group at the IBM Thomas J. Watson Research Center, Yorktown Heights. He obtained his doctoral degree in electrical engineering from Iowa State University in 2018. He was a post-doctoral associate with the department of electrical and computer engineering at the University of Minnesota Twin Cities from 2018 to 2019, and an AI resident at the Thomas J. Watson Research Center from 2019 to 2020. Dr. Lu is a recipient of the best paper runner-up award of UAI (2022), the outstanding paper award of FL-NeurIPS (2022), the IBM research accomplishment award (2021), and the ICML (2019) and AISTATS (2017) travel awards. His recent works have been published at multiple top-tier AI and machine learning conferences, including ICML, NeurIPS, AAAI, ICLR, UAI, IJCAI, AISTATS, etc. His primary research interests lie in machine learning, optimization, AI, and data science.

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