The University of Tennessee School of Natural Resources (SNR)

'Data Science Institute for Machine Learning and AI' (DSIMLA)

DSIMLA aims to promote and advance education and research in data science, machine learning, and AI for companies for the forest products industry. The Institute seeks to enhance the education and research of data science, machine learning, and AI for forest business and management companies. The goal of the Institute is to assist companies in learning, adapting, and effectively implementing the latest data science, machine learning, and AI technologies to optimize processes, leading to improved efficiency, utilization, energy savings, and cost reduction. The Institute will function as an expansion of a company's innovation group by providing access to the most current technologies in the rapidly evolving field of data science, machine learning, and AI.

The University of Tennessee, Knoxville is a public institution that was founded in 1794. It has a total undergraduate enrollment of 27,039 (fall 2022), its setting is city, and the campus size is 910 acres. It utilizes a semester-based academic calendar. University of Tennessee, Knoxville's ranking in the 2024 edition of Best Colleges is National Universities, #105. Its in-state tuition and fees are $13,244; out-of-state tuition and fees are $31,434. The University of Tennessee, Knoxville is a public research institution located in one of the state's largest cities, and is the flagship campus for the state school.

The School of Natural Resources is located in the at the University of Tennessee, Institute of Agriculture. The new MS Forest Business is open to students at UT and industry personnel willing to expand their education while working full-time, and will consist of a mostly virtual curriculum. The MS in Forest Business is a three-semester, non-thesis program that prepares students to assume leadership roles within forest industry in three separate tracks: Analytics & Data Science, Forestland Investment & Finance, and Logistics & Procurement.

Advanced Analytics and Machine Learning

January 14-16, 2025

Offered by the

'Data Science Institute for Machine Learning and AI'

THE UNIVERSITY OF **TENNESSEE** KNOXVILLE
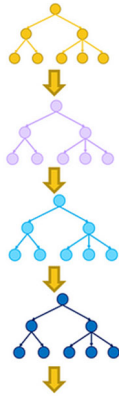
SCHOOL OF NATURAL RESOURCES
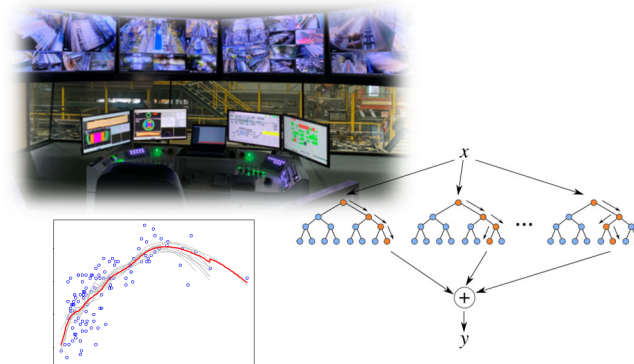
Instructor

Timothy M. Young, Ph.D.

Course Goal

The course will enhance the students' knowledge of advanced analytical methods and machine learning techniques for process and product optimization. The techniques taught in the course will greatly improve the students' knowledge of modern ML concepts and the use of ML software.

Course Structure

The course is taught in two separate 40-hour sessions in a relaxed classroom setting. Participants enjoy the small class size of 8 to 10 students. Students are required to bring a laptop with either JMP or Minitab software preloaded on the laptop. R and Python code are given to participants for machine learning algorithms. Session I is 2 ½ days and typically runs from a Tuesday morning at 8:30 am EST through Thursday, which concludes that day at 12 pm EST. Session II is scheduled by the class typically 8 to 10 weeks after the conclusion of Session I. This is a software-based course and participants should be comfortable with analytics and statistics.

MACHINE LEARNING
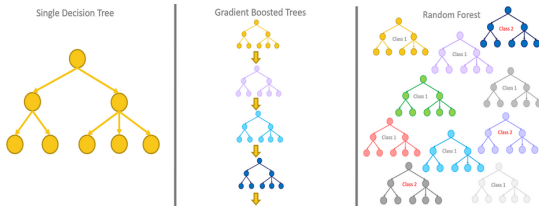
Course Outline

- Introduction to Advanced Analytics
- Introduction to Machine Learning
- Introduction to Deep Learning
- Introduction to AI
- Statistical Methods Review
- Advanced Control Charting
- Data Cleaning and Preparation
- Data Fusion Concepts
- Least Squares Regression Models
- Logistic Regression Models
- Multinomial Regression Models
- Regression Trees
- Machine Learning Algorithms
  - Random Forests
  - Boosted Trees
  - Bayesian Additive Regression Trees
  - Multivariate Adaptive Regression Trees
- Deep Learning
  - Perceptron & Multilayer Perceptron
  - Feed Forward Neural Network
  - Recurrent Neural Network
  - Convolutional Neural Network
- Concepts of AI and Digital Twins

This is a software-based course and all exercises are done in JMP and Minitab software. R and Python code are given to participants for machine learning algorithms.

Fiber Moisture
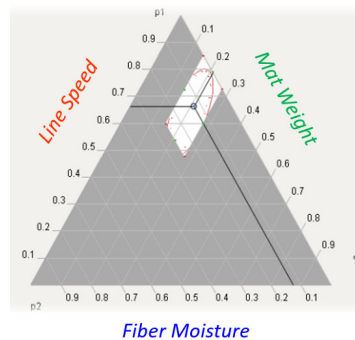
Course History

The course has been taught since 2012 to more than 30 companies and over 250 participants. This includes several in-house customized courses for companies.

4.0 CEU Credit Offering

The course is available for 4.0 CEU credits and 3 graduate or undergraduate credits within The University of Tennessee system. This course meets 3 required credit hours for the MS Forest Business degree. The fees for both Sessions i & II CEU credits are included in total course fee for both sessions of $4,250. Session dates TBD at end of Session I by group.

2023 Graduation Class

Contact

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