Welcome to AI Workshop

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AI workshop website: https://github.com/utsabigdata/AI-Workshop

AI Workshop Agenda

Monday, Aug 13, 2018

- The Evolution of AI and Machine Learning
- Review Python Programming, Data Analytics, and Visualization

Tuesday, Aug 14, 2018

- Linear Algebra, Numerical Computing, and Probabilistic Programming

Wednesday, Aug 15, 2018

- Natural Language Processing, Text Analytics, and Information Extraction Using Topic Models

Thursday, Aug 16, 2018

- Deep Learning and Convolution Neural Network and Tensorflow Programming

Friday, Aug 17, 2018

- Graph Theory and Network Analysis

Day 1

- The Evolution of AI and Machine Learning
- Review Python Programming, Data Analytics, and Visualization

This workshop covers foundational AI and Big Data topics and concepts and provides an understanding of essential AI techniques and the basics of neural networks and fundamental neural network architectural layers. This workshop will also take you from a short review of a Python programming environment hosted on a cloud to exploring many different types of big data. The workshop will introduce big data concepts and characteristics along with data manipulation and cleaning techniques using the popular python Pandas data science library and introduce the abstraction of the Series and Data Frame. You will learn how to prepare data for analysis, perform simple statistical analyses, create meaningful data visualizations, predict future trends from data, and more!

Topics covered:

- Modern AI and Cognitive AI
- Big Data Concepts
- Importing Data
- Cleaning Data
- Data Frame Manipulation
- Data Visualization
- Use Machine Learning APIs

Day 2

- Linear Algebra, Numerical Computing, and Probabilistic Programming

Linear Algebra and Matrix Computations are the backbone of data science and machine learning algorithms. In this workshop, we will cover basic ideas in linear algebra such as matrix-vector manipulations, solving matrix-vector systems, review some of the available mathematical functions in Python, and discuss how to write your own routines. Along the way, we'll learn about matplotlib to display results from our examples. In the afternoon, we will build participants' knowledge of Bayesian inference, workflows, and decision making under uncertainty. We will start with the basics of probability via simulation and analysis of real-world datasets, building up to an understanding of Bayes' theorem. We will then introduce the use of probabilistic programming to do statistical modelling.

Topics covered:

- Linear Algebra
- Matrix Operation
- Probability
- Bayes Theorem

Day 3

- Natural Language Processing, Text Analytics, and Information Extraction Using Topic Models

Natural language processing (NLP) is one of the most transformative technologies for modern enterprises. This workshop will introduce you to text mining and text manipulation algorithms. The course begins with the structure of text both to the machine and to humans and an overview of the NLP frameworks for manipulating text. This workshop is focused on practical models with many examples and developing functional applications. This workshop offers you a complete explanation of the main NLP methods such as Text Data Assembly, Text Data Preprocessing, Model Building, and finally the developing of NLP applications.

Topics covered:

- Tokenization
- Strip punctuation
- Lemmatization
- Bigram Collocation Detection
- Latent Dirichlet Allocation (LDA)
- Topic Modeling
- Text Clustering and Classification

Day 4

- Deep Learning and Convolution Neural Network and Tensorflow Programming

Deep Learning is concerned with computer programs that enable the behavior of a computer to be learned from examples or experience rather than dictated through rules written by hand. While it will be essential to learn conceptually how machine learning algorithms work and interact with data, the emphasis will be on effective methodology for using data analytics and machine learning to solve practical problems. We'll introduce TensorFlow and work through introductory exercises across several domains, including computer vision, natural language processing, and structured data classification.

<u>Topics covered:</u>

- Introduction to Machine Learning and Deep Learning
- TensorFlow Programming
- Building Deep Learning Models
- Convolution Network
- Programing Exercise

Day 5

- Graph Theory and Network Analysis

Graphs arise in various real-world situations, as there are path planning, computer networks, and social networks. This workshop will introduce you to graph theory concepts and some of their most import properties. The workshop begins with an understanding of what network analysis is and motivations for why we might model phenomena as graphs. This workshop gives you a broad overview of the field of graph analytics so you can learn new ways to model, store, retrieve, and analyze graph-structured data.

<u>Topics covered:</u>

- Graph Theory Concepts and Properties
- Path Planning and Search
- Minimum Spanning Trees
- Centrality Measurement (Influence)
- Clustering