ME 620: Fundamentals of Artificial Intelligence
January - May 2024

Published: April 15, 2024
Assignment: 3 **Due: April 25, 2024**
Max Marks: 30

General Guidelines

1. **This assignment is of 30 Marks and carries weightage for FINAL evaluation of ME 620.**
2. Please **upload screenshots / PDF of handwritten pages as a single file to MS Teams under Assignment Tab.** Submission as posts on MS Teams or email submission would not be entertained.
3. You may discuss with other students about this assignment. Ask TAs for clarifications. Consult outside sources such as the Internet and take help to learn the material. Finally, **the solutions you submit should be your own work, not copied** from a peer or an abridged outline from any solution manual.
4. **Note that the assignment has two sections. You are required to do ONLY one section.**

Principal Component Analysis

An important *Machine Learning* method for dimensionality reduction is called Principal Component Analysis or PCA. Using simple matrix operations from linear algebra and statistics, PCA calculate a projection of the original data into the same number or fewer dimensions.

Consider the following 2D data.

X	Y
4	11
8	4
13	5
7	14

Section A: Pen-Paper Assignment

Use the PCA algorithm to reduce the 2D data to 1D.
Give the geometrical representation of 1D approximation to the above data set.

Section B: Programming

Implement the PCA method for dimensionality reduction from scratch. Reduce the 2D data to 1D.
Submit the program output screen-dump.
Give the geometrical representation of 1D approximation to the above data set.