COURSE OUTLINE
CSE 437: PATTERN RECOGNITION
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
UNIVERSITY OF ASIA PACIFIC

1. PATTERN RECOGNITION INTRODUCTION AND MACHINE LEARNING.
2. TYPES OF PATTERN RECOGNITION ALGORITHMS.
3. REGRESSION AND CLASSIFICATION.
4. ONE VARIABLE LINEAR REGRESSION.
5. MULTIVARIABLE LINEAR REGRESSION.
6. NORMALIZATION AND NORMAL EQUATION.
7. LOGISTIC REGRESSION.
8. HIGH BIAS AND HIGH VARIANCE.
9. TRANING, CROSS VALIDATION AND TESTING SET.
10. K FOLD CROSS VALIDATION.
11. REGULARIZATION.
12. NAIVE BAYES.
13. K MEANS CLUSTERING.
14. K NEAREST NEIGHBOR.
15. DECISION TREE AND RANDOM FORREST.
16. REINFORCEMENT LEARNING.
17. SUPPORT VECTOR MACHINE.
    - I. Support Vector points, margin, width, hyper-plane.
    - II. Inputs and Outputs of Support Vector Machine.
    - III. Deduction of the width of the margin.
    - IV. Margin of Separation, optimal hyper-plane.
    - V. Formulation of quadratic programming problem of Support Vector machine (Page 10 total of the given slide)
    - VI. Lagrange Multiplier (example and theory)
    - VII. The properties of solution p of Lagrange multipliers solution.
    - VIII. Determination of the value of w using Lagrange Multipliers method.
    - IX. Conversion from primal problem to dual problem.
    - X. How to classify an unknown point with equations.
    - XI. Idea of Kernel and how to apply it.
    - XII. Kernel types.
18. ARTIFICIAL NEURAL NETWORK.
    - I. STRUCTURE OF HUMAN NEURON.
    - II. HOW ANN CAN MIMIC A SINGLE HUMAN NEURON.
    - III. MACCULLOCH AND PITTS MODEL OF A SINGLE NEURON.
    - IV. PERCEPTRON MODEL OF A SINGLE NEURON.
    - V. SINGLE NEURON PERCEPTRON LEARNING ALGORITHM.
    - VI. PERCEPTRON ACTIVATION FUNCTIONS.
    - VII. SINGLE AND MULTILAYER NEURAL NETWORK.
    - VIII. SIGNIFICANCE OF HIDDEN LAYER.
    - IX. MULTILAYER PERCEPTRON LEARNING ALGORITHM.
    - X. LOGIC GATE IMPLEMENTATION WITH ANN (NOT, AND, OR, XOR, XNOR).
    - XI. BACKPROPAGATION LEARNING ALGORITHM.
    - XII. CONVOLUTIONAL NEURAL NETWORK.
    - XIII. RECURRENT NEURAL NETWORK AND LONG SHORT-TERM MOMORY.
    - XIV. DEEP NEURAL NETWORK.
19. PRINCIPLE COMPONENT ANALYSIS.
20. ROC AND AUC.
21. F1 SCORE, PRECISION AND RECALL.