Machine Learning BITS F464 **01-10-2022**

Lecture 14-15: MLE, MAP

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READ THE FOLLOWING CAREFULLY:

Honour Code for Students: I shall be honest in my efforts and will make my parents proud. Write the oath and sign it on the assignment.
Deadline for Assignment Submission: 07:00 PM, 15 October 2022. No assignments will be accepted after the deadline. The submission of the assignment is via online. The quanta link to submit assignment will be provided soon. The file name has to be named in the following format: rollno_firstname_lastname. Question 2(a) and 2(b) carries 5 marks, question 2(c) carries 20 marks - provide the code snippet wherever the coding is compulsory.

-1.1 Section I: MLE and MAP

1. Read the following material on Maximum Likelihood Estimation and Maximum a Posteriori probability Estimation: `https://www.cs.cmu.edu/~tom/mlbook/Joint_MLE_MAP.pdf`
2. Consider the following scenario, where we flip a coin n number of times to produce a dataset containing n_H number of Heads and n_T number of Tails. The outcomes of the coin flips are independent and identically distributed. For this setting, solve the following problems:
   (a) Make handwritten notes to find the best estimate of θ using MLE (Refer the materials), where θ is the Probability of getting heads.
   (b) Make handwritten notes to find the best estimate of θ using MAP (Refer the materials), where θ is a random variable.
   (c) Use Python programming to solve the exercise problems (4 questions) provided in the following link: `https://www.cs.cmu.edu/~tom/mlbook/Joint_MLE_MAP.pdf`. You can use jupyter notebook to solve the programming questions (also comment on your understanding for each plots).