Online Machine Learning

Associated Term: 2024/25 Academic Session
Learning Objectives:

The course addresses the on-line framework of machine learning in which the learning system learns and issues predictions or decisions in real time, perhaps in a changing environment. The course teaches protocols, methods and applications of online learning. Course content: Markov chains and their applications; PageRank for web page ranking; Hidden Markov models and dynamic programming. Time series. ARMA model. Kalman filters. Prediction with expert advice: learning protocol, loss function, regret. Aggregating algorithm and its optimality properties for general loss functions. Sleeping and switching experts. Universal algorithms in on-line learning. Applications to portfolio theory: Cover's universal rebalanced portfolios. Online setup of the bandit problem. Learning Outcomes: 1. (max 50 words) Understand the online learning framework and appreciate the difference with the batch approach; analyse the setup of practical problems 2. (max 50 words) Demonstrate advanced knowledge of methods of Markov models, time series, and Kalman filters 3. (max 50 words) Demonstrate advanced understanding of the prediction with expert advice and online bandit algorithms 4. (max 50 words) Analyse properties of online learning algorithms 5. (max 50 words) Implement online learning algorithms, apply them algorithms to real-world data and evaluate results
Required Materials: Click here for the reading list system
Technical Requirements: The total number of notional learning hours associated with the course are 150. **These will normally be broken down as follows:** 34 hour(s) of Lectures across 11 week(s) 6 hour(s) of Practical Classes and Workshops across 6 week(s) 110 hour(s) of Guided Independent Study **Summative Assessment:** Examination (60%) 2 hours Portfolio (CW+Quizzes) (40%) 40 hours