CS4227: Deep Reinforcement Learning

Week 12: Module Summary & Final Exam.

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Module Summary

- **Neural Computing**
  - Perceptron, MLPs, Backpropagation
  - CNNs: LeNet-5, Google LeNet (Inception), ResNet
  - Loss Functions, Optimisers, Regularisation, Dropout, Weight Initialisation, etc.
  - Performance: confusion matrix, precision and recall, AUC, ROC.
- **Introduction to Reinforcement Learning**
  - Trial and error, exploration v exploitation, credit assignment problem
  - MDP, Bellman's Optimality Equation
  - Dynamic Programming (DP) → requires a full model, bootstraps, GPI
  - Monte Carlo (MC) → does not use a model, does not bootstrap
  - Temporal Difference (TD) Methods → Sarsa, Q. Do not require a model, boostrap.

Module Summary

- **Deep Q Networks**
  - Cartpole
  - Atari
  - Loss function for each
  - Maximisation bias
  - Double DQNs
- **Policy Gradient**
- **Misc:**
  - AI/ML definitions,
  - Explainability, Ethics

FINAL EXAM

- Exam is 2 hours.
- Answer Any THREE questions.
- Total of **5** questions on the paper
- Each question is worth 12 marks
  - Each question has 4 parts.

FINAL EXAM

- Work through past exam papers.

- For example, in the context of a Deep Q Network (DQN) for Atari, describe:

a) How experience is captured, stored, and sampled.
b) The network structure, including inputs and outputs.
c) Calculating the error, with coding fragments to illustrate the discussion.

Finally

- Wishing you the best with the Final Exam, and your 50 year careers.
- Expect to read about innovations and contributions from you over the next 10 years