CSE 257: Search and Optimization (Winter 2025)

Instructor: Sicun Gao

Schedule

- Week 1: Numerical Optimization (I)
  (first-order and second-order directions, line search, various accelerations)

- Week 2: Stochastic Search
  (simulated annealing, cross-entropy methods, search gradient)

- Week 3: Classical Search
  (heuristic search, adversarial search, sampling-based planning)

- Week 4: Reinforcement Learning (I)
  (MDP, value and policy iteration, temporal-difference, Q-learning)

- Week 5: Reinforcement Learning (II)
  (deep Q-learning, policy gradient, policy improvement theorems)

- Week 6: Bandits and Monte Carlo Tree Search
  (concentration bounds, upper confidence bound, MCTS, AlphaGo)

- Week 7: Combinatorial Search (I)
  (constraint programming, SAT, conflict-driven backtracking)

- Week 8: Combinatorial Search (II)
  (integer programming, cutting planes, general nonlinear problems)

- Week 9: Numerical Optimization (II)
  (further topics on constrained optimization if time permits)

- Week 10: TBA

Grading

- Assignments: 50 Points

- Participation: 10 Points

- Final (closed-book exam): 40 Points