

Tutorial 8: Genetic algorithms and optimisation

Optimisation

1. Describe machine learning as an **optimisation problem**.
2. **Quiz question** Random walk
 - (a) Write pseudocode for the **random walk** search algorithm.
 - (b) What's the drawback of this search algorithm?
3. **Quiz question** Steepest gradient descent
 - (a) Write pseudocode for the **steepest gradient descent** search algorithm (mathematical details not required).
 - (b) What's the drawback of this search algorithm?
4. **Quiz question** Simulated annealing search
 - (a) Explain how the **simulated annealing** search algorithm works.
 - (b) Is it guaranteed to find the global minimum (or maximum)?
5. **Quiz question** Genetic algorithms
 - (a) Explain how the **genetic algorithm** works.
 - (b) Explain how a child is created from two parents using **crossover** and **mutation**.
 - (c) What are the benefits and drawbacks of **elitism**?

Genetic algorithms

6. Implement a genetic algorithm to solve the 8-queens problem from Lecture 14. Consider this exercise as training in preparation for the second assignment. Use the chromosome encoding scheme from the lecture with whichever parent selection method you prefer. Follow the lecture notes for hints on how to do crossover and mutation. You can use any language for this exercise that you're comfortable with. If you chose to do this in Python, you can use the code from `eight_queens_visualiser.py` (downloadable from the Tutorial 8 website) for visualisation of the eight queens on the chessboard.