INF3490/INF4490 Exercise Solutions - Week 2

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$\mathbb{P}$ marks the programming exercises, we strongly recommend using the python programming language for these. Exercises may be added/changed after publishing.

1 Representations

Recall all the representations that have been presented. Which mutation and recombination operators are compatible with which representations?

Answer:

- Binary representation
  - Bit-flip mutation
  - N-point and uniform crossover
- Integer representation
  - Random reset and creep mutation
  - N-point and uniform crossover
- Cardinal/enumerated/symbolic representations
  - Random reset mutation
  - N-point and uniform crossover
- Real-valued/Continuous representation
  - Uniform and Gaussian mutation
  - N-point, discrete uniform and arithmetic crossover
- Permutation representation
  - Swap, insert, scramble and invert mutation
  - Partially mapped, order, cycle and edge crossover
- Tree representation
  - Mutation by random replacement
  - Subtree swap mutation

2 Bit flip mutation

Given the binary chromosome with length 4, calculate the probability that no bits, one bit and more than one bit will be flipped in a bit-flip mutation with $p_m = \frac{1}{4}$.

Answer:

ℙ 3   Crossover

Given the sequences (2,4,7,1,3,6,8,9,5) and (5,9,8,6,2,4,1,3,7). Implement these algorithms to create a new pair of solutions:

a. Partially mapped crossover (PMX).

b. Order crossover.

c. Cycle crossover.

Answer:

Corrections and suggestions

Corrections of grammar, language, notation or suggestions for improving these exercises are appreciated. E-mail me at: **olehelg@uio.no** or use **GitHub** to submit an issue or create a pull request.