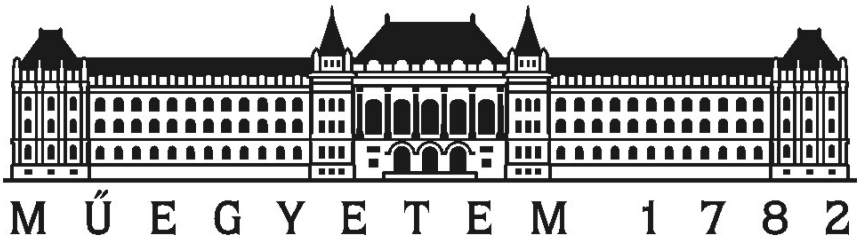

Evolutionary Algorithms

Homework

Fourth task

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1. Three individuals are coded $e_1 = 00010$, $e_2 = 01001$ and $e_3 = 11001$. How many schemes fits either e_1 or e_2? How many schemes fit all three?

   If we focus on e_1 and e_2, we can see that they differ only in positions 2,4 and 5. So the possible schemes are:

   - 0#0##
   - 0####
   - ##0##

   The schemes that fit all of them are:

   - ##0##
   - #####

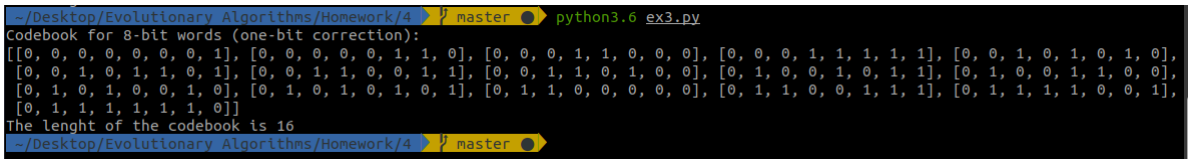
2. Two individuals are coded $e_1 = 0101$ and $e_2 = 0100$. How many different offsprings can they have if we use one-point crossover? And if we use uniform crossover?

   As the individuals are equal in all their components (exept the last one), the possible offsprings will be two (0101 and 0100) if we use one-point crossover.
   If we use uniform crossover, the result will be the same, as the first three components are always the same, no matter the parent we choose.

3. Find that largest codebook you can for the one error correcting codebook problem (using 8-long bit sequences as words).

   This problem can be easily solved by programming an script. It will calculate the possible binary combinations that can be made with 8 bits. Then, it will add the items that have a hamming distance of at least 3 to the codebook. Finally, we just have to calculate the lenght of the generated codebook.

   For 8 bit words, the lenght of the codebook is 16.



Bibliography

[1] Course Webpage
`http://math.bme.hu/ safaro/evolalgen.html`

[2] `https://tex.stackexchange.com/`