Search Based Software Engineering

Exercise 03 - Representation and Particle Swarm

2019-05-28

Deadline: 2019-06-10 23:59

Submit to: andre.karge@uni-weimar.de

Submission details: compress your files (.zip or .tar.gz or .rar)
Include a text file with the names, matrikel numbers and degree program for each group member!
Submit a .py file for your solution (no .ipynb files!)
Submit a .pdf file for theory tasks.

Name your compressed file: <lastname>_<firstname>_<matrikelnummer>-ex<exercise-number>(.tar.gz or .rar or .zip)
or for more than one student: please use this format for all group members
example: norris_chuck_123456-schwarzenegger_arnold_121212-ex01.tar.gz

Groups: submit your solved assignment in **groups of 2**

Language: Python 3

Hint: Use the given PSO framework for your algorithm.
You will need Qt and pyqt5 for this framework.
To install Qt, visit this page and follow the instructions (you probably don't need to install Qt if you use linux).
To install pyqt5, visit this page and follow the instructions.
The PSO framework can be found on the course website

Problem Description

Task 1. Representation (10 points)

a) What is the difference between genotype and phenotype? Explain in your own words. Give an example.

b) Explain the Hamming Cliff in your own words. How can it be prevented? Give an example.

Task 2. Random Walk Mutation (6 points)

a) Implement a Python function for the Random Walk Mutation. Test your function with a population of your choice.

Task 3. Particle Swarm Optimization (15 points)

a) Implement the Particle Swarm Optimization in Python for the given framework.

Hints:

- The fitness of a particle is its distance to the mouse pointer which changes for each frame
- Add your code to the files *PSO.py* and *particle.py*
- If the simulation is slow on your machine, try to reduce the *swarm_size* in *main.py*
- run your code with: *python3 main.py*