Assignment

- Group Work (maximum 3 students per group)
- Using the NetLogo framework: A powerful multi-agent modeling processes in ecosystems
- Assignment requirements
  I. Implementing PSO algorithms
  II. Performing experiments on the self implemented algorithms
  III. Reporting the analysis and results
- Detailed information will be provided on TUWEL
- Submission deadline: 31.12.2021

I. Implementing PSO Algorithms

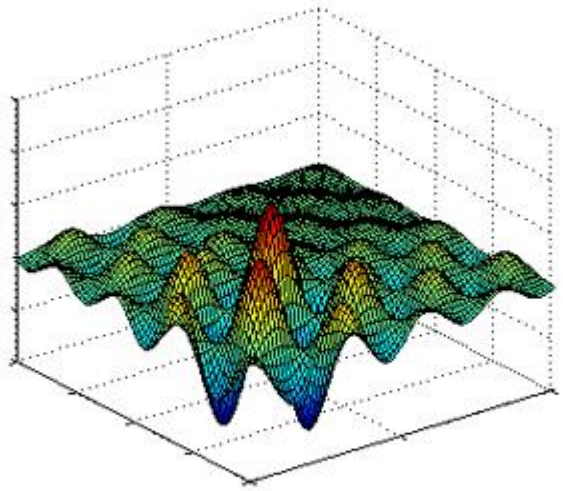
- It is recommended to start with the provided NetLogo template
  - User Interface draft
  - Incomplete PSO algorithm
  - Some functionalities are dummy or missing
- Implement PSO algorithms with extensions
  - According to the description (to be provided)
- You will be given a pool of options, from which you can select
  - different objective functions
  - Different exception handling options

Example of objective function

2. *Shubert function*

$$f(x,y) = \left(\sum_{i=1}^{5} i\cos((i+1)*x+i)\right)\left(\sum_{i=1}^{5} i\cos((i+1)*y+i)\right)$$

$$with -100 < x, y < 100$$



Shubert function

II. Experiments

- Perform experiments on the algorithms, you have implemented
- Your experiments should cover topics covered in the lecture
  - Especially PSO parameter tuning
  - E.g. influence of parameter on the performance
  - E.g. Convergence behavior of the PSO
- You will be given only the general frame
  - Start with playing with different settings, options until you get a feeling
  - Think about constructive experiments in relation to self defined goals
  - Suitable for the options, you have selected
  - Design your experiments to enable constructive reasonable analysis
  - Relate your experiment to the topics covered in the lecture:
  - Eexplain empirically the facts presented in the lecture topics

II .Experiments

- Think about statistical confidence
  - I.e. repeat your experiments sufficient number of times
- The template provides possibilities to
  - repeat the same experiment with different sittings
  - Start different experiments from the same initialization (the same population with the same positions and velocities)
  - Save / load particular experiments
  - Switch between different modus

III. Reporting

- Your report should consist of at least
  - Abstract:
    - describe the main concern of the assignment
  - Implementation
    - How did you implement the solution
    - Don’t copy your code in the report
    - Rather a high-level description:
    - ✓ The methodology you used
    - ✓ Why
    - ✓ your experience, etc.
    - ✓ Your experience
  - Experiments
    - Describe your experiments clearly
    - State the goal of each experiment
    - Define hypothesis
    - Explain your choice of experiments
    - Relate your choice and explanation
      - to the options you have selected
      - To the topics of the lecture

Report

- Result and Analysis
  - you don’t need to report all of the individual results
  - Rather averages, summaries, figures
  - Analyze these results related to the lecture topics
  - Report the results and your analysis
  - Relate each result to the experiments you performed in relation to the topics of the lecture
- Conclusion:
  - Conclude your work considering the lecture topics
  - Don’t write obvious or too general conclusions that can be done without your experiments
  - We would like to see you reporting conclusions based on the results of your experiments

NetLogo Framework

- A powerful framework for simulating biological and physical eco-systems
- More info about NetLogo: https://ccl.northwestern.edu/netlogo/
  - Large community, Many videos
  - Many Samples