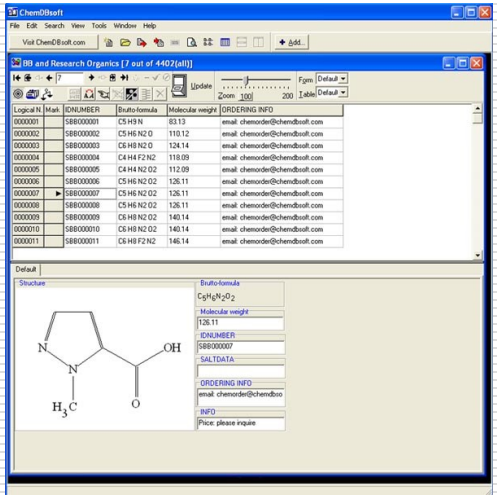
Bachelor Thesis Topics 2013/1

Dr. Michael Emmerich

Genetic Portfolio Search Engine

- Portfolio subset selection is used frequently in finance to invest in assets in the stock market
- However it can be applied to a broader class of problems:
  - Drug Discovery in Databases: Which chemical substances from a catalogue should be tested, maximizing the probability of a success and minimizing the risk to not discover a drug.
  - Search Engines: Decide which web-pages should be presented to a busy user, maximizing the probability of matching user preferences and minimizing the risk of failure.
- The portfolio subset selection problem in these cases is a mixed integer optimization problem that can be solved with quadratic programming (QP). However, for large sets QP gets prohibitively slow.
- The goal of this project is to design and implement a Genetic Algorithm and compare it to an existing QP in terms of solution quality, time consumption and scalability.
- The QP method and the objective function are available.
- Required: Knowledge in (1) genetic or evolutionary algorithms and (2) MATLAB.
- Supervisors: *Dr. Michael Emmerich, Dr. Iryna Yeveyeva*
- Duration: 3 month



ELSA on Superspheres

- Level set approximation can be used to approximate level sets
- ELSA is a simple evolutionary algorithm that does this based on a set-indicator based on K-Nearest Neighbours algorithms and/or Solow-Polasky Diversity.
- So far only 8158 superformula has been tested.
- The task is to apply ELSA on a broader test, and find strategies of improvement of this algorithm.
- Supervisors: Michael Emmerich, Andre Deutz, Iryna Yeveseyeva
- We provide ELSA basic code.
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