Ege de Bruin

Not the Netherlands

Not Turkey

Academics

B.Sc. in Computer Science and Engineering at TU Delft

- Acquired basic knowledge in Computer Science
- One course stayed with me: Computational Intelligence

- No interest in research (yet)

Academics

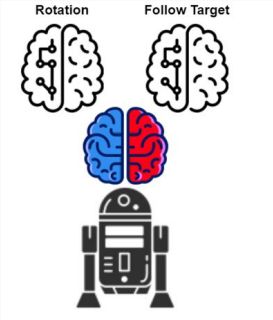
M.Sc. in Artificial Intelligence (and Cognitive Science) at VU Amsterdam

- Many topics around AI
  - First year “just following courses”
  - Second year focus on research started
- Evolutionary Computing
- Master’s thesis

Evolutionary Computing

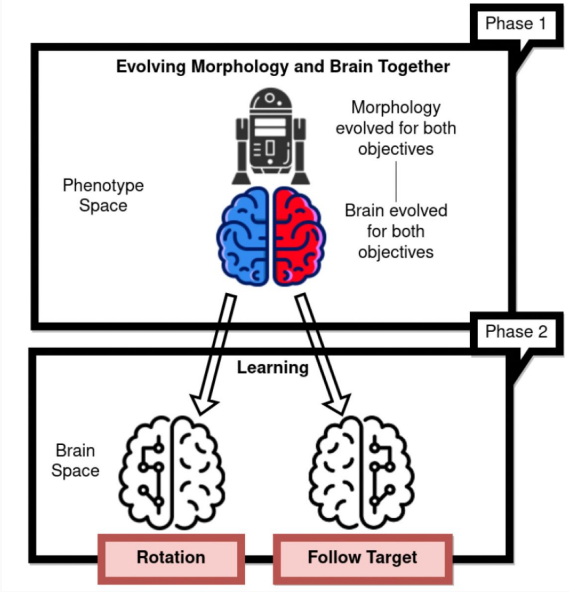
Special research project in Evolutionary Robotics: Energize!

- Goal: Evolve both Control and Morphology of robot for two tasks
  - Locate resource
  - Move towards resource
- Method: Differentiate two phases
  - Evolution: Evolve Brain and Morphology for both tasks Together
  - Learning: Learn Brain alone for both tasks Separately
  - Define controller to use two brains



One Controller:

1. Initialize robot with “Rotation” brain
2. If angle towards target < threshold:
   a. Switch robot brain to “Follow Target”
3. If target is reached:
   a. Stop



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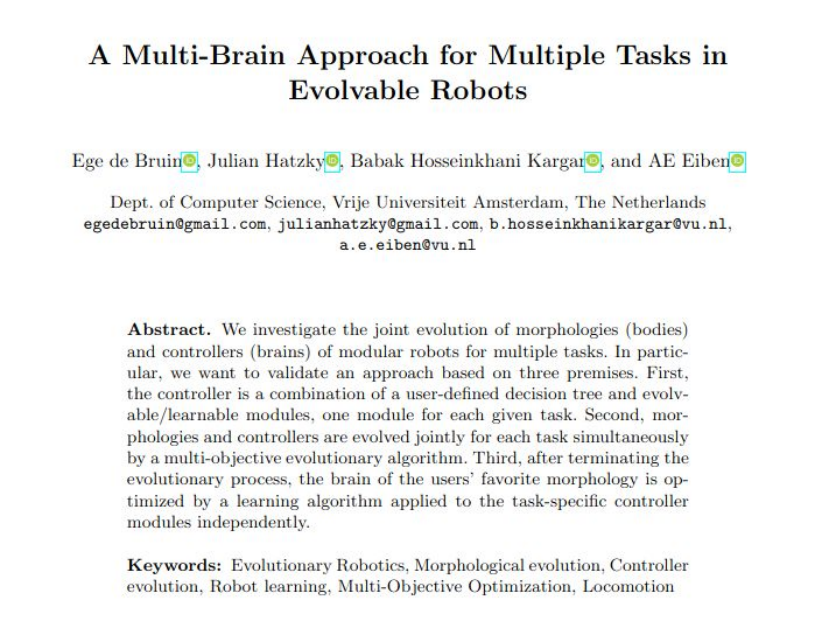

A Multi-Brain Approach for Multiple Tasks in Evolvable Robots

Ege de Bruin, Julian Hatzky, Babak Hosseinkhani Kargar, and AE Eiben

Dept. of Computer Science, Vrije Universiteit Amsterdam, The Netherlands
egedebruin@gmail.com, julianhatzky@gmail.com, b.hosseinkhanikargar@vu.nl, a.e.eiben@vu.nl

Abstract. We investigate the joint evolution of morphologies (bodies) and controllers (brains) of modular robots for multiple tasks. In particular, we want to validate an approach based on three premises. First, the controller is a combination of a user-defined decision tree and evolvable/learnable modules, one module for each given task. Second, morphologies and controllers are evolved jointly for each task simultaneously by a multi-objective evolutionary algorithm. Third, after terminating the evolutionary process, the brain of the users' favorite morphology is optimized by a learning algorithm applied to the task-specific controller modules independently.

Keywords: Evolutionary Robotics, Morphological evolution, Controller evolution, Robot learning, Multi-Objective Optimization, Locomotion

Limitations and Future Work:

- Convergence to three morphologies
  - Quality Diversity algorithms?
- More actions
  - Move forward/left/right instead of Move towards target
  - Carry resource
- Multi-agent setting
  - Collaboration and/or Competition?

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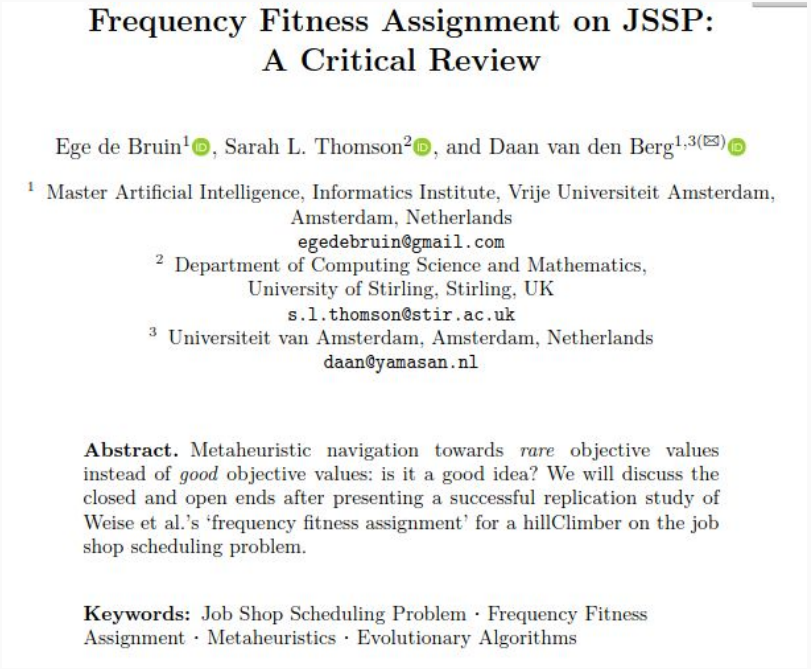

Frequency Fitness Assignment on JSSP: A Critical Review

Ege de Bruin[1], Sarah L. Thomson[2], and Daan van den Berg[1,3(✉)]

[1] Master Artificial Intelligence, Informatics Institute, Vrije Universiteit Amsterdam, Amsterdam, Netherlands
egedebruin@gmail.com
[2] Department of Computing Science and Mathematics, University of Stirling, Stirling, UK
s.l.thomson@stir.ac.uk
[3] Universiteit van Amsterdam, Amsterdam, Netherlands
daan@yamasan.nl

Abstract. Metaheuristic navigation towards *rare* objective values instead of *good* objective values: is it a good idea? We will discuss the closed and open ends after presenting a successful replication study of Weise et al.'s 'frequency fitness assignment' for a hillClimber on the job shop scheduling problem.

Keywords: Job Shop Scheduling Problem · Frequency Fitness Assignment · Metaheuristics · Evolutionary Algorithms

Master's thesis paper

- Use different metric for "good" solutions: Good solutions are also rare
- Exploration and Exploitation in one metric
- Interesting for Evolutionary Robotics?
  - My educated guess: no

Academics

Ph.D. in Evolutionary Robotics at University of Oslo

Morphology and Control, Quality-Diversity, Multi-Agent, Multi-Tasking, EPANN

How I “explain” my research to “others”

- Pokemons on Mars: What happens if you put independently evolvable robots alone on Mars?

Thanks!