

Master's Thesis Review

Thesis of Milan Rybar,

“Inspiration-triggered search: Towards higher complexities by mimicking creative processes”

I have supervised Milan in his work on the Master thesis here at the University of Paderborn from September 2014 to July 2015.

The objective was to develop an optimization algorithm that is inspired by Stanley's Picbreeder, which is an interactive optimization approach based on evolutionary algorithms with user input from a human operator. In Milan's work the idea was to substitute the behavior of the user by a similar process that is “inspiration-triggered”. Instead of having a fixed objective function, the search algorithm is free to change the objective within certain constraints as long as artifacts of higher “complexity” are generated. The overall optimization task is to generate complex artifacts (i.e., images), that cannot be generated by a greedy and direct optimization approach such as a genetic algorithm that uses the pixel-distance to a provided image as objective function.

In his thesis, Milan gives a very elaborated overview of relevant background such as related methods and published works with similar objectives (chapter 1). In chapter 2, he presents the key ideas of his “inspiration-triggered” search algorithm with which he tries to solve the requested task. This presentation is well done and supported by a number of illustrations and a well thought out notation. Milan describes the actual investigated experiment setup in chapter 3, again well illustrated and structured. The most important part of the work is chapter 4 which describes and evaluates the results. Milan has well conquered the challenge that the results are not easily evaluated merely due to their nature (complexity of images is a property that is challenging to define) and that furthermore the results are not easily comparable to alternative approaches. A variety of diagrams showing different features, illustrations of the actual evolved images, samples of evolutionary runs, and the results from a classifier, that was generated just for that purpose, give a very good overview of the results and allows to evaluate what has been achieved.

During his work, Milan had to cope with an additional challenge which was the unexpected finding that our “control experiment” (i.e., using direct optimization to evolve a desired image) was of limited use to discriminate between successful and unsuccessful runs. Hence, we had to extend the task slightly on the go and think of alternative ways to implement this discrimination (training a classifier system). Milan adapted to this new situation very well and was highly efficient in getting the additionally required implementation work done.

If the thesis would be submitted as a Master's thesis here at the Computer Science Department of the Univ. of Paderborn, I would grade it as **very good** on a grading scale of 'very good' (best), 'good', 'satisfactory', 'sufficient', and 'insufficient' (worst). My reasoning is that Milan showed excellent implementation skills, he did a very good literature research, was able to reflect on and discuss read research papers and his ideas, he showed scientific creativity in developing his 'inspiration-triggered' search method, he was almost always well organized in his work, he showed full commitment to the task, and his thesis is proof of high accurateness.

Best regards,

Jun.-Prof. Dr. Heiko Hamann