



Assignment of master's thesis

Title: Optimization of the painting placement problem using evolutionary techniques
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Study program: Informatics
Branch / specialization: Knowledge Engineering
Department: Department of Applied Mathematics
Validity: until the end of summer semester 2023/2024

Instructions

The aim of this work is to design and validate an algorithm that finds the (sub)optimal placement of images on the wall based on information about paintings of given dimensions and properties (dimensions, genre, age, drawing/painting technique, direction of lighting in the painting etc.) under certain constraints (spacing between paintings, distance from the walls, restrictions on paintings' selection: dimensions, age, genre etc.). The output of the algorithm will be a set of XY coordinates of particular paintings on the wall.

- 1) Research existing solutions. Take inspiration from the articles listed.
- 2) Based on the research, propose your own method for solving the problem of optimizing the placement of paintings on the wall based on the given inputs and constraints.
- 3) Implement the proposed method. Make a visualisation of the results.
- 4) Prepare your own datasets for the design and validation of the method.
- 5) Evaluate the results obtained on the datasets in terms of the quality of the solution achieved.
- 6) Discuss the results obtained and suggest further possible improvements.

[1] BORTFELDT, Andreas; WINTER, Tobias. A genetic algorithm for the two-dimensional knapsack problem with rectangular pieces. International Transactions in Operational Research, 2009, 16.6: 685-713.



- [2] ANAND, K. Vijay; BABU, A. Ramesh. Heuristic and genetic approach for nesting of two-dimensional rectangular shaped parts with common cutting edge concept for laser cutting and profile blanking processes. Computers & Industrial Engineering, 2015, 80: 111-124.
- [3] KANDASAMY, Vijay Anand; UDHAYAKUMAR, S. Effective location of micro joints and generation of tool path using heuristic and genetic approach for cutting sheet metal parts. International Journal of Material Forming, 2020, 13.2: 317-329.

