Artificial Intelligence: Local Search

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September 17, 2017

Contents

Introduction to the Graphical User Interface(GUI)

The Graphical User interface starts up and allows the user to select the type of puzzle evaluation. The user is given a drop down menu with the following options: Basic Puzzle Evaluation, User Generated Puzzle Evaluation, Basic Hill Climbing, Hill Climbing with Random Restarts, Hill Climbing with Random Walk, Simulated Annealing, and Population Based Approach.

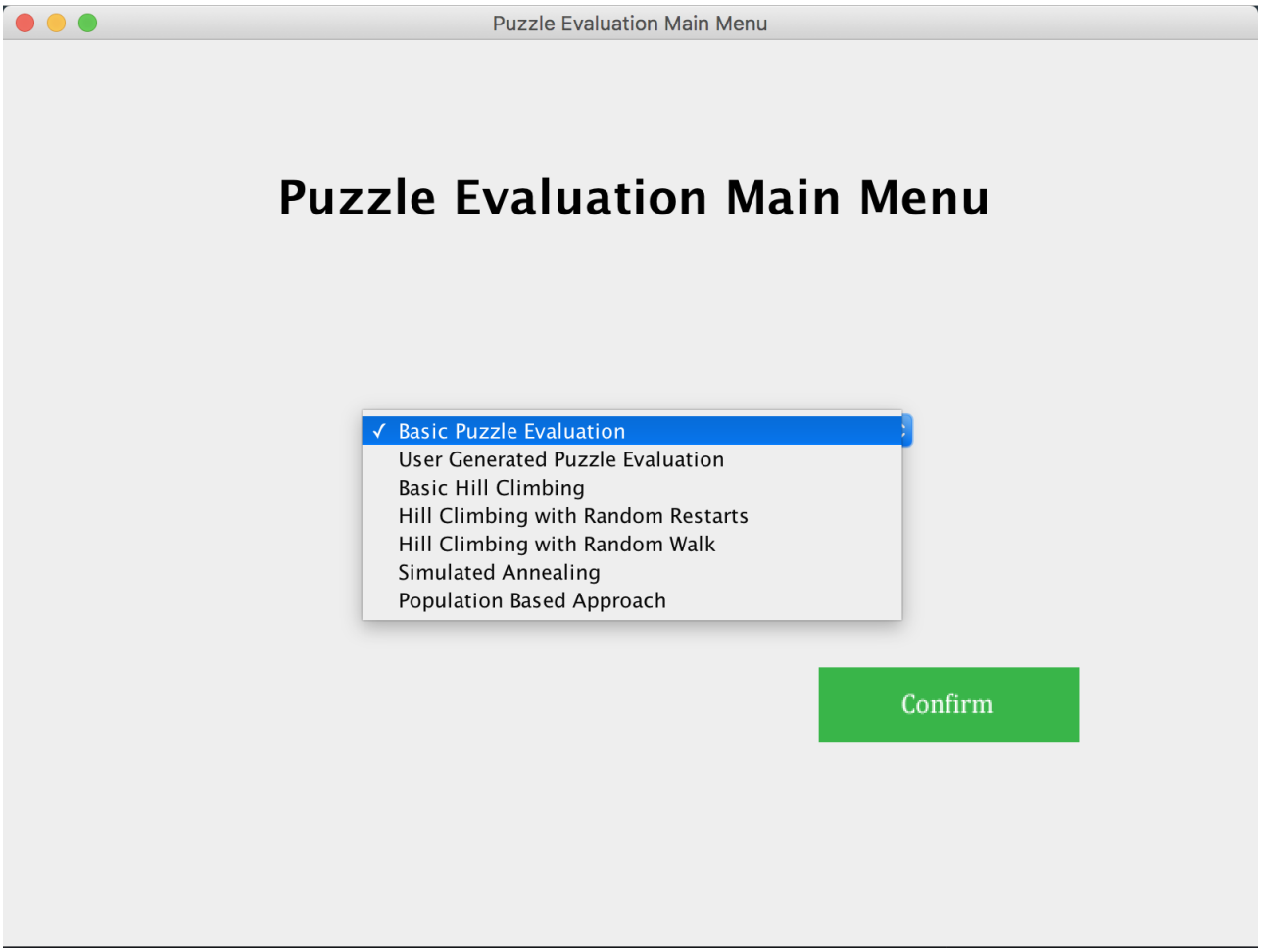

Figure 1.0: Puzzle Evaluation Main Menu

Puzzle Representation

The Graphical User Interface starts up and gives the user

Puzzle Evaluation

In your report please include an example of 2 example puzzles for each size of n, where one of the puzzles is solvable and the other is not solvable.

You will be asked during the demo to execute the evaluation puzzle on example puzzles and present the corresponding visualization. INCLUDE OPTION FOR FILE SELECTION?

Example Puzzle for n = 5

IMAGES

Example Puzzle for n = 7

IMAGES

Example Puzzle for n = 9

IMAGES

Example Puzzle for n = 11

IIMAGES

Basic Hill Climbing Approach

Your software should receive the number of iterations for the hill climbing approach as input and visualize the final optimized puzzle configuration, its value and the time it took to compute it.

Provide a plot of how the evaluation function changes as the number of iterations increases averaged over multiple runs of the approach at least 50.

Example Puzzle for n = 5

IMAGES

Example Puzzle for n = 7

IMAGES

Example Puzzle for n = 9

IMAGES

Example Puzzle for n = 11

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Hill Climbing with Random Restarts

Your input in this case should be two numbers a) the number of times you will start a hill climbing process and b) the number of iterations per hill climbing process.

Example Puzzle for n = 5

IMAGES

Example Puzzle for n = 7

IMAGES

Example Puzzle for n = 9

IMAGES

Example Puzzle for n = 11

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Hill Climbing with Random Walks

Compare the output of the above two processes against the one that utilizes random walks for the same number of total iterations. i.e. again again visualize the final optimized puzzle configuration, its value and time it took to compute it.

Your input in this case will be two numbers a) the total number of iterations for hill climbing and b) the probability of the acceptance of a downhill move

Evaluate the effects of different values for probability p and select the one that works best for this problem and preferred number of total iterations

Example Puzzle for n = 5

IMAGES

Example Puzzle for n = 7

IMAGES

Example Puzzle for n = 9

IMAGES

Example Puzzle for n = 11

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Simulated Annealing

Proposal and Implementation of a population based approach