

CS5401 FS2018 Assignment 1c with bonus

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Introduction

Assignment 1c involved implementing an EA leveraging constraint satisfaction to more effectively solve Light Up puzzles. This report compares the performance of penalty function and repair function constraint satisfaction techniques and how they compare to a plain-vanilla EA. It also outlines a comparison between Validity Forced plus Uniform Random versus plain Uniform Random initialization for a plain-vanilla EA, a constraint satisfaction EA employing a penalty function, and a constraint satisfaction EA employing a repair function. The extent to which EA performance is affected by the penalty coefficient used in a penalty function constraint satisfaction EA will also be examined.

General EA Comparisons

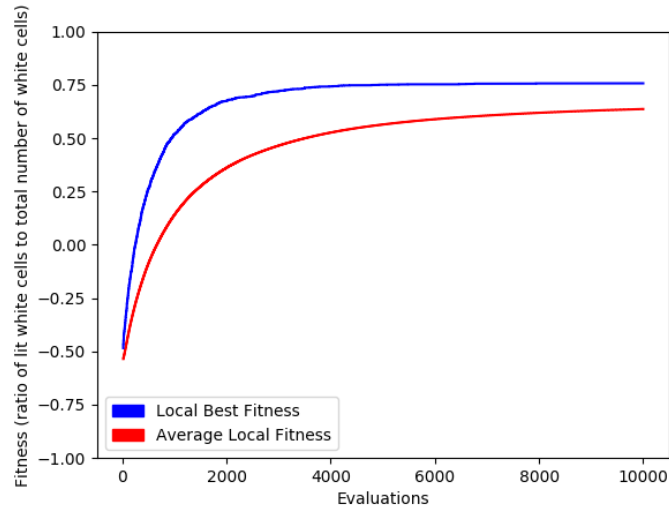


Figure 1: Evaluations versus Average Local Fitness and Evaluations versus Local Best Fitness for the **Penalty Function EA with the Validity Enforced, Provided Puzzle**, Averaged Over All Runs

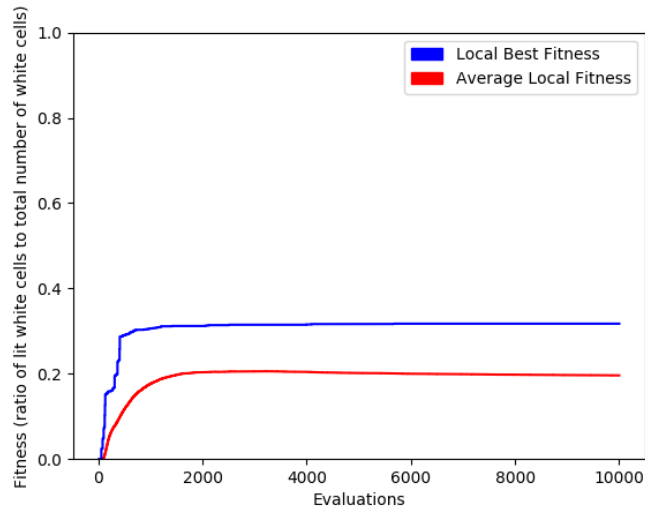


Figure 2: Evaluations versus Average Local Fitness and Evaluations versus Local Best Fitness for the **Repair Function EA with the Validity Enforced, Provided Puzzle**, Averaged Over All Runs

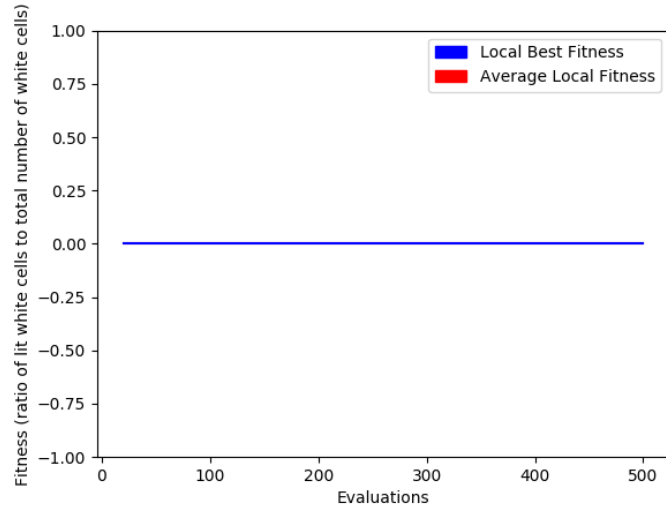


Figure 3: Evaluations versus Average Local Fitness and Evaluations versus Local Best Fitness for the **Plain-Vanilla EA with the Validity Enforced, Provided Puzzle**, Averaged Over All Runs

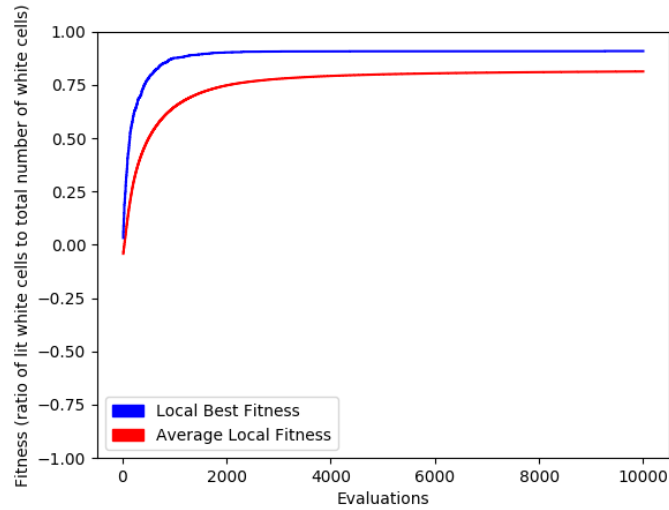


Figure 4: Evaluations versus Average Local Fitness and Evaluations versus Local Best Fitness for the **Penalty Function EA with the Validity Enforced, Randomly Generated Puzzle**, Averaged Over All Runs

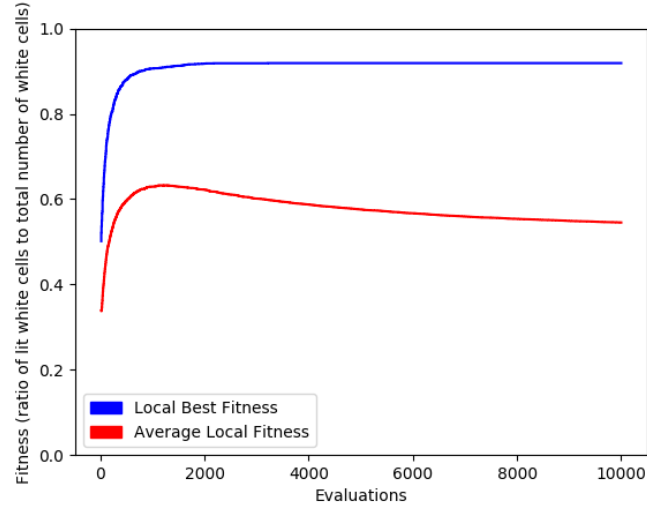


Figure 5: Evaluations versus Average Local Fitness and Evaluations versus Local Best Fitness for the **Repair Function EA with the Validity Enforced, Randomly Generated Puzzle**, Averaged Over All Runs

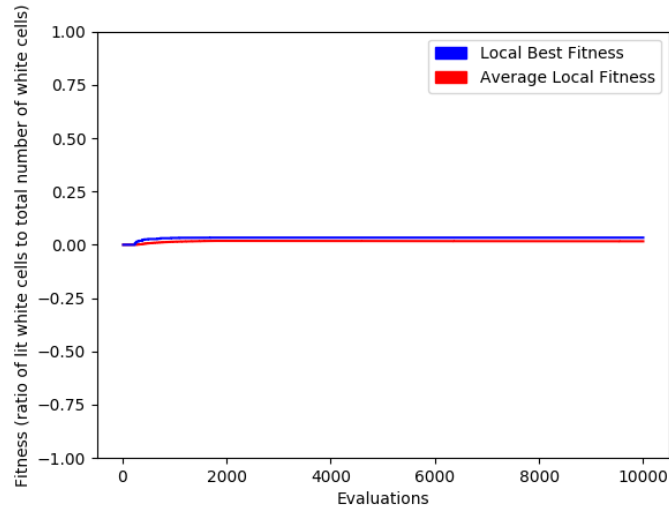


Figure 6: Evaluations versus Average Local Fitness and Evaluations versus Local Best Fitness for the **Plain-Vanilla EA with the Validity Enforced, Randomly Generated Puzzle**, Averaged Over All Runs

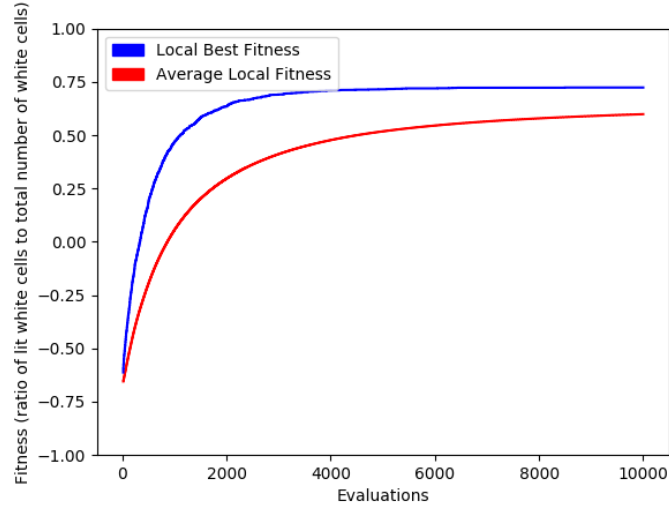


Figure 7: Evaluations versus Average Local Fitness and Evaluations versus Local Best Fitness for the **Penalty Function EA with the Uniform Random Initialized, Provided Puzzle**, Averaged Over All Runs

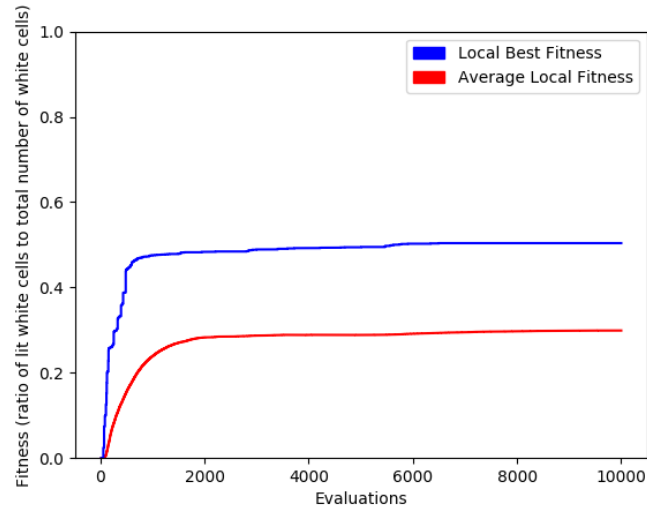


Figure 8: Evaluations versus Average Local Fitness and Evaluations versus Local Best Fitness for the **Repair Function EA with the Uniform Random Initialized, Provided Puzzle**, Averaged Over All Runs

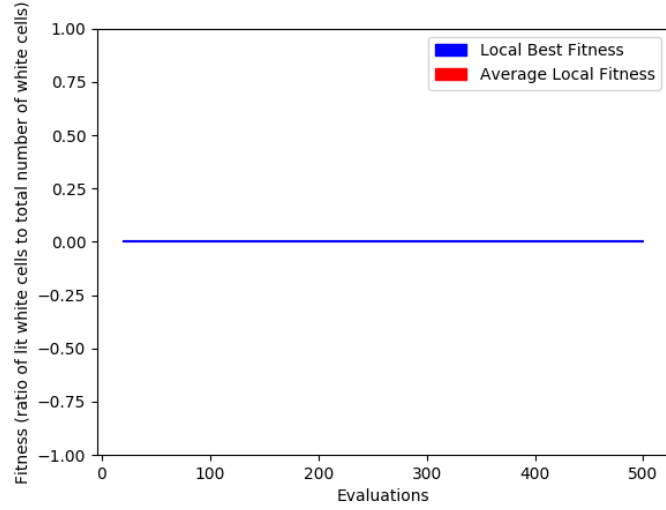


Figure 9: Evaluations versus Average Local Fitness and Evaluations versus Local Best Fitness for the **Plain-Vanilla EA with the Uniform Random Initialized, Provided Puzzle**, Averaged Over All Runs

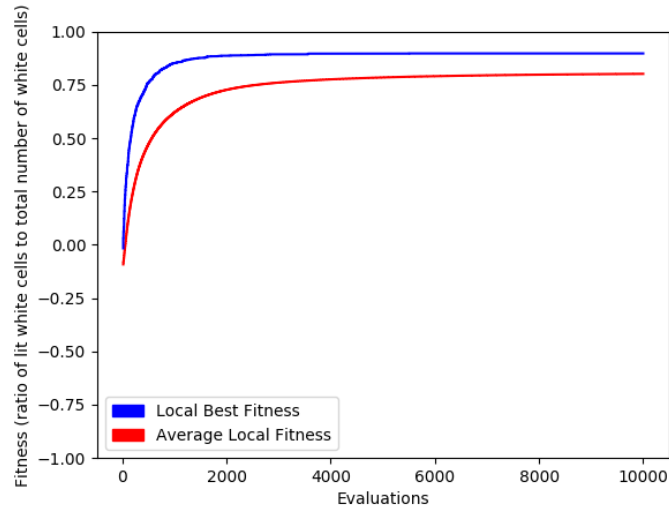


Figure 10: Evaluations versus Average Local Fitness and Evaluations versus Local Best Fitness for the **Penalty Function EA with the Uniform Random Initialized, Randomly Generated Puzzle**, Averaged Over All Runs

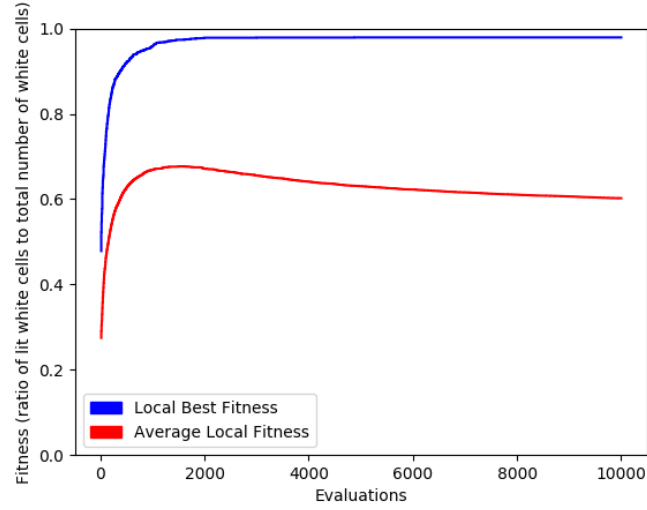


Figure 11: Evaluations versus Average Local Fitness and Evaluations versus Local Best Fitness for the **Repair Function EA with the Uniform Random Initialized, Randomly Generated Puzzle**, Averaged Over All Runs

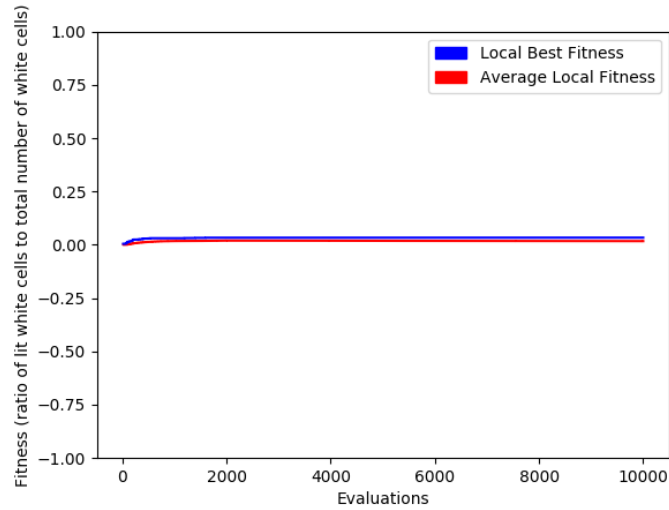


Figure 12: Evaluations versus Average Local Fitness and Evaluations versus Local Best Fitness for the **Plain-Vanilla EA with the Uniform Random Initialized, Randomly Generated Puzzle**, Averaged Over All Runs