Randomized Optimization

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Introduction

Optimization is a technique to find the best solution with certain conditions or limitations. It is researched in a lot of area from economy, mathematics to computer science. In computer science area, there many algorithms developed to solve certain problems. For example, dynamic programing algorithm to solve Knapsack problems. In this report, I focused on research on four algorithms. randomized hill climbing, simulated annealing, genetic algorithm and mutual-information-maximizing-input-clustering (MIMIC). I used the above algorithms to solve three optimization problems. They are 4 peak, flip-flop and Knapsack problems.

I started with description on how the algorithms work and how some hyper-parameters are going to affect the algorithm. Followed is my initial thought on the performance of the individual algorithm on each problem. I then showed my process on deciding the hyper-parameters and comparison between different algorithms on fitness, computational time, and complexity.

The library I use is mlrose-hiive.

Keyword: optimization, MIMIC, Knapsack Problems

Description of the problem

Plots

1. fitness vs iteration

2. fitness vs eval

3. compute time vs iteration

4. compute time/iteration time vs complexity/input size?

5. queens

Four peaks

Find ones?

Knappack

evaluate\_population\_fitness

set\_state

best\_neighbor