Report

Maximum Cut Problem using GRASP

Output file contents

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Constructive algorithm phase

- The semi greedy and randomized algorithm, total runs = 20. The average of the found best values are taken for 20 runs.
- The simple greedy algorithm, total runs = 1.

Observations

- Randomized
  - Results are generally suboptimal compared to other algorithms.
- Semi-greedy
  - The greedy algorithm outperforms the semi-greedy approach.

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Local Search Phase

- Local search is applied to both the semi-greedy and randomized algorithms.

Observations

- Number of iterations
  - Randomized took more iterations than Semi-greedy algorithm.
- Best values
  - Semi-greedy tends to yield superior results compared to the randomized algorithm.

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GRASP Phase

- GRASP is applied to both the semi-greedy and randomized algorithms.

GRASP Result

- Number of iterations: 120
- Best values
  - Semi-greedy typically achieves better results than the randomized algorithm.

Known Best Value

The output file presents statistical data for 54 test cases, with known best values available for 24 of them. Please note that instances marked as "Not given" lack known best solutions or upper bounds.

Summary

Constructive Algorithms

- Simple Randomized
  - This algorithm randomly assigns vertices to sets X and Y with equal probabilities.
- Simple Greedy
  - $\alpha = 1$
  - The Simple Greedy algorithm starts by selecting the edge with the highest weight and distributing nodes between sets X and Y. It incorporates value based edge selection.
- Semi-greedy
  - $\alpha = [0, 1]$
  - The Semi-greedy algorithm incorporates μ, σ values as heuristic parameters.

Local Search

Node transfers between sets X and Y are based on σ values. If a σ value improves with a node transfer, the sets are modified, and σ values are recalculated. The modified sets are neighbors to the current solution with improved σ values and it continues until no further improvement is achieved.

GRASP

A solution is generated using constructive algorithms, followed by local search to enhance the result. This randomized approach is repeated max iteration times.

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