CS303 Project3: Solving Influence Maximization Problem Using the IMM Algorithm

Shijie Chen
Department of Computer Science and Engineering
Southern University of Science and Technology
Shenzhen, Guangdong, China
Email: 11612028@mail.sustc.edu.cn

***Abstract*—The Influence Maximization Problem (IMP) has many real-world applications and is a NP-hard problem. In this project, I first developed a influence propagation model based on Linear Threshold (LT) and Independent Cascade (IC). Then, IMM algorithm is used to solve the IMP problem. Computational experiments have shown that IMM can solve IMP problems very efficiently.**

I. Preliminaries

II. Methodology

A. Notation

The notations used in this report is shown in the table below.

TABLE I
REPRESENTATION

Name	Variable
All tasks	tasks
Tasks remain	undone

B. Genetic Algorithm

Algorithm 1 Genetic Algorithm Framework

```
population ← initPopulation()
size ← len(population)
while end condition not met do
    offSpring ← genOffspring(population)
    population ← population + offSpring
    population.sort(key = cost)
    population ← population[0 : size]
end while
    return population[0]
```

1) Framework:

2) Initial Population:

- Ulusoy split

Algorithm 2 Ulusoy Split

```
function UlusoySplit(tasks, depot, shortestPath, load)
    DAG, incoming, outgoing ← toDAG(tasks)
    for node ∈ DAG do
        minCost ← inf
        bestEdge ← minCost(incoming[node])
        node.bestPath ← bestEdge.bestPath.append(node)
        node.cost ← bestEdge.cost
        for edge ∈ outgoing[node] do
            edge.cost ← edge.cost + node.cost
            edge.bestPath ← node.bestPath
        end for
    end for
    x ← 1
    return node[−1].cost, node[−1].bestPath
end function
function ToDAG(tasks, depot, shortestPath, load)
    construct the DAG
    return DAG
end function
```

- Generalized Path Scanning

3) Genetic Operators:

III. Validation

IV. Discussion

V. Conclusion

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