Enhancing Binary Particle Swarm Optimization for Graph Coloring Problem

Presented by:

Md Younos
Student ID: 194028

Mizanur Rahman
Student ID: 194053

Md.Osman Goni
Student ID: 194054

Supervised by:

Dr. Md. Jakirul Islam
Associate Professor
Department of Computer Science and Engineering
Dhaka University of Engineering & Technology, Gazipur

Outline

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- Aims
- Objective
- Methodology
- Proposed Research Plan
- Conclusion

Introduction

- Graph coloring is a classic NP-hard optimization problem with applications in scheduling, resource allocation, and network design.
- The Graph Coloring Problem is a challenging optimization task with practical relevance.

Introduction

- The Graph Coloring Problem involves assigning colors to the vertices of a graph in such a way that no adjacent vertices share the same color. The objective is to minimize the number of colors used.

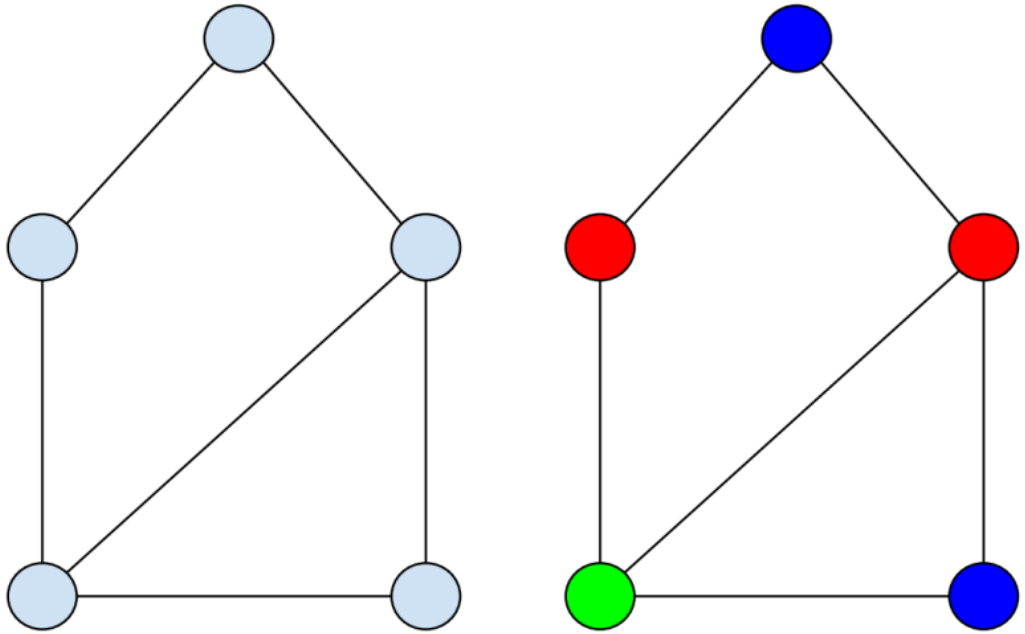

Figure: Non-colored and colored graph

Aims

- The research aims to develop novel strategies and modifications to the traditional BPSO algorithm, addressing the specific challenges posed by Graph Coloring Problem.
- To minimize the chromatic number.
- To evaluate the efficiency and effectiveness of graph coloring solutions.

Objective

- To improve the binary encoding scheme used by BPSO to represent and manipulate graph coloring solutions more effectively.
- To integrate a local search mechanism within the BPSO algorithm to refine solutions and enhance the convergence speed.
- Evaluate and compare performance of the modified BPSO algorithm.

Methodology

- Initially, we will gather varied datasets from multiple sources.
- Subsequently, we will implement the existing algorithms for GCP. Following this, we will modify the existing BPSO by adapting local search mechanism to improve its performance.
- Later, we will assess the performance of the original BPSO and our modified BPSO algorithm, followed by a comparative analysis.

Methodology

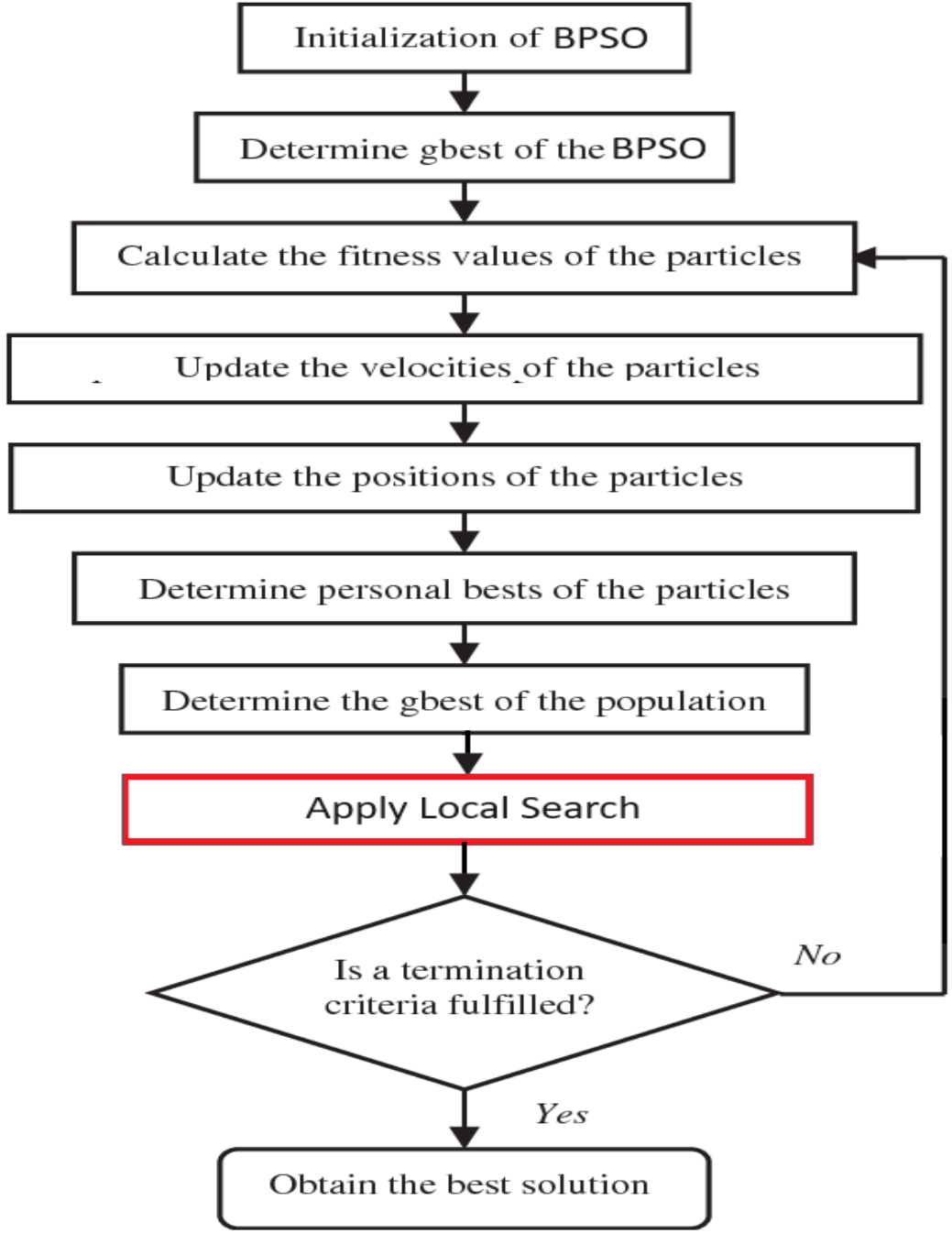

Figure: The flowchart of the modified BPSO algorithm

Proposed Research Plan

Stages of research	Jan-23 to Mar-23	Apr-23 to Jun-23	Jul-23 to Sep-23	Oct-23 to Dec-23	Jan-24 to Mar-24	Apr-24 to Jun-24
Selection of topic						
Literature review						
Research methodology plan						
Selection of the Appropriate Research Techniques						
Analysis & Interpretation of Data						
Findings and recommendations						
Final research project						

Conclusion

- This proposal outlines a research plan to enhance Binary Particle Swarm Optimization for the Graph Coloring Problem.
- The proposed modifications aim to address the specific challenges of the GCP and contribute to the development of more effective optimization algorithms for combinatorial problems.

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Q&A