

PROJECT BLOCK 1.3

Find the smallest range for the chromatic number of a graph

GROUP 10

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Summited: Wednesday January 23, 2019

MAASTRICHT UNIVERSITY

DEPARTMENT OF DATA SCIENCE AND KNOWLEDGE
ENGINEERING

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Preface

Summary

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Abbreviations and symbols

Chapter 1

Introduction

Chapter 2

Methods

2.1 Decomposing the graph

One graph can contain multiple disconnected parts, which can be considered as independent graphs. This section describes the method for decomposing the graph.

The algorithm used is based on breadth-first search. We use two colors, represented by two values 1 and -1, to color the graph. Use breadth-first search

Usage: Allow other methods to work on smaller graphs

2.2 Greedy algorithm

Sort the vertices based on their constraints

Try to reuse available colors

Usage: Find the upper-bound

2.3 Lower-bound

2.4 Special cases

2.4.1 Bipartite

Use breadth-first search

Chromatic number = 2

2.4.2 Odd cycle

Chromatic number = 3

2.4.3 Complete graph

Check if every vertex is connected to all other vertices

Chromatic number = number of vertices

2.4.4 Wheel graph

2.5 Genetic algorithm

2.5.1 Fitness function

Based on the number of invalid colorings of each graph

2.5.2 Selection method

2.5.3 Crossover

2.5.4 Mutation

2.6 Brute force search

Chapter 3

Experiments

Chapter 4

Results

Chapter 5

Discussion

Chapter 6

Conclusion

References

Appendix