

CONTENT

CHAPTER 1 A MILP MAINTENANCE SCHEDULING MODEL USING DISCRETE TIME REPRESENTATION.....	1
1.1 PROBLEM DESCRIPTION.....	1
1.2 MATHEMATICAL FORMULATION BASED ON DISCRETE TIME REPRESENTATION	5
1.3 CASE STUDY AND RESULTS.....	14
1.4 CONCLUSION	24
CHAPTER 2 A CONTINUOUS-TIME MILP MODEL FOR TASKS SCHEDULING CONSIDERING TASK PRIORITY AND BREAK CONSTRAINT	26
2.1 PROBLEM DESCRIPTION.....	27
2.2 MATHEMATICAL FORMULATION.....	31
2.2.1 <i>Time constraints</i>	33
2.2.2 <i>Allocation constraints</i>	35
2.2.3 <i>Task's sequencing constraints</i>	36
2.2.4 <i>Interrupted task constraints</i>	40
2.2.5 <i>Objective function</i>	42
2.2.6 <i>Comparison of continuous-time and discrete-time scheduling models</i> ..	44
2.3 CASE STUDY	46
2.4 CONCLUSION	56
CHAPTER 3 A TWO-LAYER DECOMPOSITION METHOD FOR TASK SCHEDULING WITH LARGE-SCALE GENERAL TYPE TASKS.....	58
3.1 PROBLEM DESCRIPTION	59
3.2 TWO-LAYER MATHEMATICAL MODELS	63
3.2.1 <i>Assumption</i>	64
3.2.2 <i>Integrated upper layer model</i>	64
3.2.3 <i>Lower layer optimization</i>	71
3.3 CASE STUDIES AND RESULTS COMPARISON.....	72
3.3.1 <i>Case studies</i>	75
3.3.2 <i>Results comparison</i>	77
3.3.3 <i>Discussion</i>	78

3.4 CONCLUSION	81
APPENDIX A. SCHEDULING PLAN DETAILS BEFORE ADOPTING TWO-LAYER OPTIMIZATION.....	83
APPENDIX B. SCHEDULING PLAN DETAILS AFTER ADOPTING TWO-LAYER OPTIMIZATION.....	87
CHAPTER 4 AN IMPROVED GENETIC ALGORITHM FOR LARGE- SCALE TASK SCHEDULING	93
4.1 PROBLEM DESCRIPTION	95
4.2 PROPOSED METHOD	100
4.2.1 Data preprocessing	101
4.2.2 Coding.....	102
4.2.3 Initializing population.....	104
4.2.4 Selection operation	105
4.2.5 Crossover operation.....	106
4.2.6 Mutation operation	108
4.2.7 Decoding.....	110
4.2.8 Repair functions	111
4.2.9 Task re-scheduling.....	113
4.3 CASE STUDY	113
4.3.1 Case analysis	114
4.3.2 Case comparison.....	121
4.4 CONCLUSIONS.....	124
CHAPTER 5 ALNS AND TS COMBINING STRATEGY FOR TASK SCHEDULING.....	126
5.1 PROBLEM DESCRIPTION AND MODEL CONSTRUCTION.....	126
5.1.1 Problem description.....	126
5.1.2 Model Construction	129
5.2 OPTIMIZATION ALGORITHM BASED ON ALNS-TS	131
5.2.1 Adaptive large neighborhood search	131
5.2.2 Tabu Search.....	133
5.2.3 Optimization algorithm based on ALNS-TS.....	134
5.3. CASE ANALYSIS.....	145

5.3.1 Case analysis	145
5.3.2 Comparison and analysis before and after adding tabu search.....	150
5.3.3 Comparison and analysis with precise algorithm.....	153
5.3.4 Comparative analysis with other heuristic algorithms	154
5.3.5 Comparison and analysis with Gurobi solver	158
5.4 CONCLUSION	159
CHAPTER 6 REINFORCEMENT LEARNING BASED OPTIMIZATION ALGORITHM FOR TASK SCHEDULING.....	162
6.1 PROBLEM DESCRIPTION AND ITS MATHEMATICAL MODEL.....	169
6.1.1 Model symbols	170
6.1.2 Mathematical model.....	171
6.2 Q-LEARNING BASED SCHEDULING OPTIMIZATION ALGORITHM.....	177
6.2.1 Reinforcement learning.....	177
6.2.2 Q-learning based algorithm.....	182
6.2.3 Assumptions and algorithm framework.....	184
6.3 CASE STUDY	191
6.3.1 Results and analysis using traditional method.....	191
6.3.2 Result analysis using proposed method.....	195
6.3.3 Comparative analysis.....	205
6.4 CONCLUSIONS.....	209
CHAPTER 7 TWO-STAGE GRAPH ATTENTION NETWORKS AND Q- LEARNING BASED STRATEGY FOR TASK SCHEDULING	211
7.1 MAINTENANCE TASKS SCHEDULING PROBLEM	212
7.1.1 Background.....	212
7.1.2 Problem description.....	216
7.2 MATHEMATICAL MODEL.....	219
7.3 PROPOSED METHOD	227
7.3.1 Graph embedding.....	228
7.3.2 Two-stage Graph Attention Networks	231
7.3.3 Training with reinforcement learning	238
7.4 CASE STUDY	242
7.4.1 Preparation.....	244

7.4.2 Determining parameters	247
7.4.3 Comparative analysis.....	248
7.4.4 Practical application.....	257
7.5 CONCLUSIONS.....	262
CHAPTER 8 FUTURE TREND	265
REFERENCE	267