TABLE OF CONTENTS

Acknowledgement iii
Abstract in Thai iv
Abstract in English vi
List of Tables ix
List of Figures x

Chapter 1 Introduction
1.1 Motivation 1
1.2 Models For Human Resource Management 3
1.3 Conventional Optimization And Search Techniques 7
1.4 A Simple Genetic Algorithms (Gas) 11
1.5 Closure 25

Chapter 2 Problem Formulation And Proposed Solution Methodogy 26
2.1 Problem Formulation 26
2.2 Solution Methodology 46

Chapter 3 Numerical Examples 49
3.1 Dynamic Adjustment Of Age Distribution In Knowledge Worker Management 49
3.2 Optimal Long-Term Planning Of Knowledge Workers 62
3.3 Optimal Design Of Appointment System For Outpatient Service 69
3.4 Discussions 80

Chapter 4 Conclusions and Future Works 81
4.1 Conclusions 81
4.2 Future Works 82
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>17</td>
</tr>
<tr>
<td>3.1</td>
<td>55</td>
</tr>
<tr>
<td>3.2</td>
<td>57</td>
</tr>
<tr>
<td>3.3</td>
<td>75</td>
</tr>
<tr>
<td>3.4</td>
<td>76</td>
</tr>
</tbody>
</table>

1.1 Binary numbers and their corresponding decimal numbers.
3.1 Summation of the number of employees in each year for study case 1.
3.2 Summation of the number of employees in each year for study case 2.
3.3 Definition of random variables in the numerical example.
3.4 Threshold values in case of deterministic number of patients.
<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 GAs search procedure.</td>
<td>15</td>
</tr>
<tr>
<td>1.2 Chromosome representation using binary coding for real values [Michalewicz 1996].</td>
<td>17</td>
</tr>
<tr>
<td>1.3 A binary-coded chromosome for real values.</td>
<td>17</td>
</tr>
<tr>
<td>1.4 Crossover of two chromosomes.</td>
<td>20</td>
</tr>
<tr>
<td>1.5 Mutation on a chromosome.</td>
<td>22</td>
</tr>
<tr>
<td>2.1 A part of an appointment system for a doctor.</td>
<td>39</td>
</tr>
<tr>
<td>2.2 An appointment system with multiple doctors, no-show patients, and patients</td>
<td>40</td>
</tr>
<tr>
<td>3.1 The present age distribution $P_0$ and the desired age distribution $P_S$ at 5 years.</td>
<td>52</td>
</tr>
<tr>
<td>3.2 Adjustment magnitudes obtained from GA for study case 1.</td>
<td>53</td>
</tr>
<tr>
<td>3.3 Age distribution at $NYear = 5$ for study case 1.</td>
<td>54</td>
</tr>
<tr>
<td>3.4 Evolution of age distribution for study case 1.</td>
<td>55</td>
</tr>
<tr>
<td>3.5 Adjustment magnitudes obtained from GA for study case 2.</td>
<td>56</td>
</tr>
<tr>
<td>3.6 Age distribution at $NYear = 5$ for study case 2.</td>
<td>56</td>
</tr>
<tr>
<td>3.7 Evolution of age distribution for study case 2.</td>
<td>57</td>
</tr>
<tr>
<td>3.8 Adjustment magnitudes obtained from GA for study case 3.</td>
<td>58</td>
</tr>
<tr>
<td>3.9 Age distribution at $NYear = 5$ for study case 3.</td>
<td>59</td>
</tr>
<tr>
<td>3.10 Evolution of age distribution for study case 3.</td>
<td>59</td>
</tr>
<tr>
<td>3.11 Histogram of absolute deviation for study case 1.</td>
<td>60</td>
</tr>
<tr>
<td>3.12 Histogram of absolute deviation for study case 2.</td>
<td>61</td>
</tr>
<tr>
<td>3.13 Histogram of absolute deviation for study case 3.</td>
<td>61</td>
</tr>
<tr>
<td>3.14 Demand of knowledge workers.</td>
<td>65</td>
</tr>
<tr>
<td>3.15 Costs for educating students at each respective academic-year.</td>
<td>66</td>
</tr>
<tr>
<td>3.16 Passing rate.</td>
<td>66</td>
</tr>
<tr>
<td>3.17 Resigning rate.</td>
<td>67</td>
</tr>
<tr>
<td>3.18 Retiring rate.</td>
<td>67</td>
</tr>
<tr>
<td>3.19 The upper bound of total budget available in each year.</td>
<td>68</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>3.20</td>
<td>The optimal number of the first academic-year students that can be supported.</td>
</tr>
<tr>
<td>3.21</td>
<td>The history of the average fitness of the feasible chromosomes in case of deterministic number of patients.</td>
</tr>
<tr>
<td>3.22</td>
<td>The distributions of chromosomes at various generations: (a) – Starting Generation, (b) – 20th Generation, and (c) – 50th Generation.</td>
</tr>
<tr>
<td>3.23</td>
<td>Verification of the optimal design from GA search in case of deterministic number of patients.</td>
</tr>
</tbody>
</table>