<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Title</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acknowledgement</td>
<td>i</td>
</tr>
<tr>
<td></td>
<td>Abstract</td>
<td>iii</td>
</tr>
<tr>
<td></td>
<td>Contents</td>
<td>vi</td>
</tr>
<tr>
<td></td>
<td>Abbreviations</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>List of Figures</td>
<td>xiv</td>
</tr>
<tr>
<td></td>
<td>List of Tables</td>
<td>xxi</td>
</tr>
<tr>
<td></td>
<td>Publications</td>
<td>xxv</td>
</tr>
<tr>
<td>1</td>
<td><strong>Introduction and Overview of Selected Soft Computing Techniques</strong></td>
<td>1-31</td>
</tr>
<tr>
<td></td>
<td>1.1 Introduction</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1.2 Overview of Selected Soft Computing Techniques</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>1.2.1 Genetic Algorithm</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1.2.2 Particle Swarm Optimization</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>1.2.3 Bacterial Foraging Optimization</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>1.2.4 Artificial Neural Networks</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>1.2.5 Hybrid Soft Computing Techniques</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>1.3 Limitations of Soft Computing Techniques</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>1.4 Limitations of Image and Video Quality Enhancement Techniques</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>1.5 Motivation</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>1.6 Problem Formulation</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>1.6.1 Research Title</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>1.6.2 Research Objectives</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>1.7 Thesis Organization</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td><strong>Development of Bacterial Foraging Optimization and its Hybridization for Image and Video Quality Enhancement</strong></td>
<td>32-53</td>
</tr>
<tr>
<td></td>
<td>2.1 Introduction</td>
<td>32</td>
</tr>
</tbody>
</table>

vi
2.2 Soft Computing Techniques for Image and Video Quality Enhancements
   2.2.1 Cascaded Method I (SMF and BFO) 35
   2.2.2 Cascaded Method II (AMF and BFO) 35
   2.3 Development of Model Using Bacterial Foraging 37
   2.4 Fusion of Bacterial Foraging and parameter free PSO (BF-pfPSO) 39
   2.5 Image Quality Enhancement 42
   2.6 Video Quality Enhancement 48
   2.7 Conclusion 52

3 Development of Parallel Soft Computing for Motion Estimation in Video
   3.1 Introduction 54
   3.2 Review of Parallel Particle Swarm Optimization (PPSO) 57
   3.3 Necessity of Parallel Soft Computing for Video Compression 59
   3.4 Modified Parallel Particle Swarm Optimization (MPPSO) 61
   3.5 Small Population based Modified PPSO with Time Varying Acceleration Coefficient and Inertia Weight (SPMPPSO-TVACIW) 62
   3.6 Parallel Bacterial Foraging Optimization (PBFO) 63
   3.7 Parallel Hybrid Germ Swarm Computing (PHGSC) 66
   3.8 Experimental Results and Discussions 67
   3.9 Conclusion 77

4 Development of Synchronous Bacterial Foraging Optimization and Application in Multimodal Functions and Motion Estimation
   4.1 Introduction 78
   4.2 Synchronous Bacterial Foraging Optimization (SBFO) 80
   4.3 Experimental Results for Benchmark Functions 85
   4.4 Experimental Results for Motion Estimation 100
   4.5 Conclusion 105
5 Fusion of Soft Computing Techniques and use in Multimodal Functions and Motion Estimation

5.1 Introduction

5.2 Necessity of Fusion of BFO with PSO variants

5.3 Fusion of Synchronous Bacterial Foraging Optimization and ePSO

5.4 Syncro Germ Co-operations by Twin Swarm Intelligence (SGCTSI)

5.5 Dynamically Shared Mutation based Bacterial Foraging using dual Swarm Intelligence (BFdSI)

5.6 Hybrid Bacterial Foraging with Parameter free PSO (HBF-pfPSO)

5.7 Concurrent Bacterial Foraging with Emotional Intelligence (CBFEI)

5.8 Experimental Results for Benchmark Functions

5.9 Experimental Results for Motion Estimation

5.10 Conclusion

6 Development of Swine Influenza Model Based Optimization

6.1 Introduction

6.2 Review of Mathematical Models of Swine Influenza

6.3 Swine Influenza Model Based Optimization (SIMBO)

6.3.1 Key Terms and Definitions

6.3.2 SIMBO-T

6.3.3 SIMBO-V

6.3.4 SIMBO-Q

6.3.5 Difference between SIMBO and other optimization Tech.

6.4 Experimental Results and Discussions for Benchmark Functions

6.5 Experimental Results and Discussions for Motion Estimation

6.6 Conclusion

7 Development of Bacterial Foraging Optimization Driven Spatio-Temporal Neural Network

7.1 Introduction

7.2 Artificial Neural Network

7.3 Error Concealment in Video

7.4 Spatio-Temporal Neural Network
7.5 Motion Estimation and Motion Vectors 220
7.6 Development Spatio-Temporal Neural Network for recovery of lost Motion Vector 223
7.7 Bacterial Foraging Optimization Driven Spatio-Temporal Neural Network 224
7.8 Result and Discussions 228
7.9 Conclusion 232

8 Conclusions and Future Scope 234-237
8.1 Conclusions 234
8.2 Future Scope 236

References 238-265