# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>INNER FIRST PAGE</td>
<td>i</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>iii</td>
</tr>
<tr>
<td>DECLARATION BY THE SCHOLAR</td>
<td>ix</td>
</tr>
<tr>
<td>SUPERVISOR’S CERTIFICATE</td>
<td>xi</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENT</td>
<td>xiii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>xv</td>
</tr>
<tr>
<td>LIST OF ACRONYMS AND ABBREVIATIONS</td>
<td>xvii</td>
</tr>
<tr>
<td>LIST OF SYMBOLS</td>
<td>xix</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xxi</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>xxvi</td>
</tr>
<tr>
<td><strong>CHAPTER – 1</strong></td>
<td></td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 TAMPERING WITH VIDEOS</td>
<td>4</td>
</tr>
<tr>
<td>1.1.1 TAMPERING DOMAIN</td>
<td>5</td>
</tr>
<tr>
<td>1.1.2 LEVELS OF TEMPORAL TAMPERING</td>
<td>7</td>
</tr>
<tr>
<td>1.1.3 COMMON TEMPORAL TAMPERING WITH VIDEOS</td>
<td>8</td>
</tr>
<tr>
<td>1.2 DETECTION OF TAMPERING WITH VIDEOS</td>
<td>10</td>
</tr>
<tr>
<td>1.3 VIDEO QUALITY ASSESSMENT</td>
<td>11</td>
</tr>
<tr>
<td>1.4 THESIS ORGANIZATION</td>
<td>12</td>
</tr>
<tr>
<td><strong>CHAPTER – 2</strong></td>
<td></td>
</tr>
<tr>
<td>LITERATURE REVIEW</td>
<td>15</td>
</tr>
</tbody>
</table>
2.1 LITERATURE REVIEW – TAMPERING DETECTION 15

2.1.1 TECHNIQUES UNDER NR MODE OF TAMPERING DETECTION 17

2.1.1.1 CODING ARTIFACTS BASED TECHNIQUES 17

2.1.1.2 CLASSIFICATION BASED TECHNIQUES 22

2.1.2 EMBEDDED INFORMATION BASED TECHNIQUES 24

2.2 VIDEO QUALITY ASSESSMENT 28

2.2.1 SUBJECTIVE QUALITY ASSESSMENT 29

2.2.1 OBJECTIVE QUALITY ASSESSMENT 31

2.3 IDENTIFIED ISSUES 32

2.4 THESIS OBJECTIVE 33

CHAPTER- 3

FULL REFERENCE SCHEMES FOR DROPPED FRAMES IDENTIFICATION 35

3.1 PROBLEM STATEMENT 36

3.2 PROPOSED SCHEMES 37

3.2.1 THE ALGORITHM – withoutST 38

3.2.2 THE ALGORITHM – detectFrameDrop 40

3.3 SIMULATION AND ANALYSIS 50

3.3.1 EXPERIMENT CASES 50

3.3.2 VIDEO DATA SETS 52

3.3.2.1 SETS OF ORIGINAL VIDEOS 52

3.3.2.2 SETS OF TAMPERED VIDEOS 53

3.3.3 EXPERIMENTAL ANALYSIS 55

3.4 DATA PARALLELIZATION 59
3.4.1 DATA PARALLEL ALGORITHM – `detectFDPParallel` 60
3.4.2 SIMULATION DETAILS 62
   3.4.2.1 VIDEO DATA SETS 62
   3.4.2.2 PERFORMANCE ANALYSIS 63
3.5 SUMMARY 65

CHAPTER- 4

LEARNING BASED NO REFERENCE SCHEME FOR FRAME DROP DETECTION 67
4.1 PROBLEM STATEMENT 67
4.2 PROPOSED SCHEME 68
   4.2.1 TRAINING VIDEO DATABASE 69
   4.2.2 PROPOSED FEATURES 71
   4.2.3 TRAINING MODULE 74
4.3 TEST MODULE 77
4.4 SUMMARY 80

CHAPTER-5

THRESHOLD BASED NO REFERENCE SCHEME FOR FRAME DROP DETECTION 81
5.1 PROBLEM STATEMENT 82
5.2 PROPOSED SCHEME 83
   5.2.1 THRESHOLDS 83
   5.2.2 ABRUPT SCENE CHANGE DETECTION 87
   5.2.3 DETECTION OF FRAME DROP 90
5.3  EXPERIMENTAL ANALYSIS  
   5.3.1  VIDEO DATA SETS  
   5.3.2  PERFORMANCE ANALYSIS  
5.4  SUMMARY  

CHAPTER- 6  
THRESHOLD BASED NO REFERENCE SCHEME FOR FRAME COPY DETECTION  
6.1  PROBLEM STATEMENT  
6.2  PROPOSED SCHEME  
6.3  EXPERIMENTAL ANALYSIS  
   6.3.1  VIDEO DATA SETS  
   6.3.2  PERFORMANCE ANALYSIS  
6.4  SUMMARY  

CHAPTER- 7  
THRESHOLD BASED NO REFERENCE SCHEME FOR FRAME SWAPPING DETECTION  
7.1  PROBLEM STATEMENT  
7.2  PROPOSED SCHEME  
7.3  EXPERIMENTAL ANALYSIS  
   7.3.1  VIDEO DATA SETS  
   7.3.2  PERFORMANCE ANALYSIS  
7.4  SUMMARY
CHAPTER- 8

FULL REFERENCE DROPPED FRAMES VIDEO QUALITY METRICS 135

8.1 SUBJECTIVE EXPERIMENTS 136

8.2 PSNR AND SSIM VS. MOS 143

8.3 DFVQM 145

8.4 SUMMARY 148

CONCLUSION AND FUTURE WORK 149

REFERENCES 151

LIST OF PUBLICATIONS 159

SYNOPSIS