

Contents

| | |
|-----------------------------------------------------------------------------------------------------|-----------|
| Abstract | page |
| Acknowledgements | i |
| Contents | iii |
| List of Figures | v |
| List of Tables | vii |
| List of Symbols | viii |
| List of Abbreviations | xiii |
| | xv |
| Chapter 1: Introduction | 1 |
| 1.1 Motivation and Literature Survey | 1 |
| 1.1.1 Camera Content Image Compression | 2 |
| 1.1.2 Screen Content Image Compression | 4 |
| 1.1.3 Camera and Screen Content Image Quality Assessment | 7 |
| 1.2 Related Works | 15 |
| 1.2.1 JPEG Baseline | 15 |
| 1.2.2 Scale-Invariant Feature Transform (SIFT) | 19 |
| 1.3 Thesis overview and Contributions | 22 |
| Chapter 2: Multilevel Saliency Enabled Compression for Camera-Content Images | 25 |
| 2.1 Proposed Compression Method | 25 |
| 2.1.1 Number of Regions Identification & Multiple Saliency Identification | 26 |
| 2.1.2 Saliency Ranking | 29 |
| 2.1.3 Block Ranking | 29 |
| 2.1.4 Adaptive Quantization of DCT Coefficients | 30 |
| 2.1.5 Overhead Reduction | 30 |
| 2.2 Results and Analysis | 30 |
| 2.3 Conclusions | 36 |
| Chapter 3: Saliency Enabled Screen Content Coding | 41 |
| 3.1 Proposed SCI Compression Method | 41 |
| 3.1.1 I-DCT with Pruned Coefficients | 42 |
| 3.1.2 Error Energy Evaluation | 44 |
| 3.1.3 Salient Region Identification | 45 |
| 3.1.4 Adaptive Quantization | 46 |
| 3.1.5 Overhead Encoding | 47 |
| 3.2 Results and Discussions | 47 |
| 3.2.1 Protocol | 47 |
| 3.2.2 Performance of Saliency Detection | 48 |
| 3.2.3 Rate Distortion Analysis | 49 |
| 3.3 Conclusions | 52 |
| Chapter 4: Reduced-Reference Quality Assessment Methods for Camera and Screen Content Images | 53 |
| 4.1 Camera and Screen Content Quality Assessment: CSQA | 54 |
| 4.1.1 Feature Matching | 54 |
| 4.1.2 Normalization and Inner-Product | 55 |
| 4.2 Experimental Results and Discussions | 56 |
| 4.2.1 Datasets and Protocol | 56 |
| 4.2.2 Performance Evaluation | 56 |
| 4.2.3 Dynamic Range Analysis | 57 |
| 4.2.4 Computation Cost Reduction in Proposed RDM | 60 |
| 4.3 Feature Quality Index: FQI | 60 |
| 4.3.1 Feature Points Identification | 61 |
| 4.3.2 Local Feature Descriptors | 66 |
| 4.3.3 Feature Matching: RDM | 67 |
| 4.3.4 Normalization and Inner-Product | 69 |
| 4.4 Experimental Results and Discussions | 69 |
| 4.4.1 Protocol | 69 |

| | | |
|------------------------------------------------|---------------------------------------------------|----|
| 4.4.2 | <i>Parameter Analysis</i> | 73 |
| 4.4.3 | <i>Performance Evaluation</i> | 74 |
| 4.4.4 | <i>Performance on Individual Distortion Type</i> | 74 |
| 4.4.5 | <i>Computation Cost Reduction in Proposed RDM</i> | 79 |
| 4.5 | Conclusions | 80 |
| Chapter 5: Conclusions and Future Works | | 81 |
| 5.1 | Conclusions | 81 |
| 5.2 | Recommendations for Future Works | 82 |
| References | | 85 |