

# Contents

Abstract (in Chinese) .....	i
Abstract (in English) .....	ii
Acknowledgements.....	iii
Contents.....	iv
List of Tables.....	vi
List of Figures.....	vii
<b><u>CHAPTER 1 INTRODUCTION</u></b>	
<u>1.1 Motivation of the research</u> .....	1
<u>1.2 Survey of related researches</u> .....	2
<u>1.3 Sketch of the research work</u> .....	4
<u>1.4 Thesis organization</u> .....	4
<b><u>CHAPTER 2 PRINCIPAL TYPES OF PHOTOGRAPHIC COMPOSITIONS</u></b>	
<u>2.1 Sun-like Composition (SC)</u> .....	5
<u>2.2 Golden-section-like Composition (GC)</u> .....	6
<u>2.3 Diagonal-like Composition (DC)</u> .....	6
<u>2.4 Frame-like Composition (FC)</u> .....	7
<u>2.5 Symmetry-like Composition (SMC)</u> .....	8
<u>2.6 Triangle-like Composition (TC)</u> .....	8
<u>2.7 Vanishing-point-like Composition (VC)</u> .....	9
<u>2.8 Horizontal/vertical-line-like Composition (HVC)</u> .....	10
<b><u>CHAPTER 3 FEATURES ANALYSIS AND EXTRACTION</u></b>	
<u>3.1 Feature Analysis</u> .....	11

<u>3.2 Features extraction</u> .....	13
<u>3.2.1 Feature 1: Sharpness</u> .....	14
<u>3.2.2 Feature 2: Brightness average</u> .....	15
<u>3.2.3 Feature 3~6: Local linearity</u> .....	15
<u>3.2.4 Feature 7: Symmetry</u> .....	17
<u>3.2.5 Feature 8~10: Global major line direction</u> .....	18
<u>CHAPTER 4 FUZZY LOGIC FUSION</u>	
<u>4.1 Basic concepts</u> .....	22
<u>4.2 Input variables</u> .....	23
<u>4.3 Membership functions</u> .....	23
<u>4.4 Fuzzy logic rule-based fusion</u> .....	24
<u>CHAPTER 5 EXPERIMENTAL RESULTS</u>	
<u>5.1 The typical experiment</u> .....	29
<u>5.2 The test sets</u> .....	37
<u>CHAPTER 6 SUMMARY AND FUTURE RESEARCH</u>	
<u>6.1 Summary and conclusions</u> .....	47
<u>6.2 Topics for future research</u> .....	47
<u>REFERENCES</u>	48

## List of Tables

Table 1. The requirements of features extraction of 25 selected *ROIs*.

Table 2. True average values of 6 estimated features in 25 *ROIs*.

Table 3. Confidences of 6 features in Table 2.

Table 4. The fuzzy “*High(H)*” memberships of confidences in Table 3.

Table 5. The memberships of 8 photographic compositions about the Fig. 6.

Table 6.1. Sample images with sun-like composition.

Table 6.2. Sample images with golden-like composition.

Table 6.3. Sample images with diagonal-like composition.

Table 6.4. Sample images with frame-like composition.

Table 6.5. Sample images with symmetry-like composition.

Table 6.6. Sample images with triangle-like composition.

Table 6.7. Sample images with vanishing-point-like composition.

Table 6.8. Sample images with Horizontal/Vertical-line-like composition.

Table 7. The correlations between different photographic compositions and the outputs of fuzzy logic rules.

## List of Figures

Fig. 1. The sun-like photographic composition.

Fig. 2. The golden-section-like photographic composition.

Fig. 3. The diagonal-like photographic composition.

Fig. 4. The frame-like photographic composition.

Fig. 5. The symmetry-like photographic composition.

Fig. 6. The triangle-like photographic composition.

Fig. 7. The vanishing-point-like photographic composition.

Fig. 8. The horizontal/vertical-like photographic composition.

Fig. 9. The locations of 25 *ROI*'s.

Fig.10. Flowchart of the proposed algorithm for identifying the photographic composition based on fuzzy logic.

Fig. 11. Two membership functions for input variables.

Fig.12. The identifying system output membership functions.

Fig. 13 (a) Test image. (b) The 25 *ROI* images with size  $17 \times 17$ .

Fig. 14. The sharpness of 25 *ROI*s from the Fig. 13(b).

Fig. 15. The edge map of the tested image in Fig. 13(a).

Fig. 16. The four features of linearity of the tested image. The abscissa of the plots denotes the number of the *ROI*.

Fig.17. The symmetric feature of all *ROI* pairs. The color blocks denote the corresponded *ROI* pair is referenced in the recognition procedure.

Fig. 18. The Hough space of the tested image

Fig. 19. The histogram of the directions of straight lines in the tested image.

