

# Contents

<b>1</b>	<b>Introduction</b> .....	1
1.1	Background .....	1
1.2	Existing Surveillance Systems .....	2
1.3	Book Contents .....	3
1.4	Conclusion .....	5
<b>2</b>	<b>Background/Foreground Detection</b> .....	7
2.1	Introduction .....	7
2.2	Pattern Classification Method .....	7
2.2.1	Overview of Background Update Methods .....	7
2.2.2	Pattern Classification-based Adaptive Background Update Method .....	11
2.3	Frame Differencing Method .....	16
2.4	Optical Flow Method .....	20
2.5	Conclusion .....	21
<b>3</b>	<b>Segmentation and Tracking</b> .....	23
3.1	Introduction .....	23
3.2	Segmentation .....	23
3.3	Tracking .....	28
3.3.1	Hybrid Tracking Method .....	28
3.3.2	Particle Filter-based Tracking Method .....	31
3.3.3	Local Binary Pattern-based Tracking Method .....	35
3.4	Conclusion .....	43
<b>4</b>	<b>Behavior Analysis of Individuals</b> .....	45
4.1	Introduction .....	45
4.2	Learning-based Behavior Analysis .....	45
4.2.1	Contour-based Feature Analysis .....	45
4.2.2	Motion-based Feature Analysis .....	49
4.3	Rule-based Behavior Analysis .....	55

4.4	Application: Household Surveillance Robot	56
4.4.1	System Implementation	60
4.4.2	Combined Surveillance with Video and Audio	61
4.4.3	Experimental Results	65
4.5	Conclusion	68
<b>5</b>	<b>Facial Analysis of Individuals</b>	<b>71</b>
5.1	Feature Extraction	73
5.1.1	Supervised PCA for Feature Generation	73
5.1.2	ICA-based Feature Extraction	75
5.2	Fusion of SVM Classifiers	76
5.3	System and Experiments	78
5.3.1	Implementation	79
5.3.2	Experiment Result	80
5.4	Conclusion	80
<b>6</b>	<b>Behavior Analysis of Human Groups</b>	<b>81</b>
6.1	Introduction	81
6.2	Agent Tracking and Status Analysis	82
6.3	Group Analysis	83
6.3.1	Queuing	85
6.3.2	Gathering and Dispersing	87
6.4	Experiments	88
6.4.1	Multi-Agent Queuing	90
6.4.2	Gathering and Dispersing	90
6.5	Conclusion	91
<b>7</b>	<b>Static Analysis of Crowds: Human Counting and Distribution</b>	<b>93</b>
7.1	Blob-based Human Counting and Distribution	93
7.1.1	Overview	94
7.1.2	Preprocessing	96
7.1.3	Input Selection	96
7.1.4	Blob Learning	98
7.1.5	Experiments	99
7.1.6	Conclusion	101
7.2	Feature-based Human Counting and Distribution	101
7.2.1	Overview	102
7.2.2	Initial Calibration	104
7.2.3	Density Estimation	108
7.2.4	Detection of an Abnormal Density Distribution	112
7.2.5	Experiment Results	114
7.2.6	Conclusion	117

- 8 Dynamic Analysis of Crowd Behavior** . . . . . 119
  - 8.1 Behavior Analysis of Individuals in Crowds . . . . . 119
  - 8.2 Energy-based Behavior Analysis of Groups in Crowds . . . . . 120
    - 8.2.1 First Video Energy . . . . . 123
    - 8.2.2 Second Video Energy . . . . . 127
    - 8.2.3 Third Video Energy . . . . . 131
    - 8.2.4 Experiment using a Metro Surveillance System . . . . . 133
    - 8.2.5 Experiment Using an ATM Surveillance System . . . . . 137
  - 8.3 RANSAC-based Behavior Analysis of Groups in Crowds . . . . . 146
    - 8.3.1 Random Sample Consensus (RANSAC) . . . . . 146
    - 8.3.2 Estimation of Crowd Flow Direction . . . . . 148
    - 8.3.3 Definition of a Group in a Crowd (Crowd Group) . . . . . 150
    - 8.3.4 Experiment and Discussion . . . . . 152
- References** . . . . . 155
- Index** . . . . . 165



<http://www.springer.com/978-94-007-1136-5>

Intelligent Surveillance Systems

Qian, H.; Wu, X.; Xu, Y.

2011, XX, 168 p., Hardcover

ISBN: 978-94-007-1136-5