

Contents

1	Introduction	1
1.1	Problem	5
1.2	Contribution	8
1.3	Overview	11
2	Related Work	13
2.1	Terminology	13
2.2	Gait Representation	14
2.2.1	Model-based Approaches	14
2.2.2	Appearance-based Approaches	16
2.3	Cross-view Gait Recognition	18
2.3.1	View-invariant Gait Descriptor	19
2.3.2	3D View Gait Descriptor	20
2.3.3	View Transformation Model	21
2.4	Benchmark Gait Databases	22
2.5	Movement Analysis	26
2.5.1	Visual Sensor-based Approaches	27
2.5.2	Motion Sensor-based Algorithms	29
3	Single-view Gait Recognition	33
3.1	Gait Recognition using Spatiotemporal Motion Characteristics	34
3.1.1	Motion Descriptors	34
3.1.2	Codebook Generation	36
3.1.3	Feature Encoding	39
3.1.4	Dimensionality Reduction	41
3.1.5	Classification	42
3.1.6	Experiments and Results	43
3.2	Adaptation of Generic Codebook for Gait Recognition Algorithms	53

3.2.1 Experiments and Results	54
3.2.2 Discussion	54
3.3 Summary	57
4 Cross-view Gait Recognition	59
4.1 Gait Representation	61
4.2 View Transfer Model	61
4.3 Cross-view Gait Representation and Classification	65
4.4 Experiments and Results	66
4.5 Summary	74
5 Movement Analysis of Human Body Parts	75
5.1 A Deformable Part-based Model for Movement Analysis of Infants	76
5.2 Template-based Model for Infant's Detection	77
5.3 Infant's Motion Analysis	80
5.4 Model Training	81
5.5 Experiments and Results	84
5.6 Summary	89
6 Evaluation of the Therapeutic Procedure	91
6.1 A Vision-based Framework to Evaluate the Physiotherapy	93
6.1.1 Data Pre-processing	93
6.1.2 Patient Body Detection	94
6.1.3 Pose Representation	100
6.1.4 Classification	101
6.1.5 Experiments and Results	103
6.2 A Deformable Part-based Model to Evaluate the Physiotherapy	106
6.3 Summary	107
7 Conclusion and Future Work	109
7.1 Conclusion	109
7.2 Future Work	111
Abbreviations	113
Mathematical Symbols	115
List of Figures	117

List of Tables	119
Bibliography	121
Own Publications	137
Curriculum Vitae	140