

Contents

Abstract	i
Acknowledgments	vii
Contents	ix
1 Introduction	1
2 Overview of Pen & Touch Recognition	7
2.1 Handwritten Text Recognition	7
2.1.1 On-line HTR System	8
2.1.2 Off-line HTR System	12
2.2 Gesture Recognition	13
2.2.1 Recognizers	14
2.3 Assessing the Recognition Performance	16
2.3.1 Datasets	17
2.4 Conclusion	21
3 Improving Interactive Transcription of Text Images	23
3.1 Overview of Interactive Transcription of Text Images . .	25
3.1.1 Formal Framework	25
3.1.2 Interaction Using Isolated Typed Characters . .	27
3.1.3 Interaction Using Isolated Handwritten Words .	28
3.1.4 Assessing the Performance of Interactive Systems	31
3.2 Interaction Using Isolated Handwritten Characters . .	33
3.2.1 Formal Framework	33
3.2.2 Dynamic Language Modeling	35
3.2.3 Evaluation	36

3.2.4	Results	38
3.3	Interaction Using A Sequence of Handwritten Characters	41
3.3.1	Formal Framework	42
3.3.2	Dynamic Language Modeling	43
3.3.3	Evaluation	43
3.3.4	Results	46
3.4	Discussion	48
3.5	Conclusion	49
4	Improving Sigma-Lognormal Parameters Extraction	51
4.1	Overview of the Kinematic Theory	52
4.1.1	Delta-Lognormal Model	53
4.1.2	Sigma-Lognormal Model	54
4.1.3	Sigma-Lognormal Parameters Extractor	55
4.1.4	Assessing the Sigma-Lognormal Parameters Ex- traction	61
4.2	New Sigma-Lognormal Parameters Extractor	63
4.2.1	Preprocessing	63
4.2.2	Stroke Extraction	64
4.2.3	Evaluation	69
4.2.4	Results	70
4.3	Discussion	73
4.4	Conclusion	75
5	Synthesizing Pen & Touch On-line Strokes	77
5.1	Overview of Stroke Synthesis	78
5.1.1	Shape-simulation Synthesis Techniques	78
5.1.2	Movement-simulation Synthesis Techniques	79
5.1.3	Synthesizing Strokes Using the Kinematic Theory	80
5.2	Using Synthetic Samples for Recognition Task	83
5.2.1	Evaluation	84
5.2.2	Results	85
5.3	Discussion	97
5.4	Conclusion	99
6	Applications	101
6.1	Escritoire	101
6.1.1	Related Work	102

6.1.2	Interacting with Escritoire	103
6.1.3	System Implementation	103
6.1.4	Conclusion	109
6.2	Gestures à Go Go	109
6.2.1	Related Work	110
6.2.2	G3 Web Service	113
6.2.3	G3 Web Application	115
6.2.4	Interacting with G3	116
6.2.5	Discussion	119
6.2.6	Conclusion	120
6.3	Interactive Translation Reviewing Using a Pen	120
6.3.1	Field Evaluation	121
6.3.2	Laboratory Evaluation	125
6.3.3	Discussion	126
6.3.4	Conclusion	127
7	Conclusions	129
7.1	Scientific Contributions	129
7.1.1	Interactive Handwritten Text Transcription	130
7.1.2	Human Movement Modeling	131
7.1.3	Synthesizing Pen & Touch On-line Strokes	131
7.2	Future Work	133
A	Evaluating Synthetic Gestures Human Likeness	135
A.1	Gesture Relative Accuracy Measures	135
A.2	Evaluation	138
A.2.1	Method	138
A.2.2	Results	139
A.3	Conclusion	142
	List of Figures	143
	List of Tables	150
	Bibliography	153