

# Contents

<b>List of Figures</b>	<b>xv</b>
<b>List of Tables</b>	<b>xvii</b>
<b>List of Algorithms</b>	<b>xix</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Motivation . . . . .	3
1.2 Objectives . . . . .	6
1.3 Main contributions . . . . .	7
1.3.1 Contributions to prostate and bladder cancer . . . . .	8
1.3.2 Contributions to glaucoma . . . . .	10
1.4 Framework . . . . .	11
1.5 Outline . . . . .	12
<b>2 First-Stage Prostate Cancer Identification</b>	<b>15</b>
2.1 Introduction . . . . .	17
2.1.1 Related work . . . . .	18
2.1.2 Contribution of this work . . . . .	21
2.2 Material . . . . .	22
2.3 Methods . . . . .	23
2.3.1 Hand-driven learning approach . . . . .	27
2.3.2 Deep learning approach . . . . .	45
2.4 Results . . . . .	47
2.5 Discussion . . . . .	51
2.6 Conclusion . . . . .	53
<b>3 Self-Learning Framework for Bladder Cancer Grading</b>	<b>55</b>
3.1 Introduction . . . . .	57
3.1.1 Related work . . . . .	59
3.1.2 Contribution of this work . . . . .	61

3.2	Material	62
3.3	Methods	63
3.3.1	CAE pre-training	64
3.3.2	DCEAC training	66
3.4	Experimental results	69
3.4.1	Comparison with other state-of-the-art methods	69
3.4.2	Quantitative results	71
3.4.3	Qualitative results	72
3.5	Discussion	73
3.5.1	On quantitative results	73
3.5.2	On qualitative results	76
3.6	Conclusion	77
<b>4</b>	<b>Glaucoma Detection from Raw SD-OCT Volumes</b>	<b>79</b>
4.1	Introduction	81
4.1.1	Related work	82
4.1.2	Contribution of this work	84
4.2	Material	86
4.3	Methodology	88
4.3.1	Slide-level feature extractor design	88
4.3.2	Volume-based predictive model development	91
4.4	Results	95
4.4.1	Slide-level feature extractor	95
4.4.2	Volume-based predictive model	100
4.5	Discussion	106
4.5.1	On the slide-level feature extractor	106
4.5.2	On the volume-based predictive model	108
4.6	Conclusion	111
<b>5</b>	<b>Circumpapillary OCT-Focused Hybrid Learning</b>	<b>113</b>
5.1	Introduction	115
5.1.1	Related work	116
5.1.2	Contribution of this work	118
5.2	Methods	120
5.2.1	Backbone development	120
5.2.2	Prototype-based learning strategies development	123
5.3	Ablation experiments	130
5.3.1	Datasets	130
5.3.2	Backbone selection	132
5.3.3	Prototype-based learning strategies	134
5.4	Prediction results	136

5.5 Discussion . . . . .	138
5.5.1 On ablation experiments . . . . .	139
5.5.2 On prediction results . . . . .	141
5.6 Conclusion . . . . .	144
<b>6 Final conclusions</b>	<b>145</b>
6.1 Specific remarks . . . . .	146
6.2 Future work . . . . .	148
<b>Merits</b>	<b>150</b>
<b>Bibliography</b>	<b>155</b>