

# Table of content

---

---

<b>Certificate .....</b>	<b>ii</b>
<b>Declaration by the Candidate .....</b>	<b>iii</b>
<b>Copyright Transfer Certificate .....</b>	<b>iv</b>
<b>Acknowledgement .....</b>	<b>v</b>
<b>Preface.....</b>	<b>vii</b>
<b>Table of content.....</b>	<b>x</b>
<b>List of Figures.....</b>	<b>xiii</b>
<b>List of Tables .....</b>	<b>xvi</b>
<b>List of Symbols .....</b>	<b>xvii</b>
<b>List of Abbreviations .....</b>	<b>xviii</b>
<b>Chapter 1 Introduction.....</b>	<b>1</b>
1.1. Background .....	1
1.2 Dental Image Segmentation .....	3
1.3 Motivation .....	4
1.4 Problem Statement .....	5
1.5 Research Objectives .....	6
1.6 Contributions to the Thesis.....	6
1.7 Thesis Organization.....	7
<b>Chapter 2 Literature Review .....</b>	<b>9</b>
2.1 Literature Review for Dental Image Segmentation .....	9
2.1.1 Conventional Approaches.....	9
2.1.2 Deep Learning Techniques.....	14
2.1.3 Literature for Capsule Network for medical image segmentation .....	24
2.1.4 Advances made by industry for Dentistry .....	29
2.2 Research Gaps .....	30
2.3 Dataset used for Experimental Analysis.....	31
2.3.1 UFBA_USEC Dataset .....	32
2.3.2 Tufts Dental Database .....	33
2.4 Performance Metrics .....	33
2.5 Conclusion.....	34

---

---

<b>Chapter 3 Teeth image segmentation methods using Multimodal CNN architecture and Attention Guided deep network.....</b>	<b>35</b>
3.1 Background .....	36
3.2 Related Work .....	36
3.3 Proposed Methods.....	37
3.3.1 Exploiting Multimodal CNN architecture for automated teeth segmentation on dental panoramic X-ray images .....	37
3.3.2 Cascaded Deep Neural Network with Attention Guidance for Teeth Segmentation on Dental Panoramic Radiographs .....	48
3.4 Conclusion .....	70
<b>Chapter 4 Enhancing teeth segmentation using multifusion deep neural net in panoramic X-rays</b>	<b>71</b>
4.1 Background .....	71
4.2 Related Work .....	72
4.3 Proposed Methods.....	75
4.3.1 Overview .....	75
4.3.2 Detailed Architecture of Proposed Network .....	76
4.4 Experiments and Results.....	80
4.4.1 Datasets .....	80
4.4.2 Experimental Setup .....	80
4.4.3 Result and Discussion .....	81
4.4.4 Ablation Study.....	86
4.5 Conclusion .....	90
<b>Chapter 5 TeethCaps: A dental image segmentation model based on capsule network .....</b>	<b>92</b>
5.1 Background.....	92
5.2 Related Work .....	94
5.3 Proposed Method .....	96
5.3.1 Overview .....	96
5.3.2 Details of the Proposed Architecture TeethCaps.....	97
5.4 Experiments and Results.....	101
5.4.1 Datasets .....	101
5.4.2 Experimental Setup .....	101
5.4.3 Result and Discussion .....	101
5.5 Conclusion .....	105
<b>Chapter 6 Investigation of Transformer-based neural network for dental image segmentation ...</b>	<b>107</b>
6.1 Background.....	107
6.2 Related Work .....	108
6.3 Proposed Method .....	109
6.3.1 Proposed Network Architecture .....	109
6.4 Experiment and Results.....	111
6.4.1 Datasets .....	111

6.4.2 Experimental Setup.....	111
6.4.3 Result and Discussion.....	112
6.5 Conclusion.....	116
<b>Chapter 7 Conclusion and Future Scope .....</b>	<b>118</b>
7.1 Conclusions .....	118
7.2 Suggestion for Future Research.....	122
<b>References.....</b>	<b>124</b>
<b>Appendix A.....</b>	<b>133</b>
<b>List of Publications.....</b>	<b>135</b>