Foreword

As a result of unstoppable developments in computer technology, it has become a critical approach to use computer-oriented techniques for achieving better problem solutions in all fields of the modern life. In this context, especially computational techniques have taken important roles to derive new solution approaches for improving already obtained results or making it possible to solve critical problems, which were not solved before. At this point, it has been also clear that both effectiveness and efficiency can be taken many steps away thanks to computer systems running many alternative forms of computational techniques. Because of that, there has been a great research interest in using such systems – techniques to solve difficult tasks in the fields requiring many practical works and efforts. The sub-fields of medical take top places in this manner, as being associated with healthcare of the humankind and also other living organisms over the world. In this context, dentistry has always been in the foreground because of its detailed and sensitive characteristics to ensure desired dental health.

Dentistry is a medical sub-field, which can be affected from technological developments rapidly and because of that, approaches, methods or techniques used for diagnosis, treatment and surgery used currently can be changed with revolutionary solution ways. It is clear that technological innovations has gained a momentum especially after the start of 21st century and dentistry has always been open to use newly developed systems and tools to make everything better for both dentists and patients. Here, it is possible to mention that effective innovations appeared within dentistry has been in the context of image analysis and equipment – material development. As it was mentioned under the first paragraph, computer systems and computational techniques employed in them have shaped and accelerated all these innovations.

This book, which is titled as Computational Techniques for Dental Image Analysis, is an important contribution to the scientific literature for enabling interested readers to have idea about what are currently done with computational methods to improve image analysis oriented works in dentistry. It is certain that accurate dental imaging is too important to have good analysis and evaluation of the encountered cases. As like many other fields employing practical tasks, there are often environmental factors and unexpected situations causing negative effects on critical tasks and dental imaging is the most widely examined issue in the dentistry. Because of that, use of computer based computational techniques is a popular research interest by causing both making effective decision making and developing effective dental equipment and materials. In the book, these problem issues are covered under 11 quality research works as classified under two sections: Dental Imaging and Analysis, and Dental Materials, Mechanics and Instrumentation, respectively. Anyone reading these chapters will have idea about the following research aspects in the context of dental image analysis:

- Image enhancement for better diagnosis, treatment and surgery phases.
- Image segmentation as an important image processing method to achieve better treatments.
- Use of heuristic and Artificial Intelligence based approaches to improve dental operations.
- Analysis that can be done over dental components.
- Evaluation of dental equipment and materials in terms of achieving better outputs in tasks.

By combining the findings – results obtained in the works done by the related authors, it is possible for readers to draw a general research environment of current computational techniques for improving dentistry and taking it steps away to build up a future with full of innovations and scientific approaches to make all medical tasks automated with more practical and effective solutions at the end.

For their efforts on providing such a valuable contribution to the scientific community, I would like to thank to the editors: Dr. Kamalanand, Dr. Thayumanavan, and Dr. Jawahar. Without their ideas and also hard works to combine different research works under a common environment, this book project would not be realized. I hope everyone interested and enrolled in that dental image analysis works will enjoy reading all valuable chapters. Let's turn the pages to open doors of innovations changing the ways of dentistry and understand how computational techniques have effective roles in better image analysis in the clinical works!

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