

# MEDICAL PHYSICS

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Auto-Segmentation for Radiation Oncology – State of the Art by Jinzhong Yang, Gregory C. Sharp, and Mark J. Gooding. Boca Raton, FL: CRC Press, 2021. ISBN 978-0-3673-3600-4.

Reviewed by Charlotte Brouwer, M.Sc.

## **DESCRIPTION**

This textbook titled Auto-Segmentation for Radiation Oncology – State of the Art (CRC Press, ISBN: 978-0-3673-3600-4 (hbk) ) provides a comprehensive overview of multi-atlas and deep learning approaches to auto-contouring. Furthermore, key questions on clinical implementation are considered.

## **PURPOSE**

The first introductory chapter describes the main focus of this book being the Thoracic Auto-segmentation Challenge held as an event of the 2017 Annual Meeting of the American Association of Physicists in Medicine (AAPM). Several challenge participants contributed a chapter to this book, addressing a specific strength of their segmentation algorithms. The lack of broad clinical introduction of auto-segmentation, which according to the editors is partly due to the lack of commissioning guidelines, made them dedicate the third part of the book to clinical implementation concerns.

## **AUDIENCE**

The book is written for everyone working in the field of auto-segmentation in radiotherapy. The experienced editors are from academia, clinical physics, and industry; their broad experience gives excellent perspective to this book.

## **CONTENT / FEATURES**

The book is split into three main parts; (1) multi-atlas-based auto-segmentation, (2) deep learning-based auto-segmentation, and (3) clinical implementation concerns. The book

includes comprehensive overview tables and figures that guide the reader to better understand the different deep learning-based methods. The fact that most of the authors refer back to the same dataset is helpful for comparison and interpretation of the different algorithms. The practical considerations that are added to the theoretical aspects help to make the book vivid, such as insights into situations when auto-contouring could fail and possible strategies to mitigate in such case. The book concludes with a practical and clear overview of the evaluation of auto-contouring, including a link to an open-source implementation of quantitative contour evaluation metrics, that is recommended to everyone working in this field.

Each chapter can be read on its own, which makes it accessible to a wide audience. The downside of this (and having a large number of authors that contributed to the book) is quite a bit of repetition in the content and slight differences in style and structure. In addition, implementations discussed are mainly restricted to the thorax region, which might be seen as a limitation. Since research and insights in the field of auto-segmentation develop rapidly, new editions might be needed in the coming years.

### **ASSESSMENT / COMPARISON**

This book was useful toward improving my understanding of deep learning-based methods in medical image segmentation. To the best of my knowledge, this is the only textbook available on auto-segmentation dedicated to radiation oncology. Practical concerns and recommendations for implementation make this textbook a must-have for every radiation oncology department.

### **Book Reviewer Biography:**

Charlotte Brouwer works as a Medical Physics Expert at the Department of Radiation Oncology of the University Medical Center Groningen, The Netherlands. She has been responsible for the validation, introduction and evaluation of the use of atlas- and deep learning-based auto-segmentation in her clinic.