

Preface

Interactive curve modeling techniques and their applications are extremely useful in a number of academic and industrial settings. Specifically, curve modeling plays a significant role in multidisciplinary problem solving. It is extremely useful in various situations like font design, designing objects, CAD/CAM, medical imaging and visualization, scientific data visualization, virtual reality, object recognition, etc. In particular, various problems like iris recognition, fingerprint recognition, signature recognition, etc. can also be intelligently solved and automated using curve techniques. In addition to its critical importance more recently, the curve modeling methods have also proven to be indispensable in a variety of modern industries, including computer vision, robotics, medical imaging, visualization, and even media.

This book aims to provide a valuable source that focuses on interdisciplinary methods and to add up-to-date methodologies in the area. It aims to provide the user community with a variety of techniques, applications, and systems necessary for various real-life problems in the areas such as font design, medical visualization, scientific data visualization, archaeology, toon rendering, virtual reality, body simulation, outline capture of images, object recognition, signature recognition, industrial applications, and many others.

Book Features

It aims to collect and disseminate information in various disciplines including computer graphics, image processing, computer vision, pattern recognition, artificial intelligence, soft computing, shape analysis and description, curve and surface fitting, scientific visualization, shape abstraction and modeling, intelligent CAD systems, computational geometry, reverse engineering, and levels of details for curves and surfaces. The major goal of this book is to stimulate views and provide a source where students, researchers, and practitioners can find the latest developments in the field of interactive curve modeling and its applications. The book provides classical and up-to-date theory and practice to get the problems solved in diverse areas of science and engineering.

All the chapters of the book will contribute toward curve modeling techniques, applications, and systems. The book will have the best possible utility for students, researchers, computer scientists, practicing engineers, and many others who seek classical and state-of-the-art techniques, applications, and systems with curve

modeling. It will be an extremely useful book for undergraduate senior students as well as graduate students in the areas of computer science, engineering, and other computational sciences.

Suggested Course Outlines

This book is designed to have around fifteen chapters. These chapters will contribute toward interactive curve modeling techniques, applications, systems, and tools. The book is planned to have the best possible utility for researchers, computer scientists, practicing engineers, and many others who seek classical and state-of-the-art techniques and applications for computer graphics, vision, and imaging. It will also be equally and extremely useful for undergraduate senior students as well as graduate students in the areas of computer science. It is also beneficial to students in other disciplines including computer engineering, electrical engineering, mechanical engineering, and mathematics. The book is equally beneficial to researchers and practitioners in the industry and academia.

The book has been designed as a course book for undergraduate as well as graduate students in the area of computer science in particular. The main audience of the book are the communities related to the field of computer graphics, vision, and imaging. However, it can be useful for students in other disciplines like computer engineering, electrical engineering, mechanical engineering, mathematics, etc. The book is equally beneficial to researchers and practitioners in the industry. The book can formulate at least three courses as follows:

Course I. As an undergraduate course, at senior level, Chaps. 1–3, 8, 9, 11 (any two corner detectors), 12 (any two methods), 13, and 14 (one heuristic approach) will comprise a full length three credit hours course for a semester of 15 weeks. This course can be conducted with practical projects of reasonable weight.

Course II. As a graduate course consisting of Chaps. 1–4, 6–8 (self-study), 9, and 11–14 (one heuristic approach). This course should also have heavy projects for practical applications.

Course III. As a slightly different graduate course, if the undergraduate course described in Course I is considered to be a prerequisite. This course can be designed with Chaps. 4–7, 9 (using other curve schemes in the book but different than those in Chap. 9), 11–13 (just a quick review), 14, and 15. This course design can also consist of some state-of-the-art topics together with good weighted projects.

The researchers and practitioners can utilize the manuscript as a source as well as a reference book. Depending on their needs, they can study on pick and choose basis. They are also advised to study in their leisure time as it may prove to be fruitful to them.

Required Background

As such, it is not required to possess a specific qualification as a prerequisite to any of the undergraduate Course I or graduate courses II or III mentioned above. But, the user of this book is presumed to have some knowledge of computer programming together with some basic mathematical topics including analytic geometry, linear algebra, and calculus.

Acknowledgments

This manuscript has been prepared after a lot of struggle and efforts. Many graduate students and colleagues around the globe have assisted toward its completion. It is worthwhile to mention Asif Masood, Zulfiqar Habib, M. Zawwar Hussain, S. Ali Rizvi, M. Balah, M. Riyazuddin, Humayun Baig, S. Arshad Raza, Murtaza Ali Khan, Faisal AbdulRazzak, and M.A. Siddiqui. The author is thankful to all of them for their valuable efforts and advice. A lot of credit is also due to various experts who reviewed the chapters and provided helpful feedback.

It is not possible to forget my family here without whose help and support I would not have completed this work. Their love, support, and patience were tremendous throughout. In addition to thanking, I should also apologize for having taken much of their time during the conduct of my work.

The author is happy to acknowledge the support of King Fahd University of Petroleum and Minerals (KFUPM) toward the compilation of this book, against the Book Project #ICS/GRAPHICS/306. This book project was a main source of funding to this book. A partial funded support of KFUPM, through another Research Project #ICS/REVERSE ENG./312, also contributed toward a couple of chapters.

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<http://www.springer.com/978-1-84628-870-8>

Interactive Curve Modeling

With Applications to Computer Graphics, Vision and
Image Processing

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2008, XVII, 350 p., Hardcover

ISBN: 978-1-84628-870-8