
Computational Music Science

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Basic Music Technology

An Introduction

 Springer

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Preface

The idea for this book came from one of my students, Yiqing Ma, in my course *Introduction to Music Information Technology*. She suggested that we should continue our tradition of writing textbooks for my university courses at the School of Music of the University of Minnesota, a tradition that has successfully produced the books *Cool Math for Hot Music* [42] and *All About Music* [43] for Springer's series *Computational Music Science*.

Writing this third textbook was a challenge in that our presentation of basic music technology not only comprises core concepts from acoustics and analog and digital approaches to this specific knowledge, but also includes computational aspects with their mathematical and software-oriented specifications. It was our aim to transcend a purely qualitative discussion of recent progress by a rigorous introduction to the quantitative, mathematical, and computational methods that are crucial for the understanding of what is at stake in this fascinating field of computer-aided musical creativity and data management.

This textbook is addressed to anyone who wants to learn the core methodologies of this field from the very beginning. Besides our experience with the students' learning curve during their pedagogical development in the course, we decided to produce a text that can be understood by undergraduate students of music, and not only by an audience that already knows mathematical and computational methods and facts. Our approach was therefore driven by the condition that every single sentence of this book must be stated in a style that can be appreciated by non-specialist readers.

To this end, the co-authors of the book were asked to collaboratively create a text that meets their basic qualification of interested and intelligent, but not yet specialized participants. The co-authors are undergraduate students Yiqing Ma (music/psychology), Tianxue Hu (music/mathematics), Zilu Chen (music/computer science), and Jacob Grunklee (electrical engineering/music), and graduate music students Yan Pang, Bill Heinze, Jay Afrisando, and Kakia Gkoudina.

This pool of students guarantees that the present text is accessible to the non-specialist audience. This setup of co-authors defines an approach that is more than a first presentation of our material, it is a communicative singularity that creates a bridge between a highly innovative technology and its precise and thorough comprehension. It is our strong belief that this endeavor will help fill the difficult gap between application and understanding. Figure -1.1 shows our co-author group in a happy mood after the accomplishment of our project.

This book also gives access to a number of sound examples. Here is how to find them online: The music examples in this book are available as MIDI, Sibelius, or MP3 files. They are all accessible via www.encycloSPACE.org/special/BMTBOOK. So if you are looking for the file XX.mid, you define the address www.encycloSPACE.org/special/BMTOOK/XX.mid.

We are pleased to acknowledge the strong support for writing such a demanding treatise from Springer’s computer science editor Ronan Nugent.

Minneapolis, May 2017

Guerino Mazzola, Yan Pang,
Bill Heinze, Kakia Gkoudina, Jay Afrisando,
Jacob Grunklee, Zilu Chen, Tianxue Hu, Yiqing Ma.



Fig. -1.1: From left to right, top row: Jacob Grunklee, Jay Afrisando; middle row: Tianxue Hu, Zilu Chen, Yiqing Ma; front row: Bill Heinze, Guerino Mazzola, Yan Pang, Kakia Gkoudina.

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