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Graduate/advanced undergraduate textbook

Computer Science : Pattern Recognition

Müller, Meinard

Fundamentals of Music Processing

Using Python and Jupyter Notebooks

- Combines foundational technologies and essential applications in music processing and music information retrieval
- Chapters can be read independently and thus serve as building blocks for individually structured courses
- Each chapter is complemented with many examples, figures, exercises, and references for further reading
- Related Web page includes additional audio-visual material and Python code examples

The textbook provides both profound technological knowledge and a comprehensive treatment of essential topics in music processing and music information retrieval (MIR). Including numerous examples, figures, and exercises, this book is suited for students, lecturers, and researchers working in audio engineering, signal processing, computer science, digital humanities, and musicology. The book consists of eight chapters. The first two cover foundations of music representations and the Fourier transform—concepts used throughout the book. Each of the subsequent chapters starts with a general description of a concrete music processing task and then discusses—in a mathematically rigorous way—essential techniques and algorithms applicable to a wide range of analysis, classification, and retrieval problems. By mixing theory and practice, the book's goal is to offer detailed technological insights and a deep understanding of music processing applications. As a substantial extension, the textbook's second edition introduces the FMP (fundamentals of music processing) notebooks, which provide additional audio-visual material and Python code examples that implement all computational approaches step by step. Using Jupyter notebooks and open-source web applications, the FMP notebooks yield an interactive framework that allows students to experiment with their music examples, explore the effect of parameter settings, and understand the computed results by suitable visualizations and sonifications. The FMP notebooks are available from the author's institutional web page at the International Audio Laboratories Erlangen.

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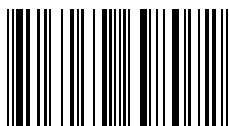
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