Signal Processing for Neuroscientists: An Introduction to the Analysis of Physiological Signals

Wim van Drongelen
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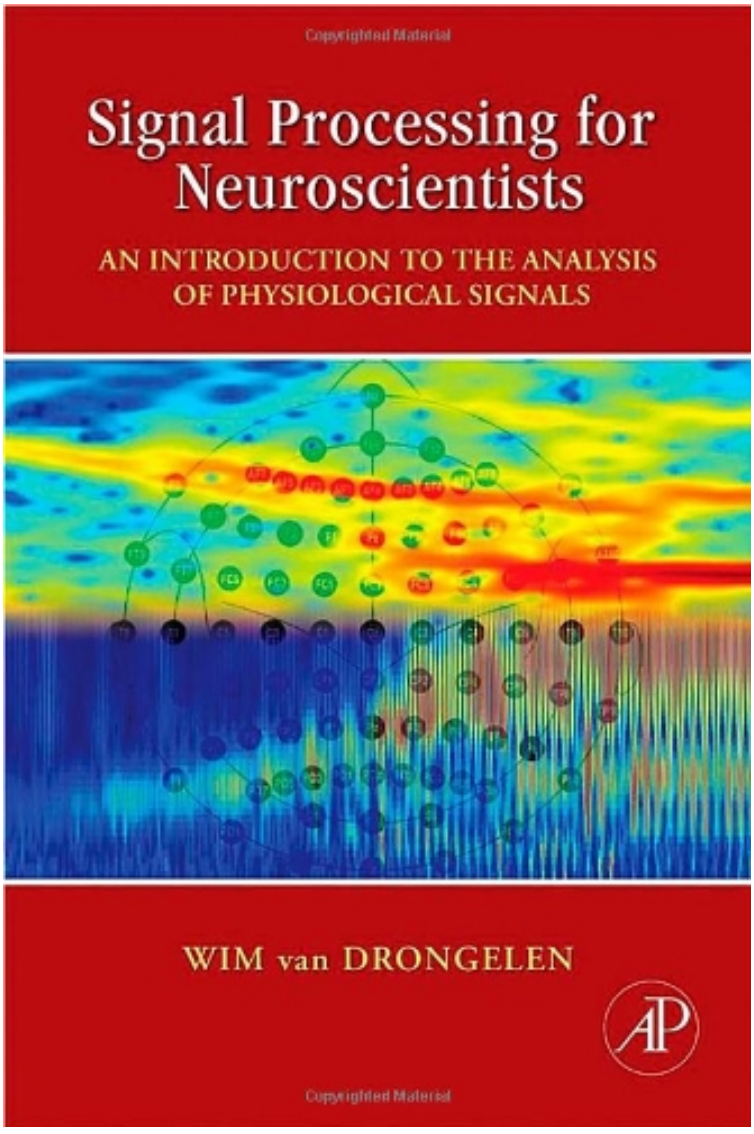

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Wim van Drongelen : Signal Processing for Neuroscientists: An Introduction to the Analysis of Physiological Signals before purchasing it in order to gage whether or not it would be worth my time, and all praised Signal Processing for Neuroscientists: An Introduction to the Analysis of Physiological Signals:

2 of 2 people found the following review helpful. Outstanding if you're up on your ODEsBy Let's Compare Options

PreptorialI'm an EE who writes domain specific languages for robotics, and also works in medical devices. I've worked in Neuro a LOT but am not a Neurologist. From an Engineering viewpoint, signal processing is about analyzing, transforming and designing time and/or frequency based signals. The two major "divisions" of the field include analog and digital. The major "tools" are advanced statistics (read: sampling), transforms and filters.This book attempts to put mostly DSP in biological frames with EEG type examples for the harmonics. If you're either a neuro person who is up on ordinary differential equations (a little pdes don't hurt), or you've taken EE courses in SP, you will LOVE this text. In an ironic sense, biological neural and synaptic nets are "sortof" analog, whereas SP is now heavily digital. Over a decade ago some of Neurology started to analyze spiking and other neuronal systems via dynamical systems models-- meaning differential equations, and if you're a part of that group, this book will be wonderful for you.If you are very rusty on calculus, haven't done any linear algebra, and no ODEs/PDEs, and especially if you're an autodidact, I'd pick up one of the inexpensive Dover intros to Fourier transforms, odes and pdes before tackling this. You can get some of these for as little as $3 US. BTW, this book also has a number of amazing new and used "deals" and I've seen it new for as low as $35 US, so SHOP it, especially via third parties and at Abe Books.I worked at GE in MRI and NMR for a while and took a number of neural imaging physics classes. In addition to the signal processing features of neural rhythms and spikes themselves, many measurement and research technologies are also SP based, eg. ASP- RF in the case of MRI. Matlab or its GNU free version are musts for those studies, and this fine text. Again, if you haven't worked with Matlab, you won't learn it with this text, and will get lost quickly. There are a number of inexpensive Matlab books, one specifically for neuro (MATLAB for Neuroscientists, Second Edition: An Introduction to Scientific Computing in MATLAB) if you find it used, and you'll need to brush up on the user interface. There are many online tutorials on it, and numerous books on the GNU version here on also.If you can't find a good Matlab prep text, this is the best one I've read, used and found that is up to date and reasonably priced: Matlab, Third Edition: A Practical Introduction to Programming and Problem Solving. You don't really need the "neuro" version if you get Dr. Stormy's fine text.The Matlab code in this text is at about 95% usable right out of the book. That is astonishing for a text, and some of the code runs the first time! Unheard of in most of the texts you get today that are rushed to press. Highly recommended with the right background or pre-reading/ supplementary prep.1 of 1 people found the following review helpful. Intuitive approach to signal analysisBy SpellkingExcellently laid out; a very instructive book. However, the figures of the book are annoyingly in black/white. I took the course taught by the author of this book, and he explained that it was decision made by the publishers and was out of his control, but to address the issue, he made the color figures as well as his programs freely available from his website. Again, excellent book and excellent instructor.5 of 5 people found the following review helpful. Useful.By High DefinitionThis book contains useful exercises and demonstrations of MATLAB code that are worth looking at. Overall, I think it covers the major topics and does a decent job fulfilling that purpose.Having said that, however, the language of the book is not reader-friendly. It's not to say that we aren't dealing with advanced material here, because it wasn't intended for the beginner. Don't expect that you'll just be able to pick up the text and read it without any prior knowledge.I would have given this book an additional star, however, there are some errors of calculation in the beginning exercises. If you are the advanced reader, you'll pick up on these--someone other than myself actually picked up on these, so don't just take the calculation and their end result to be the answer--as always, be cautious when you read.

Signal Processing for Neuroscientists introduces analysis techniques primarily aimed at neuroscientists and biomedical engineering students with a reasonable but modest background in mathematics, physics, and computer programming. The focus of this text is on what can be considered the golden trio in the signal processing field: averaging, Fourier analysis, and filtering. Techniques such as convolution, correlation, coherence, and wavelet analysis are considered in the context of time and frequency domain analysis. The whole spectrum of signal analysis is covered, ranging from data acquisition to data processing; and from the mathematical background of the analysis to the practical application of processing algorithms. Overall, the approach to the mathematics is informal with a focus on basic understanding of the methods and their interrelationships rather than detailed proofs or derivations. One of the principle goals is to provide the reader with the background required to understand the principles of commercially available analyses software, and to allow him/her to construct his/her own analysis tools in an environment such as MATLAB.Multiple color illustrations are integrated in the textIncludes an introduction to biomedical signals, noise characteristics, and recording techniquesBasics and background for more advanced topics can be found in extensive notes and appendicesA Companion Website hosts the MATLAB scripts and several data files: http://www.elsevierdirect.com/companion.jsp?ISBN=9780123708670

About the AuthorWim van Drongelen studied Biophysics at the University Leiden, The Netherlands. After a period in the Laboratoire d'Electrophysiologie, Universit Claude Bernard, Lyon, France, he received the Doctoral degree cum laude. In 1980 he received the Ph.D. degree. He worked for the Netherlands Organization for the Advancement of Pure Research (ZWO) in the Department of Animal Physiology, Wageningen, The Netherlands. He lectured and founded a Medical Technology Department at the HBO Institute Twente, The Netherlands. In 1986 he joined the

Benelux office of Nicolet Biomedical as an Application Specialist and in 1993 he relocated to Madison, WI, USA where he was involved in research and development of equipment for clinical neurophysiology and neuromonitoring. In 2001 he joined the Epilepsy Center at The University of Chicago, Chicago, IL, USA. Currently he is Professor of Pediatrics, Neurology, and Computational Neuroscience. In addition to his faculty position he serves as Technical and Research Director of the Pediatric Epilepsy Center and he is Senior Fellow with the Computation Institute. Since 2003 he teaches applied mathematics courses for the Committee on Computational Neuroscience. His ongoing research interests include the application of signal processing and modeling techniques to help resolve problems in neurophysiology and neuropathology. For details of recent work see http://epilepsylab.uchicago.edu/Wim van Drongelen studied Biophysics at the University Leiden, The Netherlands. After a period in the Laboratoire d'Electrophysiologie, Universit Claude Bernard, Lyon, France, he received the Doctoral degree cum laude. In 1980 he received the Ph.D. degree. He worked for the Netherlands Organization for the Advancement of Pure Research (ZWO) in the Department of Animal Physiology, Wageningen, The Netherlands. He lectured and founded a Medical Technology Department at the HBO Institute Twente, The Netherlands. In 1986 he joined the Benelux office of Nicolet Biomedical as an Application Specialist and in 1993 he relocated to Madison, WI, USA where he was involved in research and development of equipment for clinical neurophysiology and neuromonitoring. In 2001 he joined the Epilepsy Center at The University of Chicago, Chicago, IL, USA. Currently he is Professor of Pediatrics, Neurology, and Computational Neuroscience. In addition to his faculty position he serves as Technical and Research Director of the Pediatric Epilepsy Center and he is Senior Fellow with the Computation Institute. Since 2003 he teaches applied mathematics courses for the Committee on Computational Neuroscience. His ongoing research interests include the application of signal processing and modeling techniques to help resolve problems in neurophysiology and neuropathology. For details of recent work see http://epilepsylab.uchicago.edu/