# Python for Probability, Statistics, and Machine Learning

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# Preface

This book will teach you the fundamentals of signal processing via the Python language and its powerful extensions for scientific computing. This is not a good *first* book in signal processing because we assume that you already had a course in signal processing at the undergraduate level. Furthermore, we also assume that you have some basic understanding of the Python language itself, perhaps through an online course (e.g. `codeacademy.com`). Having said that, this book is appropriate if you have a basic background in signal processing and want to learn how to use the scientific Python toolchain. On the other hand, if you are comfortable with Python, perhaps through working in another scientific field, then this book will teach you the fundamentals of signal processing. Likewise, if you are a signal processing engineer using a commercial package (e.g. MATLAB, IDL), then you will learn how to effectively use the scientific Python toolchain by reviewing concepts you are already familiar with.

The unique feature of this book is that everything in it is reproducible using Python. Specifically, all of the code, all of the figures, and (most of) the text is available in the downloadable supplementary materials that correspond to this book in the form of IPython Notebooks. IPython Notebooks are *live* interactive documents that allow you to change parameters, recompute plots, and generally tinker with all of the ideas and code in this book. I urge you to download these IPython Notebooks and follow along with the text to experiment with the signal processing topics covered. As an open source project, the entire scientific Python toolchain, including the IPython Notebook, is freely available. Having taught this material for many years, I am convinced that the only way to learn is to experiment as you go. The text provides instructions on how to get started installing and configuring your scientific Python environment.

This book is not designed to be exhaustive and reflects the author's eclectic background in industry. The focus is on fundamentals for day-

to-day work. Although Python supports many powerful constructs such as decorators, generators, and context-managers, all the code here uses Python in the most straightforward way possible while encouraging good Python coding practices.

# Contents

# Intuition About Probability

# 1

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# References

1. T. E. Oliphant. Python for scientific computing. *Computing in Science & Engineering*, 9, 2007.