# Preface

This book offers a stochastic integral perspective of deep machine learning in artificial intelligence. The organization of the book is presented in the following, from contextualized observations.

*In a stochastic environment, an intelligence integrates on average, by analysis of variance*, *etc.* Chapter 1 introduces the basics of stochastic reasoning and the most useful properties of stochastic processes.

*Mathematical compositions alternating convolutions and nonlinear operators are a powerful framework for generating complex realities.* This is demonstrated in Chapters 2 and 3 using stochastic convolutive models designed with the expertise of natural neurons. More precisely, these chapters provide three original contributions to the construction, analysis and simulation of fractionally integrated stochastic fields.

Chapter 4 shows how some deep artificial neurons can disentangle the very long-range stochastic dependencies created by natural neurons in Chapter 3, when the former neurons are parameterized to integrate spectral responses (invaluable help issued from natural and expert neurons).

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