

《高等概率论》第三次作业

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1. Exercise 16 of subsection 2.6.

证明 根据条件 (a) 和 (b) 知, $\forall A \in \mathcal{B}$, 有

$$P(A) + P(A^c) = P(A \cup A^c) = P(\Omega) = 1$$

即 $P(A^c) = 1 - P(A)$.

$\forall A_i \in \mathcal{B}$, $A_i \cap A_j = \emptyset$, $i \neq j$. 记 $A = (\sum_{i=1}^{\infty} A_i)$, 则 $\sum_{i=1}^{\infty} A_i = \Omega$. 故根据条件 (c) 有:

$$\sum_{i=1}^{\infty} P(A_i) = 1$$

于是,

$$\sum_{i=1}^{\infty} P(A_i) = 1 - P(A^c) = 1 - P(\sum_{i=1}^{\infty} A_i)^c = 1 - [1 - P(\sum_{i=1}^{\infty} A_i)] = P(\sum_{i=1}^{\infty} A_i)$$

故 P 满足 σ -可加性, 因此是一个概率测度.

2. Exercise 23 of subsection 2.6.

证明 (a) 记 $A = \{\omega \in \mathcal{R}^d : x_1 \leq \omega_1\}$, $B = \{\omega \in \mathcal{R}^d : x_2 \leq \omega_2\}$, 则 $A \in \mathcal{R}$, $B \in \mathcal{R}$.

$$A \cap B = \prod_{i=1}^d A_i, \quad A \cap B_1 \cap B_2 \cap \dots \cap B_n = A \cap B_1 \cap \dots \cap B_n,$$

$$A \cap B_1 \cap B_2 \cap \dots \cap B_n = A \cap B_1 \cap \dots \cap B_n, \quad \dots, \quad A \cap B_1 \cap B_2 \cap \dots \cap B_n = A \cap B_1 \cap \dots \cap B_n$$

于是

$$P_1(A \cap B) = \int_{\mathcal{R}^d} \mathbb{1}_A \mathbb{1}_B dP = \int_{\mathcal{R}^d} \mathbb{1}_A \mathbb{1}_B d(P_1 \times P_2) = \int_{\mathcal{R}^d} \mathbb{1}_A dP_1 \int_{\mathcal{R}^d} \mathbb{1}_B dP_2 = \int_{\mathcal{R}^d} \mathbb{1}_A dP_1 \times \int_{\mathcal{R}^d} \mathbb{1}_B dP_2$$

$$= \int_{\mathcal{R}^d} \mathbb{1}_A dP_1 \times [\int_{\mathcal{R}^d} \mathbb{1}_A dP_1 \cap \int_{\mathcal{R}^d} \mathbb{1}_B dP_2] = \int_{\mathcal{R}^d} \mathbb{1}_A dP_1 \times [\int_{\mathcal{R}^d} \mathbb{1}_{A \cap B} dP_1 \cap \int_{\mathcal{R}^d} \mathbb{1}_B dP_2]$$

$$= \int_{\mathcal{R}^d} \mathbb{1}_A dP_1 \times [\int_{\mathcal{R}^d} \mathbb{1}_A dP_1 \cup \int_{\mathcal{R}^d} \mathbb{1}_{A^c} dP_1 \cap \int_{\mathcal{R}^d} \mathbb{1}_B dP_2 \cup \int_{\mathcal{R}^d} \mathbb{1}_{A^c} dP_1 \cap \int_{\mathcal{R}^d} \mathbb{1}_B dP_2]$$

$$= \int_{\mathcal{R}^d} \mathbb{1}_A dP_1 \times [\int_{\mathcal{R}^d} \mathbb{1}_A dP_1 \cup \int_{\mathcal{R}^d} \mathbb{1}_{A^c} dP_1 \cap \int_{\mathcal{R}^d} \mathbb{1}_B dP_2 \cup \dots \cup \int_{\mathcal{R}^d} \mathbb{1}_A dP_1 \cup \int_{\mathcal{R}^d} \mathbb{1}_{A^c} dP_1 \cap \int_{\mathcal{R}^d} \mathbb{1}_B dP_2]$$

(b) 显然 $\forall \omega \in \mathcal{R}^d$, $(-\infty, \omega] \in \mathcal{B}(\mathcal{R}^d) = \sigma\left\{[a, b] : -\infty < a \leq b < \infty, a, b \in \mathcal{R}\right\}$. 因此,

$$\sigma((-\infty, \omega], \omega \in \mathcal{R}^d) \subset \mathcal{B}(\mathcal{R}^d)$$

A Probability Path Solution

A Gutmann



A Probability Path Solution:

Algorithm Design: A Methodological Approach - 150 problems and detailed solutions Patrick Bosc, Marc Guyomard, Laurent Miclet, 2023-01-31 A bestseller in its French edition this book is original in its construction and its success in the French market demonstrates its appeal It is based on three principles 1 An organization of the chapters by families of algorithms exhaustive search divide and conquer etc On the contrary there is no chapter devoted only to a systematic exposure of say algorithms on strings Some of these will be found in different chapters 2 For each family of algorithms an introduction is given to the mathematical principles and the issues of a rigorous design with one or two pedagogical examples 3 For the most part the book details 150 problems spanning seven families of algorithms For each problem a precise and progressive statement is given More importantly a complete solution is detailed with respect to the design principles that have been presented often some classical errors are pointed out Roughly speaking two thirds of the book is devoted to the detailed rational construction of the solutions

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Parallel Problem Solving from Nature - PPSN XIV Julia Handl, Emma Hart, Peter R. Lewis, Manuel López-Ibáñez, Gabriela Ochoa, Ben Paechter, 2016-08-30 This book constitutes the refereed proceedings of the 14th International Conference on Parallel Problem Solving from Nature PPSN 2016 held in Edinburgh UK in September 2016 The total of 93 revised full papers were carefully reviewed and selected from 224 submissions The meeting began with four workshops which offered an ideal opportunity to explore specific topics in intelligent transportation Workshop landscape aware heuristic search natural computing in scheduling and timetabling and advances in multi modal optimization PPSN XIV also included sixteen free tutorials to give us all the opportunity to learn about new aspects gray box optimization in theory theory of evolutionary computation graph based and cartesian genetic programming theory of parallel evolutionary algorithms promoting diversity in evolutionary optimization why and how evolutionary multi objective optimization intelligent systems for smart cities advances on multi modal optimization evolutionary computation in cryptography evolutionary robotics a practical guide to experiment with real hardware evolutionary algorithms and hyper heuristics a bridge between optimization over manifolds and evolutionary computation implementing evolutionary algorithms in the cloud the attainment function approach to performance evaluation in EMO runtime analysis of evolutionary algorithms basic introduction meta model assisted evolutionary optimization The papers are organized in topical sections on adaption self adaption and parameter tuning differential evolution and swarm intelligence

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