STOCHASTIC MODELS IN POPULATION GENETICS

Edited by

WEN-HSIUNG LI

Stochastic Models In Population Genetics

Warren J. Ewens

Stochastic Models In Population Genetics:

Stochastic Models in Population Genetics Wen-Hsiung Li,1977   Stochastic Models in Population Genetics M. Hsiung Li,1977   *Some Stochastic Models in Population Genetics* Susan Joan Michell,1972   **Stochastic Models in Population Genetics** Hilde Maria Jozefa Dominiek Herbots,1994   *Some Stochastic Models in Population Genetics* Ruth Anderson,1979   **Estimation in Stochastic Models for Population Genetics** Mads Sundby Palle,2016   **Stochastic Models in Biology** Narendra S. Goel,Nira Richter-Dyn,2013-10-22 Stochastic Models in Biology describes the usefulness of the theory of stochastic process in studying biological phenomena The book describes analysis of biological systems and experiments though probabilistic models rather than deterministic methods The text reviews the mathematical analyses for modeling different biological systems such as the random processes continuous in time and discrete in state space The book also discusses population growth and extinction through Malthus law and the work of MacArthur and Wilson The text then explains the dynamics of a population of interacting species The book also addresses population genetics under systematic evolutionary pressures known as deterministic equations and genetic changes in a finite population known as stochastic equations The text then turns to stochastic modeling of biological systems at the molecular level particularly the kinetics of biochemical reactions The book also presents various useful equations such as the differential equation for generating functions for birth and death processes The text can prove valuable for biochemists cellular biologists and researchers in the medical and chemical field who are tasked to perform data analysis   On Some Finite Stochastic Models in Population Genetics Albert Charles Trajstman,1973   *Asymptotic Analysis of Some Stochastic Models from Population Dynamics and Population Genetics* Todd Parsons,2012   **Stochastic Models in Population Genetics: the Impact of Selection and Recombination** Rebekka Brink-Spalink,2014 We consider gene genealogies from populations under selective pressure and take into account that genes can be reassembled during the reproduction process due to recombination The main result is the derivation of an approximate distribution of the ancestral relationships of neutral genes in a sample taken out of a population after a so called selective sweep Such a sweep occurs if an advantageous mutation appears in one individual and then spreads in the population such that after some number of generations every individual in the population has this advantageous gene expression at the lo   *Mathematical Population Genetics 1* Warren J. Ewens,2004-01-09 This is the first of a planned two volume work discussing the mathematical aspects of population genetics with an emphasis on evolutionary theory This volume draws heavily from the author s 1979 classic but it has been revised and expanded to include recent topics which follow naturally from the treatment in the earlier edition such as the theory of molecular population genetics   **Some Mathematical Models from Population Genetics** Alison Etheridge,2011-01-05 This work reflects sixteen hours of lectures delivered by the author at the 2009 St Flour summer school in probability It provides a rapid introduction to a range of mathematical models that have their origins in theoretical population genetics The models fall into two classes

forwards in time models for the evolution of frequencies of different genetic types in a population and backwards in time coalescent models that trace out the genealogical relationships between individuals in a sample from the population Some like the classical Wright Fisher model date right back to the origins of the subject Others like the multiple merger coalescents or the spatial Lambda Fleming Viot process are much more recent All share a rich mathematical structure Biological terms are explained the models are carefully motivated and tools for their study are presented systematically

An Introduction to Population Genetics Theory J.F. Crow,2017-01-01 This text book originally published in 1970 presents the field of population genetics starting with elementary concepts and leading the reader well into the field It is concerned mainly with population genetics in a strict sense and deals primarily with natural populations and less fully with the rather similar problems that arise in breading live stock and cul t i vat ed plans The emphasis is on the behavior of genes and population attributes under natural selection where the most important measure is Darwinian fitness This text is intended for graduatestudents and advanced undergraduates in genetics and population biology This book steers a middle course between completely verbal biological arguments and the rigor of the mathematician The first two thirds of the book do not require advanced mathematical background An ordinary knowledge of calculus will suffice The latter parts of the book which deal with population stochastically use more advanced methods **Theoretical Population Genetics** J.S. Gale,2012-12-06 The rise of the neutral theory of molecular evolution seems to have aroused a renewed interest in mathematical population genetics among biologists who are primarily experimenters rather than theoreticians This has encouraged me to set out the mathematics of the evolutionary process in a manner that I hope will be comprehensible to those with only a basic knowledge of calculus and matrix algebra I must acknowledge from the start my great debt to my students Equipped initially with rather limited mathematics they have pursued the subject with much enthusiasm and success This has enabled me to try a number of different approaches over the years I was particularly grateful to Dr L J Eaves and Professor W E Nance for the opportunity to give a one semester course at the Medical College of Virginia and I would like to thank them their colleagues and their students for the many kindnesses shown to me during my visit I have concentrated almost entirely on stochastic topics since these cause the greatest problems for non mathematicians The latter are particularly concerned with the range of validity of formulae A sense of confidence in applying these formulae is almost certainly best gained by following their derivation I have set out proofs in fair detail since in my experience minor points of algebraic manipulation occasionally cause problems To avoid loss of continuity I have sometimes put material in notes at the end of chapters **Population Genetics, Evolution and Gamete Biology** Mr. Rohit Manglik,2024-03-15 EduGorilla Publication is a trusted name in the education sector committed to empowering learners with high quality study materials and resources Specializing in competitive exams and academic support EduGorilla provides comprehensive and well structured content tailored to meet the needs of students across various streams and levels **The Craft of Probabilistic**

Modelling J. Gani,2012-12-06 This book brings together the personal accounts and reflections of nineteen mathematical model builders whose specialty is probabilistic modelling The reader may well wonder why apart from personal interest one should commission and edit such a collection of articles There are of course many reasons but perhaps the three most relevant are i a philosophicaJ interest in conceptual models this is an interest shared by everyone who has ever puzzled over the relationship between thought and reality ii a conviction not unsupported by empirical evidence that probabilistic modelling has an important contribution to make to scientific research and finally iii a curiosity historical in its nature about the complex interplay between personal events and the development of a field of mathematical research namely applied probability Let me discuss each of these in turn Philosophical Abstraction the formation of concepts and the construction of conceptual models present us with complex philosophical problems which date back to Democritus Plato and Aristotle We have all at one time or another wondered just how we think are our thoughts concepts and models of reality approxim tions to the truth or are they simply functional constructs helping us to master our environment Nowhere are these problems more apparent than in mathematical model ling where idealized concepts and constructions replace the imperfect realities for which they stand   The Foundations of Population Genetics Daniel M. Weinreich,2023-08-29 An accessible but rigorous treatment of the theoretical foundations of population genetics Population genetics the branch of evolutionary biology concerned with understanding how and why populations genetic compositions change over time rests on a well developed theoretical foundation that draws on genetics mathematics and computer science This textbook provides an approachable but rigorous treatment for advanced undergraduate and graduate students interested in building a quantitative understanding of the genetics of evolution Existing texts either assume very mathematically advanced readers or avoid much of the underlying theory instead focusing on current methods of data analysis In contrast The Foundations of Population Genetics develops the theory from first principles Requiring only confidence in algebra this self contained student friendly book illustrates the conceptual framework terminology and methods of mathematical modeling It progressively introduces concepts from genetics as needed while emphasizing biological implications throughout As a result readers come away with a deep understanding of the structure of population genetics without needing to master its mathematics Connects theory with the most recent genetic data better than existing texts Features engaging real world examples and extensive original figures Provides dozens of carefully scaffolded questions that deepen the reader s understanding of key concepts Ideal as a succinct reference for established scientists in biology medicine and computer science Instructor resources available   Population Genetics in Forestry Hans-Rolf Gregorius,2013-03-13 When we consider the main object of forestry the tree it immediately becomes clear why experimental population geneticists have been so hesitant in making this object a primary concern of their research Trees are very long living organisms with generation intervals frequently exceeding those of their investigators by multiples They virtually exclude therefore application of the classical methods of population genetics since

these are based on observing genetic structures over generations This situation where the limits set to observation are so severe particularly requires close cooperation between theory and experiment It also requires careful consideration of results obtained for organisms other than trees in order to gain additional insights by comparing the results for trees with those for other organisms Yet the greatest challenge to population and ecological genetics probably originates from the fact that forests are very likely to be the most complex ecosystems of all even in some cases where they are subject to intense management This complexity which equally comprises biotic and abiotic factors varying both in time and space makes extremely high demands on the adaptational capacity and thus flexibility of the carriers of such an ecosystem Longevity combined with immobility during the vegetative phase however appears to contradict the obvious necessity of adaptational flexibility in forest tree populations when compared with short lived and or mobile organisms **Human Population Genetics** P.P. Majumder,2012-12-06 J B S Haldane R A Fisher and Sewall Wright simultaneously and largely independently laid the foundations of population genetics and the mathematical theory of evolution Hal dane was born on November 5 1892 Although he primarily worked at the University College London UCL in 1957 he resigned from the UCL and joined the Indian Statistical Institute Calcutta India as a Research Professor In celebration of his birth centenary the Indian Statistical Institute organized an International Conference on Human Genetics from 15 to 19 December 1992 The prime motive in holding this Conference was to bring together a group of scientists geneticists anthropologists clinicians and statisticians to evaluate the impact of Haldane s contributions to various areas of human genetics and also to review recent developments in the subject Session and lecture themes were so chosen that they covered areas theoretical and applied classical and emerging Speakers were then identified and invited to deliver lectures on these themes Manuscripts of all invited presentations and a selected number of contributed presentations were considered for inclusion in this Proceed ings Volume Each manuscript was reviewed by at least one Conference participant which resulted in revision of several manuscripts and rejection of some This volume is a collection of the manuscripts which have been accepted after the review process The Conference began with the J B S Haldane Centenary Lecture delivered by C R Rao *MATHEMATICAL MODELS OF LIFE SUPPORT SYSTEMS - Volume II* Valeri I. Agoshko , Jean-Pierre Puel,2009-10-10 Mathematical Models of Life Support Systems is a component of Encyclopedia of Mathematical Sciences in which is part of the global Encyclopedia of Life Support Systems EOLSS an integrated compendium of twenty one Encyclopedias The Theme is organized into several topics which represent the main scientific areas of the theme The first topic Introduction to Mathematical Modeling discusses the foundations of mathematical modeling and computational experiments which are formed to support new methodologies of scientific research The succeeding topics are Mathematical Models in Water Sciences Climate Environmental Pollution and Degradation Energy Sciences Food and Agricultural Sciences Population Immunology Medical Sciences and Control of Catastrophic Processes These two volumes are aimed at the following five major target audiences University and College

students Educators Professional practitioners Research personnel and Policy analysts managers and decision makers and NGOs

Unveiling the Power of Verbal Art: An Psychological Sojourn through **Stochastic Models In Population Genetics**

In a global inundated with screens and the cacophony of fast communication, the profound energy and emotional resonance of verbal beauty usually diminish into obscurity, eclipsed by the continuous barrage of sound and distractions. However, set within the musical pages of **Stochastic Models In Population Genetics**, a fascinating work of fictional beauty that impulses with natural feelings, lies an wonderful journey waiting to be embarked upon. Penned with a virtuoso wordsmith, this exciting opus guides visitors on a psychological odyssey, softly revealing the latent possible and profound influence stuck within the complicated internet of language. Within the heart-wrenching expanse of the evocative examination, we can embark upon an introspective exploration of the book is key styles, dissect its charming writing model, and immerse ourselves in the indelible effect it leaves upon the depths of readers souls.

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