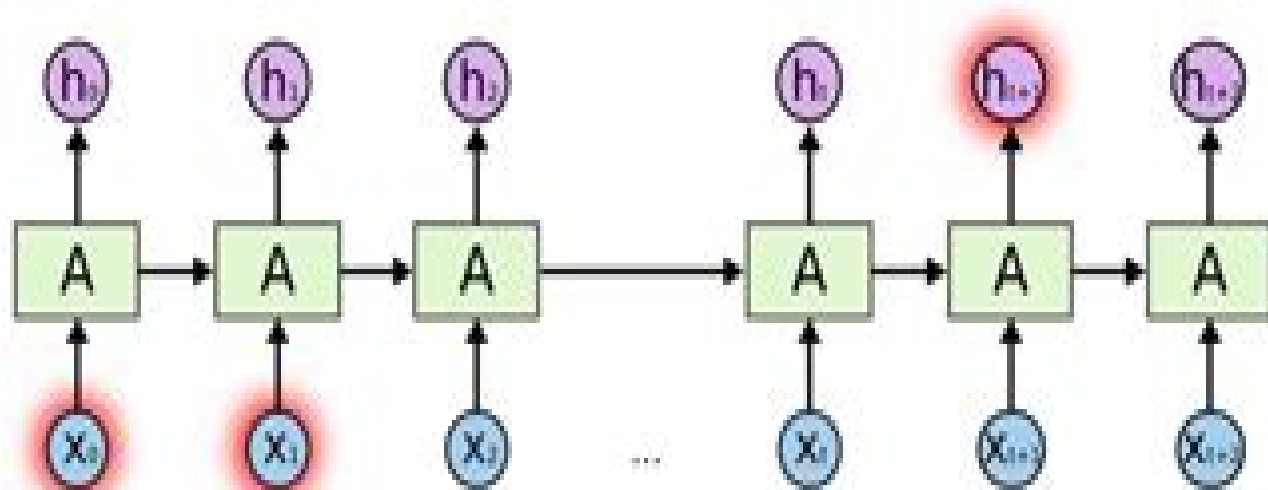
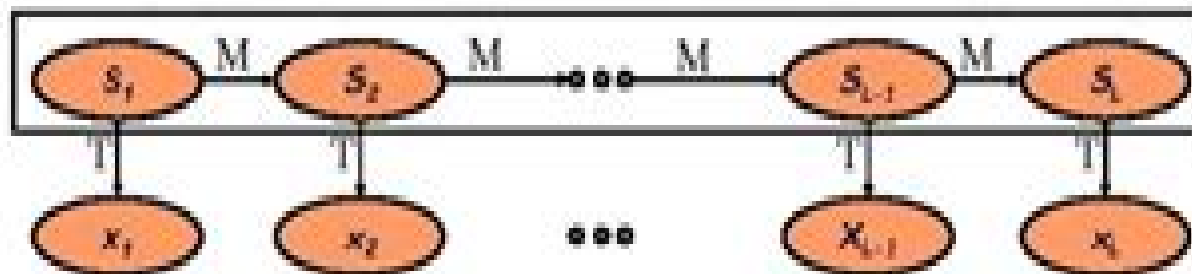




Hidden Markov Model



The Hidden Model

Vlad Stefan Barbu, Nikolaos Limnios



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Hidden Markov Models: Applications In Computer Vision Horst Bunke, Terry Michael Caelli, 2001-06-04 Hidden Markov models HMMs originally emerged in the domain of speech recognition In recent years they have attracted growing interest in the area of computer vision as well This book is a collection of articles on new developments in the theory of HMMs and their application in computer vision It addresses topics such as handwriting recognition shape recognition face and gesture recognition tracking and image database retrieval This book is also published as a special issue of the International Journal of Pattern Recognition and Artificial Intelligence February 2001

Hidden Markov and Other Models for Discrete-valued Time Series Iain L. MacDonald, Walter Zucchini, 1997-01-01 Discrete valued time series are common in practice but methods for their analysis are not well known In recent years methods have been developed which are specifically designed for the analysis of discrete valued time series Hidden Markov and Other Models for Discrete Valued Time Series introduces a new versatile and computationally tractable class of models the hidden Markov models It presents a detailed account of these models then applies them to data from a wide range of diverse subject areas including medicine climatology and geophysics This book will be invaluable to researchers and postgraduate and senior undergraduate students in statistics Researchers and applied statisticians who analyze time series data in medicine animal behavior hydrology and sociology will also find this information useful

Hidden Markov Models João Paulo Coelho, Tatiana M. Pinho, José Boaventura-Cunha, 2019-08-02 This book presents in an integrated form both the analysis and synthesis of three different types of hidden Markov models Unlike other books on the subject it is generic and does not focus on a specific theme e g speech processing Moreover it presents the translation of hidden Markov models concepts from the domain of formal mathematics into computer codes using MATLAB The unique feature of this book is that the theoretical concepts are first presented using an intuition based approach followed by the description of the fundamental algorithms behind hidden Markov models using MATLAB This approach by means of analysis followed by synthesis is suitable for those who want to study the subject using a more empirical approach

Key Selling Points Presents a broad range of concepts related to Hidden Markov Models HMM from simple problems to advanced theory Covers the analysis of both continuous and discrete Markov chains Discusses the translation of HMM concepts from the realm of formal mathematics into computer code Offers many examples to supplement mathematical notation when explaining new concepts

Hidden Markov Models in Finance Rogemar S. Mamon, Robert J. Elliott, 2014-05-14 Since the groundbreaking research of Harry Markowitz into the application of operations research to the optimization of investment portfolios finance has been one of the most important areas of application of operations research The use of hidden Markov models HMMs has become one of the hottest areas of research for such applications to finance This handbook offers systemic applications of different methodologies that have been used for decision making solutions to the financial problems of global markets As the follow up to the authors Hidden Markov

Models in Finance 2007 this offers the latest research developments and applications of HMMs to finance and other related fields Amongst the fields of quantitative finance and actuarial science that will be covered are interest rate theory fixed income instruments currency market annuity and insurance policies with option embedded features investment strategies commodity markets energy high frequency trading credit risk numerical algorithms financial econometrics and operational risk Hidden Markov Models in Finance Further Developments and Applications Volume II presents recent applications and case studies in finance and showcases the formulation of emerging potential applications of new research over the book's 11 chapters This will benefit not only researchers in financial modeling but also others in fields such as engineering the physical sciences and social sciences Ultimately the handbook should prove to be a valuable resource to dynamic researchers interested in taking full advantage of the power and versatility of HMMs in accurately and efficiently capturing many of the processes in the financial market

Mixture and Hidden Markov Models with R Ingmar Visser, Maarten

Speekenbrink, 2022-06-28 This book discusses mixture and hidden Markov models for modeling behavioral data Mixture and hidden Markov models are statistical models which are useful when an observed system occupies a number of distinct regimes or unobserved hidden states These models are widely used in a variety of fields including artificial intelligence biology finance and psychology Hidden Markov models can be viewed as an extension of mixture models to model transitions between states over time Covering both mixture and hidden Markov models in a single book allows main concepts and issues to be introduced in the relatively simpler context of mixture models After a thorough treatment of the theory and practice of mixture modeling the conceptual leap towards hidden Markov models is relatively straightforward This book provides many practical examples illustrating the wide variety of uses of the models These examples are drawn from our own work in psychology as well as other areas such as financial time series and climate data Most examples illustrate the use of the authors depmixS4 package which provides a flexible framework to construct and estimate mixture and hidden Markov models All examples are fully reproducible and the accompanying hmmR package provides all the datasets used as well as additional functionality This book is suitable for advanced students and researchers with an applied background

The

Value of Signals in Hidden Action Models Wendelin Schnedler, 2012-12-06 Since the fundamental work of Walras 1874 markets have received particular attention by economists because they lead to an efficient allocation of goods and services However the proper functioning of markets rests on certain assumptions For instance the good or service which is to be traded must be clearly defined This elementary requirement is often violated in reality in particular when services are concerned Consider the example of railway workers who are hired to lay tracks A labour contract which stipulates a fixed wage and defines the workers task as laying tracks is rather unspecific Workers may profit from this vagueness by reducing effort to a comfortable amount as long as tracks are laid they do not violate contract conditions Thus an imprecise definition of the service can result in inefficiently low efforts An obvious solution to this problem is a clearer definition of the service

but often this way is barred To specify for instance all actions which are involved in laying tracks and which may vary with weather surface and other conditions is far too complicated and too costly In deed labour contracts seldom give a detailed account of the task of a worker Alternatively to a more precise task description the wage of the worker could be conditioned on information about the worker s performance For example the railway workers might be paid by the length of tracks laid so that they are motivated to exert more effort

Semi-Markov Chains and Hidden Semi-Markov Models toward Applications

Vlad Stefan Barbu,Nikolaos Limnios,2009-01-07 Here is a work that adds much to the sum of our knowledge in a key area of science today It is concerned with the estimation of discrete time semi Markov and hidden semi Markov processes A unique feature of the book is the use of discrete time especially useful in some specific applications where the time scale is intrinsically discrete The models presented in the book are specifically adapted to reliability studies and DNA analysis The book is mainly intended for applied probabilists and statisticians interested in semi Markov chains theory reliability and DNA analysis and for theoretical oriented reliability and bioinformatics engineers

Hidden Markov Models for Time Series

Walter Zucchini,Iain L. MacDonald,Roland Langrock,2017-12-19 Hidden Markov Models for Time Series An Introduction Using R Second Edition illustrates the great flexibility of hidden Markov models HMMs as general purpose models for time series data The book provides a broad understanding of the models and their uses After presenting the basic model formulation the book covers estimation forecasting decoding prediction model selection and Bayesian inference for HMMs Through examples and applications the authors describe how to extend and generalize the basic model so that it can be applied in a rich variety of situations The book demonstrates how HMMs can be applied to a wide range of types of time series continuous valued circular multivariate binary bounded and unbounded counts and categorical observations It also discusses how to employ the freely available computing environment R to carry out the computations Features Presents an accessible overview of HMMs Explores a variety of applications in ecology finance epidemiology climatology and sociology Includes numerous theoretical and programming exercises Provides most of the analysed data sets online New to the second edition A total of five chapters on extensions including HMMs for longitudinal data hidden semi Markov models and models with continuous valued state process New case studies on animal movement rainfall occurrence and capture recapture data

Inference in Hidden Markov Models

Olivier Cappé,Eric Moulines,Tobias Ryden,2006-04-12 Hidden Markov models have become a widely used class of statistical models with applications in diverse areas such as communications engineering bioinformatics finance and many more This book is a comprehensive treatment of inference for hidden Markov models including both algorithms and statistical theory Topics range from filtering and smoothing of the hidden Markov chain to parameter estimation Bayesian methods and estimation of the number of states In a unified way the book covers both models with finite state spaces which allow for exact algorithms for filtering estimation etc and models with continuous state spaces also called state space models requiring approximate simulation based algorithms that are also described in detail Simulation

in hidden Markov models is addressed in five different chapters that cover both Markov chain Monte Carlo and sequential Monte Carlo approaches. Many examples illustrate the algorithms and theory. The book also carefully treats Gaussian linear state space models and their extensions and it contains a chapter on general Markov chain theory and probabilistic aspects of hidden Markov models. This volume will suit anybody with an interest in inference for stochastic processes and it will be useful for researchers and practitioners in areas such as statistics, signal processing, communications, engineering, control theory, econometrics, finance and more. The algorithmic parts of the book do not require an advanced mathematical background while the more theoretical parts require knowledge of probability theory at the measure theoretical level. From the reviews: By providing an overall survey of results obtained so far in a very readable manner and also presenting some new ideas, this well written book will appeal to academic researchers in the field of HMMs with PhD students working on related topics included. It will also appeal to practitioners and researchers from other fields by guiding them through the computational steps needed for making inference HMMs and or by providing them with the relevant underlying statistical theory. In the reviewer's opinion, this book will shortly become a reference work in its field. MathSciNet. This monograph is a valuable resource. It provides a good literature review, an excellent account of the state of the art research on the necessary theory and algorithms and ample illustrations of numerous applications of HMM. It goes much beyond the earlier resources on HMM. I anticipate this work to serve well many Technometrics readers in the coming years. Haikady N. Nagaraja for Technometrics, November 2006.

Introduction to Hidden Semi-Markov Models John Van der Hoek, Robert J. Elliott, 2018

Markov chains and hidden Markov chains have applications in many areas of engineering and genomics. This book provides a basic introduction to the subject by first developing the theory of Markov processes in an elementary discrete time finite state framework suitable for senior undergraduates and graduates. The authors then introduce semi Markov chains and hidden semi Markov chains before developing related estimation and filtering results. Genomics applications are modelled by discrete observations of these hidden semi Markov chains. This book contains new results and previously unpublished material not available elsewhere. The approach is rigorous and focused on applications.

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