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Mixture Models and Applications Language Identification Using Gaussian Mixture Models Encyclopedia of Biometrics Mixture Model-Based Classification A Method to Add Gaussian Mixture Models Python Data Science Handbook Grokking Machine Learning Gaussian Mixture Model Based System Identification and Control Machine Learning Local Models and Gaussian Mixture Models for Statistical Data Processing Advances in Artificial Intelligence -- SBIA 2010 Reduced Gaussian Mixture Models for Medical Data Classification Finite Mixture Models Multiresolution Gaussian Mixture Models Indexing and Knowledge Discovery of Gaussian Mixture Models and Multiple-instance Learning Probability Density Imputation of Missing Data with Gaussian Mixture Models The EM Algorithm in Multivariate Gaussian Mixture Models Using Anderson Acceleration Gaussian Mixture Models for Segmentation & Representation with Applications to Face Color & Skin Nevi Representation A Framework Based on Gaussian Mixture Models and Kalman Filters for the Segmentation and Tracking of Anomalous Events in Shipboard Video Incremental Learning of Temporally Coherent Gaussian Mixture Models Tree-based Gaussian Mixture Models for Speaker Verification Speaker Recognition Using Gaussian Mixture Models Anchored Bayesian Gaussian Mixture Models Approximate Inference Using Simplification of Gaussian Mixture Models Gaussian Mixture Models and Neural Networks for Automatic Speaker Identification Estimation of Individual Treatment Effect Via Gaussian Mixture Model Mixture Models Visual Analytics Through Gaussian Mixture Models with Subspace Constrained Component Means Automatic Speech Recognition Mixture Model Averaging for Clustering Unsupervised Seismic Facies Using Gaussian Mixture Models Model-Based Clustering, Classification, and Density Estimation Using mclust in R Data Assimilation with Gaussian Mixture Models Using the Dynamically Orthogonal Field Equations Gaussian Mixture Models for Acoustic Interference Structural, Syntactic, and Statistical Pattern Recognition Improved Multidirectional Gaussian Mixture Models Applied to Probability of Collision of Resident Space Objects Bayesian Networks and Gaussian Mixture Models in Multi-dimensional Data Analysis with Application to Religion-conflict Data Brain Tumor Segmentation Using Bivariate Gaussian Mixture Models Advances in Data Analysis Handbook of Mixture Analysis

A Framework Based on Gaussian Mixture Models and Kalman Filters for the Segmentation and Tracking of Anomalous Events in Shipboard Video Oct 10 2021

Data Assimilation with Gaussian Mixture Models Using the Dynamically Orthogonal Field Equations Jul 27 2020 Data assimilation, as presented in this thesis, is the statistical merging of sparse observational data with computational models so as to optimally improve the probabilistic description of the field of interest, thereby reducing uncertainties. The centerpiece of this thesis is the introduction of a novel such scheme that overcomes prior shortcomings observed within the community. Adopting techniques prevalent in Machine Learning and Pattern Recognition, and building on the foundations of classical assimilation schemes, we introduce the GMM-DO filter: Data Assimilation with Gaussian mixture models using the Dynamically Orthogonal field equations. We combine the use of Gaussian mixture models, the EM algorithm and the Bayesian Information Criterion to accurately approximate distributions based on Monte Carlo data in a framework that allows for efficient Bayesian inference. We give detailed descriptions of each of these techniques, supporting their application by recent literature. One novelty of the GMM-DO filter lies in coupling these concepts with an efficient representation of the evolving probabilistic description of the uncertain

dynamical field: the Dynamically Orthogonal field equations. By limiting our attention to a dominant evolving stochastic subspace of the total state space, we bridge an important gap previously identified in the literature caused by the dimensionality of the state space. We successfully apply the GMM-DO filter to two test cases: (1) the Double Well Diffusion Experiment and (2) the Sudden Expansion fluid flow. With the former, we prove the validity of utilizing Gaussian mixture models, the EM algorithm and the Bayesian Information Criterion in a dynamical systems setting. With the application of the GMM-DO filter to the two-dimensional Sudden Expansion fluid flow, we further show its applicability to realistic test cases of non-trivial dimensionality. The GMMDO filter is shown to consistently capture and retain the far-from-Gaussian statistics that arise, both prior and posterior to the assimilation of data, resulting in its superior performance over contemporary filters. We present the GMM-DO filter as an efficient, data-driven assimilation scheme, focused on a dominant evolving stochastic subspace of the total state space, that respects nonlinear dynamics and captures non-Gaussian statistics, obviating the use of heuristic arguments.

Automatic Speech Recognition Nov 30 2020 This book provides a comprehensive overview of the recent advancement in the field of automatic speech recognition with a focus on deep learning models including deep neural networks and many of their variants. This is the first automatic speech recognition book dedicated to the deep learning approach. In addition to the rigorous mathematical treatment of the subject, the book also presents insights and theoretical foundation of a series of highly successful deep learning models.

Unsupervised Seismic Facies Using Gaussian Mixture Models Sep 28 2020

Finite Mixture Models Apr 16 2022 An up-to-date, comprehensive account of major issues in finitemixture modeling This volume provides an up-to-date account of the theory andapplications of modeling via finite mixture distributions. With anemphasis on the applications of mixture models in both mainstreamanalysis and other areas such as unsupervised pattern recognition,speech recognition, and medical imaging, the book describes theformulations of the finite mixture approach, details itsmethodology, discusses aspects of its implementation, andillustrates its application in many common statisticalcontexts. Major issues discussed in this book include identifiabilityproblems, actual fitting of finite mixtures through use of the EMalgorithm, properties of the maximum likelihood estimators soobtained, assessment of the number of components to be used in themixture, and the applicability of asymptotic theory in providing abasis for the solutions to some of these problems. The author alsoconsiders how the EM algorithm can be scaled to handle the fittingof mixture models to very large databases, as in data miningapplications. This comprehensive, practical guide: * Provides more than 800 references-40% published since 1995 * Includes an appendix listing available mixture software * Links statistical literature with machine learning and patternrecognition literature * Contains more than 100 helpful graphs, charts, and tables Finite Mixture Models is an important resource for both applied andtheoretical statisticians as well as for researchers in the manyareas in which finite mixture models can be used to analyze data.

Python Data Science Handbook Nov 23 2022 For many researchers, Python is a first-class tool mainly because of its libraries for storing, manipulating, and gaining insight from data. Several resources exist for individual pieces of this data science stack, but only with the Python Data Science Handbook do you get them all—IPython, NumPy, Pandas, Matplotlib, Scikit-Learn, and other related tools. Working scientists and data crunchers familiar with reading and writing Python code will find this comprehensive desk reference ideal for tackling day-to-day issues: manipulating, transforming, and cleaning data; visualizing different types of data; and using data to build statistical or machine learning models. Quite simply, this is the must-have reference for scientific computing in Python. With this handbook, you'll learn how to use: IPython and Jupyter: provide computational environments for data scientists using Python NumPy: includes the ndarray for efficient storage and manipulation of dense data arrays in Python Pandas: features the

DataFrame for efficient storage and manipulation of labeled/columnar data in Python Matplotlib: includes capabilities for a flexible range of data visualizations in Python Scikit-Learn: for efficient and clean Python implementations of the most important and established machine learning algorithms *Estimation of Individual Treatment Effect Via Gaussian Mixture Model* Mar 03 2021 In this thesis, we investigate the estimation problem of treatment effect from Bayesian perspective through which one can first obtain the posterior distribution of unobserved potential outcome from observed data, and then obtain the posterior distribution of treatment effect. We mainly consider how to represent a joint distribution of two potential outcomes - one from treated group and another from control group, which can give us an indirect impression of correlation, since the estimation of treatment effect depends on correlation between two potential outcomes. The first part of this thesis illustrates the effectiveness of adapting Gaussian mixture models in solving the treatment effect problem. We apply the mixture models - Gaussian Mixture Regression (GMR) and Gaussian Mixture Linear Regression (GMLR)- as a potentially simple and powerful tool to investigate the joint distribution of two potential outcomes. For GMR, we consider a joint distribution of the covariate and two potential outcomes. For GMLR, we consider a joint distribution of two potential outcomes, which linearly depend on covariate. Through developing an EM algorithm for GMLR, we find that GMR and GMLR are effective in estimating means and variances, but they are not effective in capturing correlation between two potential outcomes. In the second part of this thesis, GMLR is modified to capture unobserved covariance structure (correlation between outcomes) that can be explained by latent variables introduced through making an important model assumption. We propose a much more efficient Pre-Post EM Algorithm to implement our proposed GMLR model with unobserved covariance structure in practice. Simulation studies show that Pre-Post EM Algorithm performs well not only in estimating means and variances, but also in estimating covariance.

Model-Based Clustering, Classification, and Density Estimation Using mclust in R Aug 28 2020 Model-Based Clustering, Classification, and Denisty Estimation Using mclust in R Model-based clustering and classification methods provide a systematic statistical approach to clustering, classification, and density estimation via mixture modeling. The model-based framework allows the problems of choosing or developing an appropriate clustering or classification method to be understood within the context of statistical modeling. The mclust package for the statistical environment R is a widely adopted platform implementing these model-based strategies. The package includes both summary and visual functionality, complementing procedures for estimating and choosing models. Key features of the book: An introduction to the model-based approach and the mclust R package A detailed description of mclust and the underlying modeling strategies An extensive set of examples, color plots, and figures along with the R code for reproducing them Supported by a companion website, including the R code to reproduce the examples and figures presented in the book, errata, and other supplementary material Model-Based Clustering, Classification, and Density Estimation Using mclust in R is accessible to quantitatively trained students and researchers with a basic understanding of statistical methods, including inference and computing. In addition to serving as a reference manual for mclust, the book will be particularly useful to those wishing to employ these model-based techniques in research or applications in statistics, data science, clinical research, social science, and many other disciplines.
Brain Tumor Segmentation Using Bivariate Gaussian Mixture Models Feb 20 2020
Structural, Syntactic, and Statistical Pattern Recognition May 25 2020 This volume in the Springer Lecture Notes in Computer Science (LNCS) series contains the papers presented at the S+SSPR 2010 Workshops, which was the seventh occasion that SPR and SSPR workshops have been held jointly. S+SSPR 2010 was organized by TC1 and TC2, Technical Committees of the International Association for Pattern Recognition(IAPR), andheld inCesme, Izmir, whichis a seaside resort on the Aegean

coast of Turkey. The conference took place during August 18–20, 2010, only a few days before the 20th International Conference on Pattern Recognition (ICPR) which was held in Istanbul. The aim of the series of workshops is to create an international forum for the presentation of the latest results and exchange of ideas between researchers in the ?elds of statistical and structural pattern recognition. SPR 2010 and SSPR 2010 received a total of 99 paper submissions from many di?erent countries around the world, giving it a truly international perspective, as has been the case for previous S+SSPR workshops. This volume contains 70 accepted papers, 39 for oral and 31 for poster presentation. In addition to par- lel oral sessions for SPR and SSPR, there were two joint oral sessions of interest to both SPR and SSPR communities. Furthermore, to enhance the workshop experience, there were two joint panel sessions on “Structural Learning” and “Clustering,” in which short author presentations were followed by discussion. Another innovation this year was the ?lming of the proceedings by Videol- tures.

Gaussian Mixture Model Based System Identification and Control Sep 21 2022 ABSTRACT: In this dissertation, we present a methodology of combining an improved Gaussian mixture models (GMM) with local linear models (LLM) for dynamical system identification and robust predictive model control. In order to understand the advantage of the mixture model, its structure and training are discussed in detail. A growing self-organizing map is utilized to improve the random initialization of mixture models, which makes the GMM convergence more stable. To increase local modeling capability and decrease modeling error, local linear models are trained based on GMM as one-step predictors. Following the local modeling approach, a series of controllers are designed to realize a tracking application, among which the optimal robust control shows better robustness over other controllers. Five application systems with different dynamics are simulated in order to verify the modeling and control capability of the improved Gaussian mixture model. Through experiments and comparison with self-organizing maps, radial basis functions, and other methodologies, it is shown that the improved GMM-LLM approach is a more flexible modeling approach with higher computation efficiency than its competitors. The Gaussian model algorithm shares with the self-organizing maps the ease of robust controllers design.

Gaussian Mixture Models for Segmentation & Representation with Applications to Face Color & Skin Nevi Representation Nov 11 2021

Multiresolution Gaussian Mixture Models Mar 15 2022

Language Identification Using Gaussian Mixture Models Mar 27 2023

Probability Density Imputation of Missing Data with Gaussian Mixture Models Jan 13 2022

Gaussian Mixture Models for Acoustic Interference Jun 25 2020 This report discusses the use of Gaussian mixture models to describe the noise generated by a nearby ship. The investigation consists of an analysis of selected hydrophone experimental data to determine its statistical characteristics and of simulations of the power variations expected at a hydrophone within the deep sound channel due to the motion of a source relative to the hydrophone. Gaussian mixture models, Acoustic interference.

Machine Learning Aug 20 2022 Machine learning, one of the top emerging sciences, has an extremely broad range of applications. However, many books on the subject provide only a theoretical approach, making it difficult for a newcomer to grasp the subject material. This book provides a more practical approach by explaining the concepts of machine learning algorithms and describing the areas of application for each algorithm, using simple practical examples to demonstrate each algorithm and showing how different issues related to these algorithms are applied.

Mixture Model-Based Classification Jan 25 2023 "This is a great overview of the field of model-based clustering and classification by one of its leading developers. McNicholas provides a resource that I am certain will be used by researchers in statistics and related disciplines for quite some time. The discussion of mixtures with heavy tails and asymmetric distributions will place this text as the authoritative, modern reference in the mixture modeling literature." (Douglas Steinley, University of Missouri)

Mixture Model-Based Classification is the first monograph devoted to mixture model-based approaches to clustering and classification. This is both a book for established researchers and newcomers to the field. A history of mixture models as a tool for classification is provided and Gaussian mixtures are considered extensively, including mixtures of factor analyzers and other approaches for high-dimensional data. Non-Gaussian mixtures are considered, from mixtures with components that parameterize skewness and/or concentration, right up to mixtures of multiple scaled distributions. Several other important topics are considered, including mixture approaches for clustering and classification of longitudinal data as well as discussion about how to define a cluster Paul D. McNicholas is the Canada Research Chair in Computational Statistics at McMaster University, where he is a Professor in the Department of Mathematics and Statistics. His research focuses on the use of mixture model-based approaches for classification, with particular attention to clustering applications, and he has published extensively within the field. He is an associate editor for several journals and has served as a guest editor for a number of special issues on mixture models.

Improved Multidirectional Gaussian Mixture Models Applied to Probability of Collision of Resident Space Objects Apr 23 2020 As the number of Resident Space Objects (RSOs) in Earth Orbit continues to rise by not only increased trackability but also an unprecedented number of commercial launches, conjunction assessment (CA) remains a paramount issue. Maintaining accuracy in probability of collision calculations is specifically of interest because any disparity will cause operators and analysts to lose trust, dismantling the entire CA system. Methods of state uncertainty propagation remain the most tractable way of controlling computational efficiency vs. accuracy. Gaussian Mixture Models (GMMs) have recently been used as an approach to maintain accuracy while decreasing the amount of computation time when compared to a Monte Carlo approach. These GMMs are able to represent the initial probability distribution function (pdf) as a weighted combination of individual Gaussian distributions. When propagated through a nonlinear function, such as the orbital equations of motion, higher order effects are maintained. How that initial pdf is split into a convolution of pdfs is the focus of this and current research. Multidirectional GMMs allow for the pdf to be split along directions of highest nonlinearity in a recursive manner. This study improves on this method by evaluating the directions at every split of every Gaussian mixture and also taking into account the weight of that Gaussian mixture. Equinoctial elements are also explored as a potential element space to perform the splitting due their ability to maintain linearity during propagation. Results show that these improved methods are able to capture the majority of the nonlinear effects very well with relatively few GMs, and therefore can generate accurate Pc calculations, but fail to converge to the exact Monte Carlo value as more mixtures are added in a reasonable time. This is still of use to get within 5% of the Monte Carlo value with very few propagations in highly nonlinear encounters

Incremental Learning of Temporally Coherent Gaussian Mixture Models Sep 09 2021

Handbook of Mixture Analysis Dec 20 2019 Mixture models have been around for over 150 years, and they are found in many branches of statistical modelling, as a versatile and multifaceted tool. They can be applied to a wide range of data: univariate or multivariate, continuous or categorical, cross-sectional, time series, networks, and much more. Mixture analysis is a very active research topic in statistics and machine learning, with new developments in methodology and applications taking place all the time. The Handbook of Mixture Analysis is a very timely publication, presenting a broad overview of the methods and applications of this important field of research. It covers a wide array of topics, including the EM algorithm, Bayesian mixture models, model-based clustering, high-dimensional data, hidden Markov models, and applications in finance, genomics, and astronomy. Features: Provides a comprehensive overview of the methods and applications of mixture modelling and analysis Divided into three parts: Foundations and Methods; Mixture Modelling and Extensions; and Selected Applications Contains many worked examples using real data, together with

computational implementation, to illustrate the methods described Includes contributions from the leading researchers in the field The Handbook of Mixture Analysis is targeted at graduate students and young researchers new to the field. It will also be an important reference for anyone working in this field, whether they are developing new methodology, or applying the models to real scientific problems.

Bayesian Networks and Gaussian Mixture Models in Multi-dimensional Data Analysis with Application to Religion-conflict Data Mar 23 2020 This thesis examines the application of statistical signal processing approaches to data arising from surveys intended to measure psychological and sociological phenomena underpinning human social dynamics. The use of signal processing methods for analysis of signals arising from measurement of social, biological, and other non-traditional phenomena has been an important and growing area of signal processing research over the past decade. Here, we explore the application of statistical modeling and signal processing concepts to data obtained from the Global Group Relations Project, specifically to understand and quantify the effects and interactions of social psychological factors related to intergroup conflicts. We use Bayesian networks to specify prospective models of conditional dependence. Bayesian networks are determined between social psychological factors and conflict variables, and modeled by directed acyclic graphs, while the significant interactions are modeled as conditional probabilities. Since the data are sparse and multi-dimensional, we regress Gaussian mixture models (GMMs) against the data to estimate the conditional probabilities of interest. The parameters of GMMs are estimated using the expectation-maximization (EM) algorithm. However, the EM algorithm may suffer from over-fitting problem due to the high dimensionality and limited observations entailed in this data set. Therefore, the Akaike information criterion (AIC) and the Bayesian information criterion (BIC) are used for GMM order estimation. To assist intuitive understanding of the interactions of social variables and the intergroup conflicts, we introduce a color-based visualization scheme. In this scheme, the intensities of colors are proportional to the conditional probabilities observed.

Mixture Model Averaging for Clustering Oct 30 2020

Advances in Artificial Intelligence -- SBIA 2010 Jun 18 2022 The SBIA conference series started in 1984 at the Federal University of Rio Grande do Sul (UFRGS) and through the years has bene?ted the Arti?cial Intelligence and Computer Science communities in Brazil. After 26 years and 20 conferences SBIA is now a mature event, constituting a discussion forum for new ideas in all sub-areas of AI. In this book you will ?nd the full papers selected for publication in the SBIA 2010 proceedings. The papers cover the AI sub-areas in the following way: – Ontologies, Knowledge Representation, and Reasoning: 8 – Machine Learning: 2 – Autonomous Agents and Multiagent Systems: 6 – Natural Language Processing: 2 – Planning and Scheduling: 5 – Logics for AI: 3 – Constraints and Search: 5 We would like to thank all the authors that contributed to SBIA 2010. We also thank all the members of the international Program Committee and the additional reviewers, who did an excellent job in reviewing the papers. We are very grateful to Flavio Tonidandel, General Chair of SBIA 2010 and of the Joint SBIA/SBRN/JRI 2010 Conference, for all the support that he and his team at FEI provided. Yoav Shoham, Jaime Sichman, and David Hogg were the keynote speakers of the event. We thank them very much for their acceptance of the invitation. A special acknowledgement is due to Tiago Thompsen Primo, for his de- cated e?ort in the editing of these proceedings. Finally, we thank the SBIA 2010 sponsors (CAPES, CNPq, FAPESP, and SBC) for their support.

Reduced Gaussian Mixture Models for Medical Data Classification May 17 2022

The EM Algorithm in Multivariate Gaussian Mixture Models Using Anderson Acceleration Dec 12 2021 Abstract: Over the years analysts have used the EM algorithm to obtain maximum likelihood estimates from incomplete data for various models. The general algorithm admits several appealing properties such as strong global convergence; however, the rate of convergence is linear which in some cases may be unacceptably slow. This work is

primarily concerned with applying Anderson acceleration to the EM algorithm for Gaussian mixture models (GMM) in hopes of alleviating slow convergence. As preamble we provide a review of maximum likelihood estimation and derive the EM algorithm in detail. The iterates that correspond to the GMM are then formulated and examples are provided. These examples show how faster convergence is experienced when the data are well separated, whereas much slower convergence is seen whenever the sample is poorly separated. The Anderson acceleration method is then presented, and its connection to the EM algorithm is discussed. The work is then concluded by applying Anderson acceleration to the EM algorithm which results in reducing the number of iterations required to obtain convergence.

A Method to Add Gaussian Mixture Models Dec 24 2022

Speaker Recognition Using Gaussian Mixture Models Jul 07 2021

Visual Analytics Through Gaussian Mixture Models with Subspace Constrained Component Means Jan 01 2021 We develop a new method for high dimensional data visualization via the Gaussian mixture model (GMM) with the component means constrained in a pre-selected subspace. An EM-type estimation algorithm is derived. We prove that the subspace containing the component means of a GMM with a common covariance matrix also contains the class means and the modes of the density. This motivates us to find a subspace by applying weighted principal component analysis to the class means and the modes. A dimension reduction property is proved in the sense of being informative for classification or clustering. Experiments on real data sets indicate that our method with the simple technique of spanning the subspace only by class means often outperforms the reduced rank mixture discriminant analysis (MDA) when the subspace dimension is very low. Visualization results on independent test data show that our proposed method exhibits more distinct class-wise separation of high dimensional data in 2d or 3d subspaces in comparison with reduced rank MDA.

Gaussian Mixture Models and Neural Networks for Automatic Speaker Identification Apr 04 2021

Mixture Models Feb 02 2021

Approximate Inference Using Simplification of Gaussian Mixture Models May 05 2021

Mixture Models and Applications Apr 28 2023 This book focuses on recent advances, approaches, theories and applications related to mixture models. In particular, it presents recent unsupervised and semi-supervised frameworks that consider mixture models as their main tool. The chapters considers mixture models involving several interesting and challenging problems such as parameters estimation, model selection, feature selection, etc. The goal of this book is to summarize the recent advances and modern approaches related to these problems. Each contributor presents novel research, a practical study, or novel applications based on mixture models, or a survey of the literature. Reports advances on classic problems in mixture modeling such as parameter estimation, model selection, and feature selection; Present theoretical and practical developments in mixture-based modeling and their importance in different applications; Discusses perspectives and challenging future works related to mixture modeling.

Tree-based Gaussian Mixture Models for Speaker Verification Aug 08 2021

Encyclopedia of Biometrics Feb 26 2023 With an A–Z format, this encyclopedia provides easy access to relevant information on all aspects of biometrics. It features approximately 250 overview entries and 800 definitional entries. Each entry includes a definition, key words, list of synonyms, list of related entries, illustration(s), applications, and a bibliography. Most entries include useful literature references providing the reader with a portal to more detailed information.

Grokking Machine Learning Oct 22 2022 Grokking Machine Learning presents machine learning algorithms and techniques in a way that anyone can understand. This book skips the confused academic jargon and offers clear explanations that require only basic algebra. As you go, you'll build interesting projects with Python, including models for spam detection and image recognition. You'll also pick up practical skills for cleaning and preparing data.

Indexing and Knowledge Discovery of Gaussian Mixture Models and Multiple-instance Learning

Feb 14 2022
Local Models and Gaussian Mixture Models for Statistical Data Processing Jul 19 2022 *Advances in Data Analysis* Jan 21 2020 This book focuses on exploratory data analysis, learning of latent structures in datasets, and unscrambling of knowledge. Coverage details a broad range of methods from multivariate statistics, clustering and classification, visualization and scaling as well as from data and time series analysis. It provides new approaches for information retrieval and data mining and reports a host of challenging applications in various fields. Anchored Bayesian Gaussian Mixture Models Jun 06 2021 Several basic properties of the anchor model are derived. These properties depend heavily on the choice of anchor points, the best of which is not obvious because of the large number of possible combinations. Two computationally feasible approaches for selecting anchor points are presented that promote separation among the marginal posterior distributions of the component-specific parameters, a property that is closely associated with the model's goodness of fit. The first approach seeks to find anchor points that maximize the prior information about the component labeling induced by the anchor points. The second approach focuses on producing unimodal posterior distributions for the component-specific parameters by finding an anchor model that maximizes a lower bound on the posterior density at a local mode. The performance of the model is demonstrated on examples of real and simulated data and compared to popular relabeling methods.

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