



Blind Speech Separation

Vishaal Madanagopal



Blind Speech Separation:

Blind Speech Separation Shoji Makino, Te-Won Lee, Hiroshi Sawada, 2007-09-07 We are surrounded by sounds. Such a noisy environment makes it difficult to obtain desired speech and it is difficult to converse comfortably there. This makes it important to be able to separate and extract a target speech signal from noisy observations for both man-machine and human-human communication. Blind source separation (BSS) is an approach for estimating source signals using only information about their mixtures observed in each input channel. The estimation is performed without possessing information on each source such as its frequency characteristics and location or on how the sources are mixed. The use of BSS in the development of comfortable acoustic communication channels between humans and machines is widely accepted. Some books have been published on BSS, independent component analysis (ICA) and related subjects. There, ICA-based BSS has been well studied in the statistics and information theory fields for applications to a variety of disciplines including wireless communication and biomedicine. However, as speech and audio signal mixtures in a real reverberant environment are generally convolutive mixtures, they involve a structurally much more challenging task than instantaneous mixtures, which are prevalent in many other applications.

Blind Speech Separation in Distant Speech Recognition Front-end Processing Rahil Mahdian Toroghi, 2016 *Fast Convolutive Blind Speech Separation Via Subband Adaptation* François Duplessis-Beaulieu, 2002 An implementation of a subband-based BSS system using DFT filter banks is described and an adaptive algorithm tailored for subband separation is developed. Aliasing present in the filter bank due to the non-ideal frequency response of the filters is reduced by using an oversampled scheme. Experiments conducted with two input two output BSS systems using both subband and fullband adaptation indicate that separation and distortion rates are similar for both systems. However, the proposed 32 subband system is approximately 10 times computationally faster than the fullband system.

Efficient Blind Speech Signal Separation Using Independent Component Analysis Qiongfeng Pan, 2006 **Blind Convolutive Stereo Speech Separation and Dereverberation** Atiyeh Alinaghi, 2017 **Blind Source Separation** Ganesh R. Naik, Wenwu Wang, 2014-05-21 Blind Source Separation intends to report the new results of the efforts on the study of Blind Source Separation (BSS). The book collects novel research ideas and some training in BSS, independent component analysis (ICA), artificial intelligence and signal processing applications. Furthermore, the research results previously scattered in many journals and conferences worldwide are methodically edited and presented in a unified form. The book is likely to be of interest to university researchers. R. Dr. Wenwu Wang works at University of Surrey, UK.

Blind Convolutive Speech Separation and Dereverberation Tariqullah Jan, 2012 Extraction of a target speech signal from the convolutive mixture of multiple sources observed in a cocktail party environment is a challenging task, especially when the room acoustic effects and background noise are present in the environment. Such acoustic distortions may further degrade the separation performance of many existing source separation algorithms. Algorithmic solutions to this problem are likely to have strong impact on many

applications including automatic speech recognition hearing aids and cochlear implants and human machine interaction In such applications to extract the target speech it is usually required to deal with not only the interfering sound but also the room reverberations and background noise To address this problem several methods are developed in this thesis For the blind separation of a target speech signal from the convolutive mixture a multistage algorithm is proposed in which a convolutive independent component analysis ICA algorithm is applied to the mixture followed by the estimation of an ideal binary mask IBM from the separated sources obtained with the convolutive ICA algorithm In the last step the errors introduced due to estimation of the IBM are reduced by cepstral smoothing The separation performance of the above algorithm however deteriorates with the increase in surface reflections and background noise within the room environment Two different methods are therefore developed to reduce such effects In the first method which is also a multistage method acoustic effects and background noise are treated together using an empirical mode decomposition EMD based algorithm The noisy reverberant speech is decomposed adaptively into oscillatory components called intrinsic mode functions IMFs via an EMD algorithm Denoising is then applied to selected high frequency IMFs using an EMD based minimum mean squared error MMSE filter followed by spectral subtraction of the resulting denoised high and low frequency IMFs The second method is a two stage dereverberation algorithm in which the smoothed spectral subtraction mask based on a frequency dependent model is derived and then applied to the reverberant speech to reduce the effects of late reverberations Wiener filtering is then applied such that the early reverberations are attenuated Finally an algorithm is developed for joint blind separation and blind dereverberation The proposed method consists of a step for the blind estimation of reverberation time RT The method is employed in three different ways Firstly the available mixture signals are used to estimate blindly the RT followed by the dereverberation of the mixture signals Then the separation algorithm is applied to these resultant mixtures Secondly the separation algorithm is applied first to the mixtures followed by the blind dereverberation of the segregated speech signals In the third scheme the separation algorithm is split such that the convolutive ICA is first applied to the mixtures followed by the blind dereverberation of the signals obtained from convolutive ICA Then the T F representation of the dereverberated signals is used to estimate the IBM followed by cepstral smoothing

Machine Audition: Principles, Algorithms and Systems Wang, Wenwu, 2010-07-31 Machine audition is the study of algorithms and systems for the automatic analysis and understanding of sound by machine It has recently attracted increasing interest within several research communities such as signal processing machine learning auditory modeling perception and cognition psychology pattern recognition and artificial intelligence However the developments made so far are fragmented within these disciplines lacking connections and incurring potentially overlapping research activities in this subject area Machine Audition Principles Algorithms and Systems contains advances in algorithmic developments theoretical frameworks and experimental research findings This book is useful for professionals who want an improved understanding about how to design algorithms for

performing automatic analysis of audio signals construct a computing system for understanding sound and learn how to build advanced human computer interactive systems

Time-Domain Beamforming and Blind Source Separation Julien Bourgeois, Wolfgang Minker, 2009-03-30 This book addresses the problem of separating spontaneous multi party speech by way of microphone arrays beamformers and adaptive signal processing techniques It is written in a concise manner and an effort has been made such that all presented algorithms can be straightforwardly implemented by the reader All experimental results have been obtained with real in car microphone recordings involving simultaneous speech of the driver and the co driver

Soundscape Semiotics Hervé Glotin, 2014-03-05 Book Soundscape Semiotics Localization and Categorization is a research publication that covers original research on developments within the Soundscape Semiotics field of study The book is a collection of reviewed scholarly contributions written by different authors Each scholarly contribution represents a chapter and each chapter is complete in itself but related to the major topics and objectives The chapters included in the book are divided in two sections First section Advanced Signal Processing Methodologies for Soundscape Analysis contains 5 chapters and second section Human Hearing Estimations and Cognitive Soundscape Analysis 3 chapters The target audience comprises scholars and specialists in the field

Signal Processing, Image Processing and Pattern Recognition, Dominik Slezak, Sankar Pal, Byeong-Ho Kang, Junzhong Gu, Hideo Kuroda, Tai-hoon Kim, 2009-11-24 As future generation information technology FGIT becomes specialized and fragmented it is easy to lose sight that many topics in FGIT have common threads and because of this advances in one discipline may be transmitted to others Presentation of recent results obtained in different disciplines encourages this interchange for the advancement of FGIT as a whole Of particular interest are hybrid solutions that combine ideas taken from multiple disciplines in order to achieve something more significant than the sum of the individual parts Through such hybrid philosophy a new principle can be discovered which has the propensity to propagate throughout multifaceted disciplines FGIT 2009 was the first mega conference that attempted to follow the above idea of hybridization in FGIT in a form of multiple events related to particular disciplines of IT conducted by separate scientific committees but coordinated in order to expose the most important contributions It included the following international conferences Advanced Software Engineering and Its Applications ASEA Bio Science and Bio Technology BSBT Control and Automation CA Database Theory and Application DTA Disaster Recovery and Business Continuity DRBC published independently Future Generation Communication and Networking FGCN that was combined with Advanced Communication and Networking ACN Grid and Distributed Computing GDC Multimedia Computer Graphics and Broadcasting MulGraB Security Technology SecTech Signal Processing Image Processing and Pattern Recognition SIP and e Service Science and Technology UNESST

Advances in Computing and Communications, Part IV Ajith Abraham, Jaime Lloret Mauri, John Buford, Junichi Suzuki, Sabu M. Thampi, 2011-07-06 This volume is the fourth part of a four volume set CCIS 190 CCIS 191 CCIS 192 CCIS 193 which constitutes the refereed proceedings of the First International Conference on

Computing and Communications ACC 2011 held in Kochi India in July 2011 The 62 revised full papers presented in this volume were carefully reviewed and selected from a large number of submissions The papers are the papers of the Workshop on Cloud Computing Architecture Algorithms and Applications CloudComp2011 of the Workshop on Multimedia Streaming MultiStreams2011 and of the Workshop on Trust Management in P2P Systems IWTMP2PS2011 Computational Intelligence and Information Technology Vinu Das,Nessy Thankachan,2013-01-02 This book constitutes the proceedings of the First International Conference on Computational Intelligence and Information Technology CIIT 2011 held in Pune India in November 2011 The 58 revised full papers 67 revised short papers and 32 poster papers presented were carefully reviewed and selected from 483 initial submissions The papers are contributed by innovative academics and industrial experts in the field of computer science information technology computational engineering mobile communication and security and offer a stage to a common forum where a constructive dialog on theoretical concepts practical ideas and results of the state of the art can be developed **Handbook of Blind Source Separation** Pierre Comon,Christian Jutten,2010-02-17 Edited by the people who were forerunners in creating the field together with contributions from 34 leading international experts this handbook provides the definitive reference on Blind Source Separation giving a broad and comprehensive description of all the core principles and methods numerical algorithms and major applications in the fields of telecommunications biomedical engineering and audio acoustic and speech processing Going beyond a machine learning perspective the book reflects recent results in signal processing and numerical analysis and includes topics such as optimization criteria mathematical tools the design of numerical algorithms convolutive mixtures and time frequency approaches This Handbook is an ideal reference for university researchers R algebraic identification of under determined mixtures time frequency methods Bayesian approaches blind identification under non negativity approaches semi blind methods for communications Shows the applications of the methods to key application areas such as telecommunications biomedical engineering speech acoustic audio and music processing while also giving a general method for developing applications *Blind Source Separation of Speech Signals* Vishaal Madanagopal,2018 Blind source separation is a popular technique which is used in the fields of signal processing audio video and image processing BSS is used to separate the mixed signals with only knowing the mixed signals and knowing very little about original signal characteristics The separated signals should be very good approximations of the source signals In particular the blind source separation algorithm tries to estimate the Mixing Matrix In my thesis I have studied the blind source separation of signals based on its second order statistics The problem of blind source separation is studied considering the following cases when the signal is modelled as non stationary cyclo stationary and quasi stationary A closed form solution to the blind source separation of speech signals considering speech to be a quasi stationary source is studied and implemented **Advanced Intelligent Computing. Theories and Applications** De-Shuang Huang,Martin McGinnity,Laurent Heutte,Xiao-Ping Zhang,2010-08-14 The International Conference on Intelligent Computing ICIC was

formed to provide an annual forum dedicated to the emerging and challenging topics in artificial intelligence machine learning pattern recognition image processing bioinformatics and computational biology It aims to bring together researchers and practitioners from both academia and industry to share ideas problems and solutions related to the multifaceted aspects of intelligent computing ICIC 2010 held in Changsha China August 18 21 2010 constituted the 6th International Conference on Intelligent Computing It built upon the success of ICIC 2009 ICIC 2008 ICIC 2007 ICIC 2006 and ICIC 2005 that were held in Ulsan Korea Shanghai Qingdao Kunming and Hefei China respectively This year the conference concentrated mainly on the theories and methodologies as well as the emerging applications of intelligent computing Its aim was to unify the picture of contemporary intelligent computing techniques as an integral concept that highlights the trends in advanced computational intelligence and bridges theoretical research with applications Therefore the theme for this conference was Advanced Intelligent Computing Technology and Applications Papers focusing on this theme were solicited addressing theories methodologies and applications in science and technology

Efficient Blind Speech Signal Separation Using Independent Component Analysis Qiongfeng Pan, 2006 **IEEE Transactions on Circuits and Systems**, 2006

On-line Blind Signal Separation to Speech Sources Walter Andrés Zuluaga, 2004 **Control and Intelligent Systems**, 2001

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