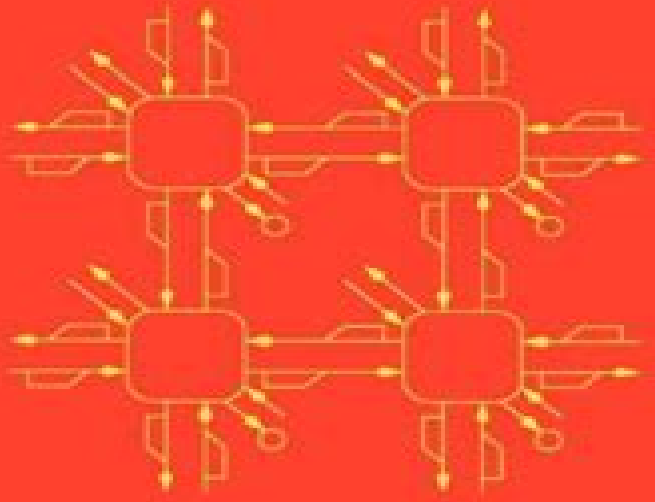
ITERATIVE DETECTION

Adaptivity, Complexity Reduction, and Applications



by
Keith Chugg
Achilleas Anastasopoulos
Xiaopeng Chen

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Iterative Detection

L Darling-Hammond

Iterative Detection:

Iterative Detection Keith Chugg,Achilleas Anastasopoulos,Xiaopeng Chen,2012-12-06 Iterative Detection Adaptivity Complexity Reduction and Applications is a primary resource for both researchers and teachers in the field of communication Unlike other books in the area it presents a general view of iterative detection that does not rely heavily on coding theory or graph theory The features of the text include Both theoretical background and numerous real world applications Over 70 detailed examples 100 problems 180 illustrations tables of notation and acronyms and an extensive bibliography and subject index A whole chapter devoted to a case study on turbo decoder design Receiver design guidelines rules and suggestions The most advanced view of iterative turbo detection based only on block diagrams and standard detection and estimation theory Development of adaptive iterative detection theory Application of adaptive iterative detection to phase and channel tracking in turbo coded systems and systems representative of digital mobile radio designs An entire chapter dedicated to complexity reduction Numerous recent research results Discussion of open problems at the end of each chapter Among the applications considered in this book are joint equalization and decoding turbo codes multiuser detection and decoding broadband wireless channel equalization and applications to two dimensional storage and imaging systems Audience Iterative Detection Adaptivity Complexity Reduction and Applications provides an accessible and detailed reference for researchers practicing engineers and students working in the field of detection and estimation It will be of particular interest to those who would like to learn how iterative detection can be applied to equalization interference mitigation and general signal processing tasks Researchers and practicing engineers interested in learning the turbo decoding algorithm should also have this book

Iterative Detection Keith Chugg,Achilleas Anastasopoulos,Xiaopeng Chen,2001 Iterative Detection Adaptivity Complexity Reduction and Applications is a primary resource for both researchers and teachers in the field of communication Unlike other books in the area it presents a general view of iterative detection that does not rely heavily on coding theory or graph theory The features of the text include Both theoretical background and numerous real world applications Over 70 detailed examples 100 problems 180 illustrations tables of notation and acronyms and an extensive bibliography and subject index A whole chapter devoted to a case study on turbo decoder design Receiver design guidelines rules and suggestions The most advanced view of iterative turbo detection based only on block diagrams and standard detection and estimation theory Development of adaptive iterative detection theory Application of adaptive iterative detection to phase and channel tracking in turbo coded systems and systems representative of digital mobile radio designs An entire chapter dedicated to complexity reduction Numerous recent research results Discussion of open problems at the end of each chapter Among the applications considered in this book are joint equalization and decoding turbo codes multiuser detection and decoding broadband wireless channel equalization and applications to two dimensional storage and imaging systems Audience Iterative Detection Adaptivity Complexity Reduction and Applications provides an accessible and detailed reference for researchers practicing

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Coding and Iterative Detection for Magnetic Recording Channels Zining Wu,2000-01-31 The advent of the internet age has produced enormous demand for in creased storage capacity and for the consequent increases in the amount of information that can be stored in a small space While physical and media improvements have driven the majority of improvement in modern storage systems signal processing and coding methods have increasing ly been used to augment those improvements Run length limited codes and partial response detection methods have come to be the norm in an industry that once rejected any sophistication in the read or write pro cessing circuits VLSI advances now enable increasingly sophisticated signal processing methods for negligible cost and complexity a trend sure to continue even as disk access speeds progress to billions of bits per second and terabits per square inch in the new millennium of the in formation age This new book representing the Ph D dissertation work of Stanford s recent graduate Dr Zining Wu is an up to date and fo cused review of the area that should be of value to those just starting in this area and as well those with considerable expertise The use of saturation recording i e the mandated restriction of two level inputs creates interesting twists on the use of communica tion transmission methods in recording **Conference Proceedings** ,2004 On Iterative Detection for Channels with Memory Gianluigi Ferrari,Università di Pavia,2001 *2002 IEEE International Symposium on Information Theory* ,2002 **Bayesian Inference and Maximum Entropy Methods in Science and Engineering** Ali Mohammad-Djafari,2006-12-13 The MaxEnt workshops are devoted to Bayesian inference and maximum entropy methods in science and engineering In addition this workshop included all aspects of probabilistic inference such as foundations techniques algorithms and applications All papers have been peer reviewed *Iterative Detection for Coded MIMO Systems* Stephan Bäro,2005 Proceedings ,2006 **VLSI Architectures for Turbo Code Decoders, LDPC Code Decoders and List Sphere Decoders** Yuping Zhang,2007 *Iterative Detection for Wireless Communications* Asri Shaheem,2008 Truncated abstract The transmission of digital information over a wireless communication channel gives rise to a number of issues which can detract from the system performance Propagation effects such as multipath fading and intersymbol interference ISI can result in significant performance degradation Recent developments in the field of iterative detection have led to a number of powerful strategies that can be effective in mitigating the detrimental effects of wireless channels In this thesis iterative detection is considered for use in two distinct areas of wireless communications The first considers the iterative decoding of concatenated block codes over slow flat fading wireless channels while the second considers the problem of detection for a coded communications system transmitting over highly dispersive frequency selective wireless channels The iterative decoding of concatenated codes over slow flat fading channels with coherent signalling requires

knowledge of the fading amplitudes known as the channel state information CSI The CSI is combined with statistical knowledge of the channel to form channel reliability metrics for use in the iterative decoding algorithm When the CSI is unknown to the receiver the existing literature suggests the use of simple approximations to the channel reliability metric However these works generally consider low rate concatenated codes with strong error correcting capabilities In some situations the error correcting capability of the channel code must be traded for other requirements such as higher spectral efficiency lower end to end latency and lower hardware cost In particular when the error correcting capabilities of the concatenated code is weak the conventional metrics are observed to fail whereas the proposed metrics are shown to perform well regardless of the error correcting capabilities of the code The effects of ISI caused by a frequency selective wireless channel environment can also be mitigated using iterative detection When the channel can be viewed as a finite impulse response FIR filter the state of the art iterative receiver is the maximum a posteriori probability MAP based turbo equaliser However the complexity of this receiver s MAP equaliser increases exponentially with the length of the FIR channel Consequently this scheme is restricted for use in systems where the channel length is relatively short In this thesis the use of a channel shortening prefilter in conjunction with the MAP based turbo equaliser is considered in order to allow its use with arbitrarily long channels The prefilter shortens the effective channel thereby reducing the number of equaliser states A consequence of channel shortening is that residual ISI appears at the input to the turbo equaliser and the noise becomes coloured In order to account for the ensuing performance loss two simple enhancements to the scheme are proposed The first is a feedback path which is used to cancel residual ISI based on decisions from past iterations The second is the use of a carefully selected value for the variance of the noise assumed by the MAP based turbo equaliser Simulations are performed over a number of highly dispersive channels and it is shown that the proposed enhancements result in considerable performance improvements Moreover these performance benefits are achieved with very little additional complexity with respect to the unmodified channel shortened turbo equaliser Coding and Channel Estimation for Block Fading Channels Salam A. Zummo,2003 **Annales des télécommunications** ,2005 1997 IEEE International Symposium on Information Theory IEEE Information Theory Society,IEEE International Symposium on Information Theory,1997-06 This proceeding covers topics such as universal sourcing code estimation cyclic codes multi user channels synchronization CDMA sequences pattern recognition and estimation and signal processing techniques Applications to communications channels and recovery from faults are described *The Journal of the Acoustical Society of America* Acoustical Society of America,2001 **U.S. Government Research & Development Reports** ,1970 Effective Signal Processing Algorithms for Packet Retransmission Diversity Harvind Singh Samra,2004 *Dissertation Abstracts International* ,2007 **Information Engineering** Robert Mylls,1994-01-11 By revolutionizing the way in which information is collected processed stored and distributed information engineering IE and computer aided software engineering CASE are helping to fuel the race to make

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Parameter Estimation in Model Analysis and Controller Design Hsuehmin Li,1992

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