

# **Automatic Modulation Recognition of Communication Signals**

**Elsayed Elsayed Azzouz and  
Asoke Kumar Nandi**

# Automatic Modulation Recognition Of Communication Signals

**Honghao Gao,Jun Wun,Jianwei  
Yin,Feifei Shen,Yulong Shen,Jun Yu**

## **Automatic Modulation Recognition Of Communication Signals:**

**Automatic Modulation Recognition of Communication Signals** Elsayed Azzouz,A.K. Nandi,2013-04-17 Automatic modulation recognition is a rapidly evolving area of signal analysis In recent years interest from the academic and military research institutes has focused around the research and development of modulation recognition algorithms Any communication intelligence COMINT system comprises three main blocks receiver front end modulation recogniser and output stage Considerable work has been done in the area of receiver front ends The work at the output stage is concerned with information extraction recording and exploitation and begins with signal demodulation that requires accurate knowledge about the signal modulation type There are however two main reasons for knowing the current modulation type of a signal to preserve the signal information content and to decide upon the suitable counter action such as jamming **Automatic Modulation Recognition of Communications Signals** describes in depth this modulation recognition process Drawing on several years of research the authors provide a critical review of automatic modulation recognition This includes techniques for recognising digitally modulated signals The book also gives comprehensive treatment of using artificial neural networks for recognising modulation types **Automatic Modulation Recognition of Communications Signals** is the first comprehensive book on automatic modulation recognition It is essential reading for researchers and practising engineers in the field It is also a valuable text for an advanced course on the subject

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*Radon Transform Based Automatic Modulation Recognition of Communication Signals* Xiang Nan Liu,2000

**Automatic Modulation Classification** Zhechen Zhu,Asoke K. Nandi,2015-02-16 Automatic Modulation Classification

AMC has been a key technology in many military security and civilian telecommunication applications for decades In military and security applications modulation often serves as another level of encryption in modern civilian applications multiple modulation types can be employed by a signal transmitter to control the data rate and link reliability This book offers comprehensive documentation of AMC models algorithms and implementations for successful modulation recognition It provides an invaluable theoretical and numerical comparison of AMC algorithms as well as guidance on state of the art classification designs with specific military and civilian applications in mind Key Features Provides an important collection of AMC algorithms in five major categories from likelihood based classifiers and distribution test based classifiers to feature based classifiers machine learning assisted classifiers and blind modulation classifiers Lists detailed implementation for each algorithm based on a unified theoretical background and a comprehensive theoretical and numerical performance comparison Gives clear guidance for the design of specific automatic modulation classifiers for different practical applications in both civilian and military communication systems Includes a MATLAB toolbox on a companion website offering the implementation of a selection of methods discussed in the book

**Cognitive Radio Oriented Wireless Networks** Ingrid Moerman, Johann Marquez-Barja, Adnan Shahid, Wei Liu, Spilios Giannoulis, Xianjun Jiao, 2019-01-08 This book constitutes the refereed proceedings of the 13th EAI International Conference on Cognitive Radio Oriented Wireless Networks CROWNCOM 2018 held in Ghent Belgium in September 2018 The 20 revised full papers were selected from 26 submissions The papers are organized thematically in tracks Experimental Licensed Shared Access and Dynamic Spectrum Access and PHX and Sensing

**Advances in VLSI, Signal Processing, Power Electronics, IoT, Communication and Embedded Systems** Shubhakar Kalya, Muralidhar Kulkarni, K. S. Shivaprakasha, 2021-04-10 This book comprises select peer reviewed papers from the International Conference on VLSI Signal Processing Power Electronics IoT Communication and Embedded Systems VSPICE 2020 The book provides insights into various aspects of the emerging fields in the areas Electronics and Communication Engineering as a holistic approach The various topics covered in this book include VLSI embedded systems signal processing communication power electronics and internet of things This book mainly focuses on the most recent innovations trends concerns and practical challenges and their solutions This book will be useful for academicians professionals and researchers in the area of electronics and communications and electrical engineering

**Advances in Signal Processing, Embedded Systems and IoT** V.V.S.S.S. Chakravarthy, Vikrant Bhateja, Wendy Flores Fuentes, Jaume Anguera, K. Padma Vasavi, 2023-05-23 The book discusses the latest developments and outlines future trends in the fields of microelectronics electromagnetics and telecommunication It contains original research works presented at the International Conference on Microelectronics Electromagnetics and Telecommunication ICMEET 2022 held in Bheemavaram West Godavari Dist Andhra Pradesh India during 22 23 July 2022 The papers were written by scientists research scholars and practitioners from leading universities engineering colleges and R D institutes from all over the world and share the latest

breakthroughs in and promising solutions to the most important issues facing today's society

**Advances in Intelligent Computing and Communication** Mihir Narayan Mohanty, Swagatam Das, 2022-05-16 The book presents high quality research papers presented at 4th International Conference on Intelligent Computing and Advances in Communication ICAC 2021 organized by Siksha O Anusandhan Deemed to be University Bhubaneswar Odisha India in November 2021 This book brings out the new advances and research results in the fields of theoretical experimental and applied signal and image processing soft computing networking and antenna research Moreover it provides a comprehensive and systematic reference on the range of alternative conversion processes and technologies

**The Proceedings of the Second International Conference on Communications, Signal Processing, and Systems** Baoju Zhang, Jiasong Mu, Wei Wang, Qilian Liang, Yiming Pi, 2014-01-28 The Proceedings of The Second International Conference on Communications Signal Processing and Systems provides the state of art developments of Communications Signal Processing and Systems The conference covered such topics as wireless communications networks systems signal processing for communications This book is a collection of contributions coming out of The Second International Conference on Communications Signal Processing and Systems CSPS held September 2013 in Tianjin China

*Machine Learning and Intelligent Communications* Xuemai Gu, Gongliang Liu, Bo Li, 2018-01-20 This two volume set constitutes the refereed post conference proceedings of the Second International Conference on Machine Learning and Intelligent Communications MLICOM 2017 held in Weihai China in August 2017 The 143 revised full papers were carefully selected from 225 submissions The papers are organized thematically in machine learning intelligent positioning and navigation intelligent multimedia processing and security intelligent wireless mobile network and security cognitive radio and intelligent networking intelligent internet of things intelligent satellite communications and networking intelligent remote sensing visual computing and three dimensional modeling green communication and intelligent networking intelligent ad hoc and sensor networks intelligent resource allocation in wireless and cloud networks intelligent signal processing in wireless and optical communications intelligent radar signal processing intelligent cooperative communications and networking

Automatic Modulation Recognition Using the Discrete Wavelet Transform Tejashri Kuber, 2013 An Automatic Modulation Recognition AMR process using the Discrete Wavelet Transform DWT is presented in this work The AMR algorithm involves the use of wavelet domain signal templates derived from digitally modulated signals that are used to transmit binary data The signal templates locally stored in a receiver are cross correlated with the incoming noisy received signal after it has been transformed into the wavelet domain The signal template that yields the largest cross correlation value determines the type of digital modulation that had been employed at the transmitter The specific binary valued digital modulation schemes considered in this work include BASK BFSK and BPSK The discrete wavelet used for the creation of the signal templates is the Haar or Daubechies 1 wavelet Extensive computer simulations have been performed to evaluate the modulation recognition performance of the AMR algorithm as a function of channel SNR

It has been determined that the rate of correct classification for BASK signals is 68% for an SNR 5 dB and 90% for an SNR 10 dB SNR The rate of correct classification for BFSK signals is 71% for an SNR 5 dB and 92% for an SNR 10 dB Correct classification of BPSK signals is 71% for an SNR 5 dB and 92% for an SNR 10 dB In comparison to alternative AMR methods reported in the literature the AMR algorithm developed in this study produces reliable results even at relatively low values of SNR which are characteristic of realistic communications channels

**Artificial Intelligence and Cybersecurity** Tuomo Sipola, Tero Kokkonen, Mika Karjalainen, 2022-12-07 This book discusses artificial intelligence AI and cybersecurity from multiple points of view The diverse chapters reveal modern trends and challenges related to the use of artificial intelligence when considering privacy cyber attacks and defense as well as applications from malware detection to radio signal intelligence The chapters are contributed by an international team of renown researchers and professionals in the field of AI and cybersecurity During the last few decades the rise of modern AI solutions that surpass humans in specific tasks has occurred Moreover these new technologies provide new methods of automating cybersecurity tasks In addition to the privacy ethics and cybersecurity concerns the readers learn several new cutting edge applications of AI technologies Researchers working in AI and cybersecurity as well as advanced level students studying computer science and electrical engineering with a focus on AI and Cybersecurity will find this book useful as a reference Professionals working within these related fields will also want to purchase this book as a reference

**Communications and Networking** Honghao Gao, Jun Wun, Jianwei Yin, Feifei Shen, Yulong Shen, Jun Yu, 2022-04-04 This proceedings constitutes the refereed proceedings of the 16th International Conference on Communications and Networking ChinaCom 2021 held in November 2021 Due to COVID 19 pandemic the conference was held virtually The 47 full papers and 5 workshop papers presented were carefully selected from 130 submissions The papers are organized in topical sections on Scheduling and Transmission Optimization in Edge Computing Complex System Optimization in Edge Computing Network Communication Enhancement Signal Processing and Communication Optimization Deep Learning and Vehicular Communication Edge Computing and Deep Learning Finite Blocklength and Distributed Machine Learning Deep Learning and Network Performance Optimization Edge Computing and Reinforcement Learning

**CONF-MLA 2024** Mustafa Istanbulu, Anil Fernando, Marwan Omar, 2025-03-11 This book constitutes the thoroughly refereed Proceedings of the 2nd International Conference on Machine Learning and Automation CONF MLA 2024 held in Adana Turkey in November 2024 The 45 full papers presented were carefully reviewed and selected from 102 submissions The papers reflect the conference sessions as follows computing automation machine learning robotics and intelligent systems artificial intelligence and data science

**Eighth International Conference on HF Radio Systems and Techniques, 10-13 July 2000, Venue University of Surrey, Guildford, UK** Institution of Electrical Engineers, 2000 This volume contains the proceedings of the Eighth International Conference on HF Radio Systems and Techniques There are 72 papers altogether

**Modeling and Estimation of Wireless Fading Channels with**

**Applications to Array-based Communication** Ali Abdi,2001      **ACM SIGCOMM '98 Proceedings** Association for Computing Machinery. Special Interest Group on Data Communications,Association for Computing Machinery,1998

*Noise in Communication Systems* Costas N. Georghiadis,Langford B. White,2005 Proceedings of SPIE present the original research papers presented at SPIE conferences and other high quality conferences in the broad ranging fields of optics and photonics These books provide prompt access to the latest innovations in research and technology in their respective fields Proceedings of SPIE are among the most cited references in patent literature      **EEREU Annual**

**Research Journal** Ruyan Guo,W. Kenneth Jenkins,2006-08      *The 10th Institution of Engineering and Technology International Conference on Ionospheric Radio Systems and Techniques* ,2006

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