Fuzzy C Means Algorithm A Review

This book comprises a selection of papers on new methods for analysis and design of hybrid intelligent systems using soft computing techniques from the IFSA 2007 World Congress, held in Cancun, Mexico, June 2007.

Dieses Buch ist das Standardwerk zu einem neuen Bereich der angewandten Fuzzy-Technologie, der Fuzzy-Clusteranalyse. Diese beinhaltet Verfahren der Mustererkennung zur Gruppierung und Strukturierung von Daten. Dabei werden im Gegensatz zu klassischen Clustering-Techniken die Daten nicht eindeutig zu Klassen zugeordnet, sondern Zugehörigkeitsgrade bestimmt, so daß die Fuzzy-Verfahren robust gegenüber gestörten oder verrauschten Daten sind und fließende Klassenübergänge handhaben können. Dieses Werk gibt eine methodische Einführung in die zahlreichen Fuzzy-Clustering-Algorithmen mit ihren Anwendungen in den Bereichen Datenanalyse, Erzeugung von Regeln für Fuzzy-Regler, Klassifikations- und Approximationsprobleme sowie eine ausführliche Darstellung des Shell-Clustering zur Erkennung von geometrischen Konturen in Bildern.

This thesis is concerned with issues related to clustering. In particular, it addresses the con- vergence speed of fuzzy c-means family of algorithms and cluster validation. The fuzzy c-means clustering algorithm and its objective function is studied along with a literature review of the speed of clustering algorithms. After careful examination, several objective functions are derived by modifying the fuzzy c-means' objective function. In addition, cluster validation is examined and new set distance based cluster validation indexes (CVI) are proposed which are the ratio of separation between clusters to compactness within a cluster. To this end, a new measure of compactness, compactness of a fuzzy partition is presented and fuzzy derivative of Pompeiu-Hausdorff distance is used as separation. The convergence of fuzzy c-means clustering algorithm is tested on real classification and clus- tering datasets. Under classification datasets, Iris, Breast Cancer Wisconsin and Wine Recognition datasets are used. Water Treatment Plant and Libras Movement datasets are used as clustering datasets. In classification datasets, the class labels in the data set are used to measure the per- formance. For clustering datasets, Rand index and Jaccard index are used to evaluate clustering results. The new set distance based validation indexes are tested on both synthetic and real datasets. Datasets with three, four, five and six clusters are generated by using Gaussian distributions. The above mentioned real datasets, Iris, Breast Cancer Wisconsin and Wine Recognition are also used to evaluate the performance of set distance based validation indexes. The result (number of clusters) obtained from the set distance based validation indexes are compared with those obtained from [50] to demonstrate efficiency of set distance based validation indexes and how it considers the structure of underlying data unlike others, [50] in particular.

VECPAR is an international conference series dedicated to the promotion and advancement of all aspects of high-performance computing for computational science, as an industrial technique and academic discipline, extending the fr- tier of both the state of the art and the state of practice. The audience and participants of VECPAR are researchers in academic departments, government laboratories and industrial organizations. There is now a permanent website for the conference series inhttp://vecpar.fe.up.pt where the history of the conference is described.

The8theditionofVECPARwasorganizedinToulouse(France),June24–27, 2008. It was the third time the conference was celebrated outside Porto after Valencia (Spain) in2004andRio deJaneiro(Brazil)in 2006. Theconferenceprogrammeconsistedof6invitedtalksand53acceptedpapers out of 73 contributions that were initially submitted. The major themes are divided into: – Large-ScaleSimulationsandNumericalAlgorithmsinComputerScienceand Engineering (aerospace, earth, environment, ?nance, geoscience) – Computing in Healthcare and Biosciences – Multiscale and Multiphysics Problems – Cluster Computing and Grid Computing – Data-Centric and High-Productivity Computing – Cooperative Engineering – Problem-Solving Environments – Imaging and Graphics Twoworkshops,inadditiontotutorials,wereorganizedbeforetheconference: HPDGrid 2008—InternationalWorkshoponHigh-PerformanceDataMana- ment in Grid Environments on June 24 and Sparse Days at CERFACS on June 23 and 24. The most signi?cant contributions are made available in the present book, edited after the conference and after a second review of all orally presented papers at VECPAR 2008 and at the workshops.

Advanced Computing, Networking and Informatics are three distinct and mutually exclusive disciplines of knowledge with no apparent sharing/overlap among them. However, their convergence is observed in many real world applications, including cyber-security, internet banking, healthcare, sensor networks, cognitive radio, pervasive computing amidst many others. This two-volume proceedings explore the combined use of Advanced Computing and Informatics in the next generation wireless networks and security, signal and image processing, ontology and human-computer interfaces (HCI). The two volumes together include 148 scholarly papers, which have been accepted for presentation from over 640 submissions in the second International Conference on Advanced Computing, Networking and Informatics, 2014, held in Kolkata, India during June 24-26, 2014. The first volume includes innovative computing techniques and relevant research results in informatics with selective applications in pattern recognition, signal/image processing and HCI. The second volume on the other hand demonstrates the possible scope of the computing techniques and informatics in wireless communications, networking and security. Fifty years have gone by since the publication of the ?rst paper on clustering based on fuzzy sets theory.

This article presents a New Neutrosophic C-Means (NNCMs) method for clustering. It uses the neutrosophic logic (NL), to generalize the Fuzzy C-Means (FCM) clustering system.

Development of models with explicit mechanisms for data generation from cluster structures is of major interest in order to provide a theoretical framework for cluster structures found in data. Especially appealing in this regard are the so-called typological structures in which observed entities relate in various degrees to one or several prototypes. Such structures are relevant in many areas such as medicine or marketing, where any entity (patient / consumer) may adhere, with different degrees, to one or several prototypes (clinical scenario / consumer behavior), modelling a typological classification. In fuzzy clustering, the fuzzy c-means (FCM) method has become one of the most popular techniques. As a fuzzy analogue of c-means crisp clustering, FCM models a typological classification, much the same way as c-means. However, FCM does not adhere to the statistical paradigm at which the data are considered generated by a cluster structure, while crisp c-means does. The present work proposes a framework for typological classification based on a fuzzy clustering model of data generation.

The goal of traditional clustering is to assign each data point to one and only one cluster. In contrast, fuzzy clustering assigns different degrees of membership to each point. The membership of a point is thus shared among various clusters. This creates the concept of fuzzy boundaries which differs from the traditional concept of well-defined boundaries. In hard clustering, data is divided into distinct clusters, where each data element belongs to exactly one cluster. In fuzzy clustering (also referred to as soft clustering), data elements can belong to more than one cluster, and associated with each element is a set of membership levels. These indicate the strength of the association between that data element and a particular cluster. Fuzzy clustering is a process of assigning these membership levels, and then using them to assign data elements to one or more clusters. This algorithm uses the FCM traditional algorithm to locate the centers of clusters for a bulk of data points. The potential of all data points is being calculated with respect to specified centers. The availability of dividing the data set into large number of clusters will

slow the processing time and needs more memory size for the program. Hence traditional clustering should device the data to four clusters and each data point should be located in one specified cluster .Imprecision in data and information gathered from and about our environment is either statistical(e.g., the outcome of a coin toss is a matter of chance) or no statistical (e.g., "apply the brakes pretty soon"). Many algorithms can be implemented to develop clustering of data sets. Fuzzy C-mean clustering (FCM) is efficient and common algorithm. We are tuning this algorithm to get a solution for the rest of data point which omitted because of its farness from all clusters. To develop a high performance algorithm that sort and group data set in variable number of clusters to use this data in control and managing of those clusters.

Recently many researchers are working on cluster analysis as a main tool for exploratory data analysis and data mining. A notable feature is that specialists in di?erent ?elds of sciences are considering the tool of data clustering to be useful. A major reason is that clustering algorithms and software are ?exible in thesensethatdi?erentmathematicalframeworksareemployedinthealgorithms and a user can select a suitable method according to his application. Moreover clusteringalgorithmshavedi?erentoutputsrangingfromtheolddendrogramsof agglomerativeclustering to more recent self-organizingmaps. Thus, a researcher or user can choose an appropriate output suited to his purpose,which is another ?exibility of the methods of clustering. An old and still most popular method is the K-means which use K cluster centers. A group of data is gathered around a cluster center and thus forms a cluster. The main subject of this book is the fuzzy c-means proposed by Dunn and Bezdek and their variations including recent studies. A main reasonwhy we concentrate on fuzzy c-means is that most methodology and application studies infuzzy clusteringusefuzzy c-means,andfuzzy c-meansshouldbe consideredto beamajortechniqueofclusteringingeneral,regardlesswhetheroneisinterested in fuzzy methods or not. Moreover recent advances in clustering techniques are rapid and we requirea new textbook that includes recent algorithms.We should also note that several books have recently been published but the contents do not include some methods studied herein.

Provides a timely and important introduction to fuzzy cluster analysis, its methods and areas of application, systematically describing different fuzzy clustering techniques so the user may choose methods appropriate for his problem. It provides a very thorough overview of the subject and covers classification, image recognition, data analysis and rule generation. The application examples are highly relevant and illustrative, and the use of the techniques are justified and well thought-out. Features include: * Sections on inducing fuzzy if-then rules by fuzzy clustering and non-alternating optimization fuzzy clustering algorithms * Discussion of solid fuzzy clustering techniques like the fuzzy c-means, the Gustafson-Kessel and the Gath-and-Geva algorithm for classification problems * Focus on linear and shell clustering techniques used for detecting contours in image analysis * Accompanying software and data sets pertaining to the examples presented, enabling the reader to learn through experimentation * Examination of the difficulties involved in evaluating the results of fuzzy cluster analysis and of determining the number of clusters with analysis of global and local validity measures This is one of the most comprehensive books on fuzzy clustering and will be welcomed by computer scientists, engineers and mathematicians in industry and research who are concerned with different methods, data analysis, pattern recognition or image processing. It will also give graduate students in computer science, mathematics or statistics a valuable overview.

This book is a part of the Proceedings of the Seventh International Symposium on Neural Networks (ISNN 2010), held on June 6-9, 2010 in Shanghai, China. Over the past few years, ISNN has matured into a well-established premier international symposium on neural networks and related fields, with a successful sequence of ISNN series in Dalian (2004), Chongqing (2005), Chengdu (2006), Nanjing (2007), Beijing (2008), and Wuhan (2009). Following the tradition of ISNN series, ISNN 2010 provided a high-level international forum for scientists, engineers, and educators to present the state-of-the-art research in neural networks and related fields, and also discuss the major opportunities and challenges of future neural network research. Over the past decades, the neural network community has witnessed significant breakthroughs and developments from all aspects of neural network research, including theoretical foundations, architectures, and network organizations, modeling and simulation, empirical studies, as well as a wide range of applications across different domains. The recent developments of science and technology, including neuroscience, computer science, cognitive science, nano-technologies and engineering design, among others, has provided significant new understandings and technological solutions to move the neural network research toward the development of complex, large scale, and networked brain-like intelligent systems. This long-term goals can only be achieved with the continuous efforts from the community to seriously investigate various issues on neural networks and related topics.

This book is the proceedings of the Third Annual Conference on Fuzzy Information and Engineering (ACFIE2008) from Dec. 5-10, 2008 in Haikou, China. The conf- ence proceedingsis published by Springer-Verlag(Advancesin Soft Computing,ISSN: 1615-3871). This year, we have received 155 submissions. Each paper has undergone a rigorous review process. Only high-quality papers are included. The Third Annual Conference on Fuzzy Information and Engineering (ACFIE2008), built on the success of previous conferences,the ACFIE2005 (Guangzhou,China), is a major symposium for scientists, engineers and practitioners in China to present their updated results, ideas, devel- ments and applications in all areas of fuzzy information and engineering. It aims to strengthen relations between industry research laboratoriesand universities, and to c- ate a primary symposium for world scientists in fuzzy ?elds as follows: 1) Fuzzy intelligence, neural networks and optimal; 2) Fuzzy algebra; 3) Fuzzy analysis; 4) Fuzzy systems and logic; 5) Fuzzy topology and measure; 6)Fuzzy probability, control, forecasting and decision-making; 7) Fuzzy clustering and fuzzy algorithms; 8) Application in fuzzy sets; 9) Rough sets and its application; etc. This book contains 80 papers, divided into nine main parts: In Section I, we have 9 papers on "fuzzy intelligence, neural networks and optimal". In Section II, we have 11 papers on "fuzzy algebra". In Section III, we have 9 papers on "fuzzy analysis". In Section IV, we have 9 papers on "fuzzy systems and logic". In Section V, we have 9 papers on "fuzzy topology and measure".

This Special Edited Volume is a unique approach towards Computational solution for the upcoming field of study called Vision Science. From a scientific firmament Optics, Ophthalmology, and Optical Science has surpassed an Odyssey of optimizing configurations of Optical systems, Surveillance Cameras and other Nano optical devices with the metaphor of Nano Science and Technology. Still these systems are falling short of its computational aspect to achieve the pinnacle of human vision system. In this edited volume much attention has been given to address the coupling issues Computational Science and Vision Studies. It is a comprehensive collection of research works addressing various related areas of Vision Science like Visual Perception and Visual system, Cognitive Psychology, Neuroscience, Psychophysics and Ophthalmology, linguistic relativity, color vision etc. This issue carries some latest developments in the form of

research articles and presentations. The volume is rich of contents with technical tools for convenient experimentation in Vision Science. There are 18 research papers having significance in an array of application areas. The volume claims to be an effective compendium of computing developments like Frequent Pattern Mining, Genetic Algorithm, Gabor Filter, Support Vector Machine, Region Based Mask Filter, 4D stereo camera systems, Principal Component Analysis etc. The detailed analysis of the papers can immensely benefit to the researchers of this domain. It can be an Endeavour in the pursuit of adding value in the existing stock of knowledge in Vision Science.

This book presents the proceedings of the 13th International Conference on Application of Fuzzy Systems and Soft Computing (ICAFS 2018), held in Warsaw, Poland on August 27–28, 2018. It includes contributions from diverse areas of soft computing such as uncertain computation, Z-information processing, neuro-fuzzy approaches, evolutionary computing and others. The topics of the papers include theory of uncertainty computation; theory and application of soft computing; decision theory with imperfect information; neuro-fuzzy technology; image processing with soft computing; intelligent control; machine learning; fuzzy logic in data analytics and data mining; evolutionary computing; chaotic systems; soft computing in business, economics and finance; fuzzy logic and soft computing in the earth sciences; fuzzy logic and soft computing in engineering; soft computing in medicine, biomedical engineering and the pharmaceutical sciences; and probabilistic and statistical reasoning in the social and educational sciences. The book covers new ideas from theoretical and practical perspectives in economics, business, industry, education, medicine, the earth sciences and other fields. In addition to promoting the development and application of soft computing methods in various real-life fields, it offers a useful guide for academics, practitioners, and graduates in fuzzy logic and soft computing fields.

The book presents high quality papers presented at the International Conference on Computational Intelligence in Data Mining (ICCIDM 2016) organized by School of Computer Engineering, Kalinga Institute of Industrial Technology (KIIT), Bhubaneswar, Odisha, India during December 10 – 11, 2016. The book disseminates the knowledge about innovative, active research directions in the field of data mining, machine and computational intelligence, along with current issues and applications of related topics. The volume aims to explicate and address the difficulties and challenges that of seamless integration of the two core disciplines of computer science.

Data science, data engineering and knowledge engineering requires networking and communication as a backbone and have wide scope of implementation in engineering sciences. Keeping this ideology in preference, this book includes the insights that reflect the advances in these fields from upcoming researchers and leading academicians across the globe. It contains high-quality peer-reviewed papers of 'International Conference on Recent Advancement in Computer, Communication and Computational Sciences (ICRACCCS 2016)', held at Janardan Rai Nagar Rajasthan Vidyapeeth University, Udaipur, India, during 25–26 November 2016. The volume covers variety of topics such as Advanced Communication Networks, Artificial Intelligence and Evolutionary Algorithms, Advanced Software Engineering and Cloud Computing, Image Processing and Computer Vision, and Security. The book will help the perspective readers from computer industry and academia to derive the advances of next generation communication and computational technology and shape them into real life applications.

This book constitutes the proceedings of the 12th International Conference on Modeling Decisions for Artificial Intelligence, MDAI 2015, held in Skövde, Sweden, in September 2015. The 18 revised full papers presented were carefully reviewed and selected from 38 submissions. They discuss theory and tools for modeling decisions, as well as applications that encompass decision making processes and information fusion techniques.

The book covers different aspects of real-world applications of optimization algorithms. It provides insights from the Fourth International Conference on Harmony Search, Soft Computing and Applications held at BML Munjal University, Gurgaon, India on February 7–9, 2018. It consists of research articles on novel and newly proposed optimization algorithms; the theoretical study of nature-inspired optimization algorithms; numerically established results of nature-inspired optimization algorithms; and real-world applications of optimization algorithms and synthetic benchmarking of optimization algorithms.

This book describes optimization models of clustering problems and clustering algorithms based on optimization techniques, including their implementation, evaluation, and applications. The book gives a comprehensive and detailed description of optimization approaches for solving clustering problems; the authors' emphasis on clustering algorithms is based on deterministic methods of optimization. The book also includes results on real-time clustering algorithms based on optimization techniques, addresses implementation issues of these clustering algorithms, and discusses new challenges arising from big data. The book is ideal for anyone teaching or learning clustering algorithms. It provides an accessible introduction to the field and it is well suited for practitioners already familiar with the basics of optimization.

It is really important to diagnose jaw tumor in its early stages to improve its prognosis. A differential diagnosis could be performed using X-ray images; therefore, accurate and fully automatic jaw lesions image segmentation is a challenging and essential task. The aim of this work was to develop a novel, fully automatic and effective method for jaw lesions in panoramic X-ray image segmentation.

The Second International Conference on Fuzzy Information and Engineering (ICFIE2007) is a major symposium for scientists, engineers and practitioners in China as well as the world to present their latest results, ideas, developments and applications in all areas of fuzzy information and knowledge engineering. It aims to strengthen relations between industry research laboratories and universities, and to create a primary symposium for world scientists.

A comprehensive, coherent, and in depth presentation of the state of the art in fuzzy clustering. Fuzzy clustering is now a mature and vibrant area of research with highly innovative advanced applications. Encapsulating this through presenting a careful selection of research contributions, this book addresses timely and relevant concepts and methods, whilst identifying major challenges and recent developments in the area. Split into five clear sections, Fundamentals, Visualization, Algorithms and Computational Aspects, Real-Time and Dynamic Clustering, and Applications and Case Studies, the book covers a wealth of novel, original and fully updated material, and in particular offers: a focus on the algorithmic and computational augmentations of fuzzy clustering and its effectiveness in handling high dimensional problems, distributed problem solving and uncertainty management. presentations of the important and relevant phases of cluster design, including the role of information granules, fuzzy sets in the realization of human-centricity facet of data analysis, as well as system modelling demonstrations of how the results facilitate further detailed development of models, and enhance interpretation aspects a carefully organized illustrative series of applications and case studies in which fuzzy clustering plays a pivotal role This book will be of key interest to engineers associated with fuzzy control, bioinformatics, data mining, image processing, and pattern recognition, while computer engineers, students and researchers, in most engineering disciplines, will find this an invaluable resource and research tool.

This volume contains papers presented at the 7th International Conference on Modeling Decisions for Artificial Intelligence (MDAI 2010), held in Perpignan, France, October 27–29. This conference followed MDAI 2004 (Barcelona, C- alonia, Spain), MDAI 2005 (Tsukuba, Japan), MDAI 2006 (Tarragona, Cata- nia, Spain), MDAI 2007 (Kitakyushu, Japan), MDAI 2008 (Sabadell, Catalonia, Spain), and MDAI 2009 (Awaji Island, Japan) with proceedings also published in the LNAI series (Vols. 3131, 3558, 3885, 4617, 5285, and 5861). The aim of this

conference was to provide a forum for researchers to discuss theory and tools for modeling decisions, as well as applications that encompass decision-making processes and information fusion techniques. The organizers received 43 papers from 12 di?erent countries, from Europe, Asia, Australia and Africa, 25 of which are published in this volume. Each s- mission received at least two reviews from the Program Committee and a few externalreviewers.Wewouldliketoexpressourgratitudetothemfortheirwork. The plenary talks presented at the conference are also included in this volume. TheconferencewassupportedbytheCNRS:CentreNationaldelaRecherche Scienti?que,theUniversit´ edePerpignanVia Domitia,theELIAUS:Laboratoire Electronique Informatique Automatique Syst` emes, IMERIR: Ecole d'Ing´ enierie Informatique et Robotique, the UNESCO Chair in Data Privacy, the Japan - cietyforFuzzyTheoryandIntelligentInformatics(SOFT),theCatalanAssoc- tionfor Arti?cialIntelligence(ACIA), the EuropeanSociety for Fuzzy Logicand Technology(EUSFLAT), the Spanish MEC(ARES—CONSOLIDER INGENIO 2010 CSD2007-00004).

Contents:Introduction:Basic Concepts of Fuzzy SetsFuzzy RelationsFuzzy Models for Image Processing and Pattern RecognitionMembership Functions:IntroductionHeuristic SelectionsClustering ApproachesTuning of Membership FunctionsConcluding RemarksOptimal Image Thresholding:IntroductionThreshold Selection Based on Statistical Decision TheoryNon-fuzzy Thresholding AlgorithmsFuzzy Thresholding AlgorithmUnified Formulation of Three Thresholding AlgorithmsMultilevel ThresholdingApplicationsConcluding RemarksFuzzy Clustering:IntroductionC-Means AlgorithmFuzzy C-Means AlgorithmComparison between Hard and Fuzzy Clustering AlgorithmsCluster ValidityApplicationsConcluding RemarksLine Pattern Matching:IntroductionSimilarity Measures between Line SegmentsBasic Matching AlgorithmDealing with Noisy PatternsDealing with Rotated PatternsApplicationsConcluding RemarksFuzzy Rule-based Systems:IntroductionLearning from ExamplesDecision Tree ApproachFuzzy Aggregation Network ApproachMinimization of Fuzzy RulesDefuzzification and OptimizationApplicationsConcluding RemarksCombined Classifiers:IntroductionVoting SchemesMaximum Posteriori ProbabilityMultilayer Perceptron ApproachFuzzy Measures and Fuzzy IntegralsApplicationsConcluding Remarks Readership: Engineers and computer scientists. keywords:

This book is dedicated to Prof. Sadaaki Miyamoto and presents cutting-edge papers in some of the areas in which he contributed. Bringing together contributions by leading researchers in the field, it concretely addresses clustering, multisets, rough sets and fuzzy sets, as well as their applications in areas such as decision-making. The book is divided in four parts, the first of which focuses on clustering and classification. The second part puts the spotlight on multisets, bags, fuzzy bags and other fuzzy extensions, while the third deals with rough sets. Rounding out the coverage, the last part explores fuzzy sets and decision-making.

Nearly everyone knows K-means algorithm in the fields of data mining and business intelligence. But the ever-emerging data with extremely complicated characteristics bring new challenges to this "old" algorithm. This book addresses these challenges and makes novel contributions in establishing theoretical frameworks for K-means distances and K-means based consensus clustering, identifying the "dangerous" uniform effect and zero-value dilemma of K-means, adapting right measures for cluster validity, and integrating K-means with SVMs for rare class analysis. This book not only enriches the clustering and optimization theories, but also provides good guidance for the practical use of K-means, especially for important tasks such as network intrusion detection and credit fraud prediction. The thesis on which this book is based has won the "2010 National Excellent Doctoral Dissertation Award", the highest honor for not more than 100 PhD theses per year in China.

Fuzzy Modeling and Genetic Algorithms for Data Mining and Exploration is a handbook for analysts, engineers, and managers involved in developing data mining models in business and government. As you'll discover, fuzzy systems are extraordinarily valuable tools for representing and manipulating all kinds of data, and genetic algorithms and evolutionary programming techniques drawn from biology provide the most effective means for designing and tuning these systems. You don't need a background in fuzzy modeling or genetic algorithms to benefit, for this book provides it, along with detailed instruction in methods that you can immediately put to work in your own projects. The author provides many diverse examples and also an extended example in which evolutionary strategies are used to create a complex scheduling system. Written to provide analysts, engineers, and managers with the background and specific instruction needed to develop and implement more effective data mining systems Helps you to understand the trade-offs implicit in various models and model architectures Provides extensive coverage of fuzzy SQL querying, fuzzy clustering, and fuzzy rule induction Lays out a roadmap for exploring data, selecting model system measures, organizing adaptive feedback loops, selecting a model configuration, implementing a working model, and validating the final model In an extended example, applies evolutionary programming techniques to solve a complicated scheduling problem Presents examples in C, C++, Java, and easy-to-understand pseudo-code Extensive online component, including sample code and a complete data mining workbench

This book constitutes the refereed proceedings of the Third International Conference on Fuzzy Systems and Knowledge Discovery, FSKD 2006, held in federation with the Second International Conference on Natural Computation ICNC 2006. The book presents 115 revised full papers and 50 revised short papers. Coverage includes neural computation, quantum computation, evolutionary computation, DNA computation, fuzzy computation, granular computation, artificial life, innovative applications to knowledge discovery, finance, operations research, and more.

For decades practitioners have been using the center-based partitional clustering algorithms like Fuzzy C Means (FCM), which rely on minimizing an objective function, comprising of an appropriately weighted sum of distances of each data point from the cluster representatives.

This report introduces two robust statistics -- the fuzzy median and the fuzzy median absolute deviation from the median -- that have been developed for use with fuzzy data sets. The two statistics were applied to the fuzzy c- Means algorithm, a powerful clustering algorithm that normally employs linear statistics. The modified algorithm showed improved performance, being able to cluster data sets generated by heavy-tailed distributions like the Cauchy and Slash distributions.

The book constitutes the refereed proceedings of the 13th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, IPMU 2010, held in Dortmund, Germany from June 28 - July 2, 2010. The 77 revised full papers were carefully reviewed and selected from 320 submissions and reflect the richness of research in the field of Computational Intelligence and represent developments on topics as: machine learning, data mining, pattern recognition, uncertainty handling, aggregation and fusion of information as well as logic and knowledge processing.

In this paper, a new clustering algorithm, neutrosophic c-means (NCM), is introduced for uncertain data clustering, which is inspired from fuzzy c-means and the neutrosophic set framework.

Algorithms for Fuzzy ClusteringMethods in c-Means Clustering with ApplicationsSpringer