

Rafik A. Aliev · Janusz Kacprzyk  
Witold Pedrycz · Mo. Jamshidi  
Fahredden M. Sadikoglu  
Editors

# 13th International Conference on Theory and Application of Fuzzy Systems and Soft Computing — ICAFS-2018

# Contents

<b>From Status Quo Bias to Innovative Multiagent Decisions Under Fuzzy Preferences and Fuzzy Majority . . . . .</b>	<b>1</b>
Janusz Kacprzyk	
<b>Bimodal Information Clustering Methods . . . . .</b>	<b>2</b>
R. A. Aliev	
<b>Maximum Likelihood Estimation from Interval-Valued Data. Application to Fuzzy Clustering . . . . .</b>	<b>3</b>
Hani Hamdan	
<b>Theory and Practice of Material Development Under Imperfect Information . . . . .</b>	<b>4</b>
M. B. Babanli	
<b>Forming and Quantifying Consensus in Distributed System Modeling and Group Decision-Making: A Perspective of Granular Computing . . .</b>	<b>15</b>
Witold Pedrycz	
<b>Why Multidimensional Fuzzy Arithmetic? . . . . .</b>	<b>16</b>
Andrzej Piegat and Marek Landowski	
<b>On Using Fuzzy Sets in Healthcare Process Analysis . . . . .</b>	<b>24</b>
Uzay Kaymak	
<b>Optimization of Jobs in GIS by Coloring of Fuzzy Temporal Graph. . .</b>	<b>25</b>
Alexander Bozhenyuk, Stanislav Belyakov, and Janusz Kacprzyk	
<b>Algebraic Properties of Z-Numbers Under Multiplicative Arithmetic Operations . . . . .</b>	<b>33</b>
R. A. Aliev and A. V. Alizadeh	
<b>Z-Number Based TOPSIS Method in Multi-Criteria Decision Making. . . . .</b>	<b>42</b>
Latafat A. Gardashova	

<b>Comparative Analysis of Artificial Intelligence Based Methods for Prediction of Precipitation. Case Study: North Cyprus</b> . . . . .	51
Selin Uzelaltinbulat, Fahreddin Sadikoglu, and Vahid Nourani	
<b>Analysis and Processing of Information in Economic Problems. Crisp and Fuzzy Technologies</b> . . . . .	65
Araz R. Aliev, Vagif M. Mamedov, and Gasim G. Gasimov	
<b>Labeled Fuzzy Rough Sets in Multiple-Criteria Decision-Making</b> . . . . .	73
Alicja Mieszkowicz-Rolka and Leszek Rolka	
<b>Comparing Image Distortion of LSB</b> . . . . .	82
Yucel Inan	
<b>An Effective Fuzzy Controlled Filter for Feature Extraction Method</b> . . .	91
Mohamad Alshahadat, Bülent Bilgehan, and Cemal Kavalcıoğlu	
<b>Analysis of Prediction Models for Wind Power Density, Case Study: Ercan Area, Northern Cyprus</b> . . . . .	99
Youssef Kassem, Hüseyin Gökçekuş, and Hüseyin Çamur	
<b>Evaluation of Image Representations for Player Detection in Field Sports Using Convolutional Neural Networks</b> . . . . .	107
Melike Şah and Cem Direkoğlu	
<b>A Fuzzy Based Gaussian Weighted Moving Windowing for Denoising Electrocardiogram (ECG) Signals</b> . . . . .	116
Cemal Kavalcıoğlu and Bülent Bilgehan	
<b>Integrated Deep Learning Structures for Hand Gesture Recognition</b> . . .	129
Senol Korkmaz	
<b>Rule Based Intelligent Diabetes Diagnosis System</b> . . . . .	137
Elbrus Imanov, Hamit Altıparmak, and Gunay E. Imanova	
<b>Intensive Investigation in Differential Diagnosis of Erythemato-Squamous Diseases</b> . . . . .	146
Idoko John Bush, Murat Arslan, and Rahib Abiyev	
<b>A Computational-Intelligence Based Approach to Diagnosis of Diabetes Mellitus Disease</b> . . . . .	154
Elif Dogu and Y. Esra Albayrak	
<b>Fuzzy Expert System for Rectal Cancer</b> . . . . .	160
Yusif R. Aliyarov, Latafat A. Gardashova, and Shamil A. Ahmadov	
<b>Dynamics and Control of HIV/AIDS in Cyprus Using Real Data</b> . . . . .	167
Evren Hincal, Tamer Sanlidag, Farouk Tijjani Saad, Kaya Suer, Isa Abdullahi Baba, Murat Sayan, Bilgen Kaymakamzade, and Nazife Sultanoglu	

<b>Intuitionistic Fuzzy Sets for Estimating the Parameters of Distributive Task</b> .....	178
Alexander Bozhenyuk, Margarita Knyazeva, and Olesiya Kosenko	
<b>Fuzzy Logic Based Modelling of Decision Buying Process</b> .....	185
Gunay Sadikoglu and Tulen Saner	
<b>An Integrated Fuzzy Decision Framework for Neuromarketing Technology Selection Problem</b> .....	195
Mehtap Dursun and Nazli Goker	
<b>Performance Indicators Evaluation of Business Process Outsourcing Employing Fuzzy Cognitive Map</b> .....	201
Nazli Goker, Y. Esra Albayrak, and Mehtap Dursun	
<b>Evaluating Lung Cancer Treatment Techniques Using Fuzzy PROMETHEE Approach</b> .....	209
Mordecai Maisaini, Berna Uzun, Ilker Ozsahin, and Dilber Uzun	
<b>A Comparative Study on the Economic Development Level of the Countries by Fuzzy DEA Methodologies</b> .....	216
Mujde Erol Genevois and Michele Cedolin	
<b>Fuzzy Analysis of Macroeconomic Stability</b> .....	223
Gorkhmaz Imanov, Yadulla Hasanli, and Malahat Murtuzaeva	
<b>Wind Speed Prediction of Four Regions in Northern Cyprus Prediction Using ARIMA and Artificial Neural Networks Models: A Comparison Study</b> .....	230
Youssef Kassem, Hüseyin Gökçekuş, and Hüseyin Çamur	
<b>Head Movement Mouse Control Using Convolutional Neural Network for People with Disabilities</b> .....	239
Murat Arslan, Idoko John Bush, and Rahib H. Abiyev	
<b>Data Coding and Neural Network Arbitration for Feasibility Prediction of Car Marketing</b> .....	249
Adnan Khashman and Gunay Sadikoglu	
<b>Signature Recognition Using Backpropagation Neural Network</b> .....	256
Yucel Inan and Boran Sekeroglu	
<b>Topological Ordering on Interval Type-2 Fuzzy Graph</b> .....	262
Margarita Knyazeva, Stanislav Belyakov, and Janusz Kacprzyk	
<b>Z-Number Clustering Based on General Type-2 Fuzzy Sets</b> .....	270
Rafik Aliev and Babek Guirimov	
<b>One Approach to Multi-criteria Evaluation of Alternatives in the Logical Basis of Neural Networks</b> .....	279
Misir Mardanov and Ramin Rzayev	

<b>Self-confidence Preference Based Decision Making in Personnel Selection . . . . .</b>	<b>288</b>
S. Z. Eyupoglu and G. E. Imanova	
<b>The Incrementality Issue in the Wu-Mendel Approach for Linguistic Summarization Using IF-THEN Rules . . . . .</b>	<b>293</b>
Vuqar E. Mirzaxhanov and Latafat A. Gardashova	
<b>A Genetic Programming Approach to Forecast Daily Electricity Demand . . . . .</b>	<b>301</b>
Ali Danandeh Mehr, Farzaneh Bagheri, and Rifat Reşatoğlu	
<b>Teaching Fuzzy Control Using an Embedded Processor . . . . .</b>	<b>309</b>
Dogan Ibrahim	
<b>PSO Algorithm Applied to Enhance Power Quality of Multilevel Inverter . . . . .</b>	<b>315</b>
Yahya Naderi, Fahreddin Sadikoglu, and Seyed Hossein Hosseini	
<b>Development of Instruments of Fuzzy Identification of Extended Objects Based on the Results of Satellite Monitoring . . . . .</b>	<b>325</b>
Imran G. Akperov and Vladimir V. Khramov	
<b>Optimal Placement of Capacitor Using Particle Swarm Optimization . . .</b>	<b>333</b>
Farzad Mohammadzadeh Shahir, Ebrahim Babaei, and Fahreddin Sadikoglu	
<b>Predicting Fresh Water of Single Slope Solar Still Using a Fuzzy Inference System . . . . .</b>	<b>344</b>
Lida Ebrahimi Vafaei and Melike Sah	
<b>Evaluation of the Impact of State's Administrative Efforts on Tax Potential Using Sugeno-Type Fuzzy Inference Method . . . . .</b>	<b>352</b>
Samir Rustamov, Akif Musayev, and Shahzada Madatova	
<b>Analysing the Economic Impacts of the Euro for the Three Largest Economies in the Emu (European Monetary Union) and the Place of the Euro in Global Economics . . . . .</b>	<b>361</b>
Hüseyin Özdeşer	
<b>Evaluation of Tourism Sector Based on the Internal Environment by Using a Fuzzy Approach . . . . .</b>	<b>371</b>
İhsan Yüksel, Metin Dağdeviren, and Gülsüm Alicioğlu	
<b>Evaluation of the Impact of the Changing the Term of Tax Liability Performance on Tax Receipts by Minmax Composition Method . . . . .</b>	<b>378</b>
A. A. Musayeva, T. M. Musayev, and M. Kh. Gazanfarli	

<b>Evaluating US Dollar Index Movements Using Markov Chains-Fuzzy States Approach . . . . .</b>	<b>386</b>
Berna Uzun and Ersin Kırıl	
<b>The Statistical Reasoning of the Occupational Attitudes of Students. Case Study: Gastronomy and Culinary Arts Program . . . . .</b>	<b>392</b>
Serdar Oktay and Saide Sadıkoğlu	
<b>Statistical Reasoning of Education Managers Opinions on Institutional Strategic Planning . . . . .</b>	<b>399</b>
Gülsün Başarı, Ali Aktepebaşı, Ediz Tuncel, Emete Yağcı, and Şahin Akdağ	
<b>The Impact of Using Social Media on University Students Socialization: Statistical Reasoning . . . . .</b>	<b>404</b>
Şahin Akdag, Huseyin Bicen, Gulsun Basari, and Ahmet Savasan	
<b>Statistical and Structural Equation Modelling the Relationship Between Creativity and Material Design Self-efficacy Beliefs of Preschool Woman Preservice Teachers . . . . .</b>	<b>410</b>
Konul Memmedova, Dervise Amca Toklu, and Saide Sadikoglu	
<b>Directions of Complex Regional Socio-Economic Development Based on Cognitive Modeling of Realization of Investment Strategy . . . . .</b>	<b>417</b>
Imran Akperov, Nataliya Brukhanova, and Dmitriy Dynnik	
<b>Expert-Analytical Support for the Document Marking Process Using a Fuzzy Analysis of Data Confidentiality . . . . .</b>	<b>426</b>
Ramin Rzayev, Elkhan Aliyev, and Afet Suleymanova	
<b>An Interval Number Based Input-Output Analysis for a Regional Economy . . . . .</b>	<b>435</b>
Behiye Cavusoglu, Serife Z. Eyupoglu, Pinar Sharghi, and Tulen Saner	
<b>Fuzzy Stability Analysis of an Isothermal First-Order Reaction . . . . .</b>	<b>444</b>
Mahsati Babanlı	
<b>Prioritization of Mosque Facility Site Selection Criteria Under Fuzzy Environment . . . . .</b>	<b>451</b>
Abdurrahman Yagmur Toprakli, Mehmet Kabak, Eren Özceylan, and Aylin Adem	
<b>Statistical Computation of the Effect of Using Mobile Applications as a Travel Information Tool . . . . .</b>	<b>458</b>
Huseyin Bicen and Ahmet Arnavut	
<b>Improvement in Strength of Radio Wave Propagation Outside the Coverage Area of the Mobile Towers for Cellular Mobile WiFi. . . . .</b>	<b>464</b>
Jamal Fathi	

<b>Application of Interval Approximation Method of a Fuzzy Number to the Supplier Selection . . . . .</b>	<b>472</b>
Kamala Aliyeva	
<b>Multifactor Personnel Selection by the Fuzzy TOPSIS Method . . . . .</b>	<b>478</b>
Kamala Aliyeva	
<b>Fractal Analysis of Chaotic Fluctuations in Oil Production . . . . .</b>	<b>484</b>
E. E. Ramazanova, A. A. Abbasov, H. Kh. Malikov, and A. A. Suleymanov	
<b>Non-parametric Criteria of Chaotic Data Analysis in Oil Production . . .</b>	<b>491</b>
T. Sh. Salavatov, A. A. Abbasov, H. Kh. Malikov, D. F. Guseynova, and A. A. Suleymanov	
<b>An Application of the VIKOR Method to Decision Making in Investment Problem Under Z-Valued Information . . . . .</b>	<b>499</b>
Konul Jabbarova and Naila Hasanova	
<b>Energy Consumption Prediction of Residential Buildings Using Fuzzy Neural Networks . . . . .</b>	<b>507</b>
Sanan Abizada and Esmira Abiyeva	
<b>Classification of Diseases on Chest X-Rays Using Deep Learning . . . . .</b>	<b>516</b>
Sertan Kaymak, Khaled Almezghwi, and Almaki A. S. Shelag	
<b>The Ecosystem of ICT Based Innovation in the Public Sector. The Role of Public Procurement . . . . .</b>	<b>524</b>
Ani Matei, Carmen Săvulescu, and Corina-Georgiana Antonovici	
<b>Fuzzy Set-Theory Analysis of Deregulations Effects on the National Taxable Capacity . . . . .</b>	<b>533</b>
Rovshan Akbarov, Musa Aghamaliyev, and Emin Garibli	
<b>Ranking of Universities on the Base of Fuzzy Evaluation Procedure of Their Index of Competitiveness . . . . .</b>	<b>542</b>
Zeynal Jamalov, Alla Khudadova, Inara Abasova, and Narmina Aliyeva	
<b>Approach to the Increasing the Validity of the Position-Binary Method for Cyclic Signal Recognition . . . . .</b>	<b>551</b>
Oktay Nusratov, Asker Almasov, and Hafiz Bayramov	
<b>Weighted Estimate of Country Risk Using a Fuzzy Method of Maxmin Convolution . . . . .</b>	<b>559</b>
Sevinj Babayeva, Inara Rzayeva, and Tofiq Babayev	
<b>Forecasting the Solvency of Legal Entities on the Base of Fuzzy Modeling of the Time Series of Their Financial Indicators . . . . .</b>	<b>568</b>
Elchin Aliyev, Hajar Shikhaliyeva, Zaur Gaziyeve, and Adila Ali	

**Deep Parkinson Disease Diagnosis: Stacked Auto-encoder . . . . .** 577  
Esam Al Shareef and Dilber Uzun Ozsahin

**Machine Learning Comparative Analysis for Plant Classification . . . . .** 586  
Elbrus Imanov and Abdallah Khaled Alzouhbi

**Exchange Market Algorithm for Selective Harmonic Elimination  
in Cascaded Multilevel Inverters . . . . .** 594  
Ardavan MohammadHassani and Ebrahim Babaei

**Fuzzy Portfolio Selection Model Using Linear Programming . . . . .** 602  
Mustafa Menekay

**Evaluation of Food Security in the Region Within the Framework  
of the FAO UN Cooperation Program Using the Fuzzy Inference . . . . .** 609  
Elkhan Aliyev, Tarana Karimova, and Galib Hajiyeu

**A Study of Fuzzy and Boolean Logics for Resource Management  
in User-Centric Wireless Networks . . . . .** 619  
Huseyin Haci

**Application of Interval Analysis in Evaluation of Macroeconomic  
Impacts of Taxes . . . . .** 627  
A. F. Musayev, R. I. Davudova, and A. A. Musayeva

**Fuzzy Method of Assessing the Intensity of Agricultural Production  
on a Set of Criteria of the Level of Intensification and the Level  
of Economic Efficiency of Intensification . . . . .** 635  
Tamara V. Alekseychik, Taras V. Bogachev, Denis N. Karasev,  
Lyudmila V. Sakharova, and Michael B. Stryukov

**Fuzzy-Logic Analysis of the Level of Comfort and Environmental  
Well-Being of the Urban Environment on the Example of Large  
Cities of Rostov Region . . . . .** 643  
Elizabeth A. Arapova, Galina V. Lukyanova, Lyudmila V. Sakharova,  
and Gurru I. Akperov

**Comparative Assessment of the Transport Systems of the Regions  
Using Fuzzy Modeling . . . . .** 651  
Taras Bogachev, Tamara Alekseychik, and Viktor Bogachev

**Bifurcation Analysis and Synergetic Management of the Dynamic  
System “Intermediary Activity” . . . . .** 659  
Alexander V. Bratishchev, Galina A. Batishcheva, and Maria I. Zhuravleva

**Patients Identification in Medical Organization Using  
Neural Network . . . . .** 668  
V. Evdokimov Alexey, A. Kovalenko Vasiliy, V. Kurbesov Alexandr,  
and V. Shabanov Alexey

<b>Evaluation of Innovative Changes in the Structure of Economy of Regions on the Basis of Statistical Analysis and Theory of Fuzzy Sets</b> . . . . .	676
Aleksandr R. Groshev	
<b>Assessment of the Sustainability of Agricultural Production in the Region on the Basis of Five-Level Fuzzy [0,1] – Classifier</b> . . . . .	681
Elizabeth A. Arapova, Michael Yu Denisov, Elena A. Ivanova, and Yulia V. Kulikova	
<b>Fuzzy-Multiple Analysis of Dependence Between Psychological Features of Human and Its Predispolence to Drug Addiction</b> . . . . .	689
E. Astapenko and A. Maksimenko	
<b>Fuzzy Models of the Results of the Mastering the Educational Programs in the Field of Information Security</b> . . . . .	694
Evgeniy Nikolaevich Tishchenko, Elena Victorovna Zhilina, Tatyana Nikolaevna Sharypova, and Galiya Nailevna Palyutina	
<b>The Possibilities of Using Modern CASIO CG-50 Graphing Calculators for Volumetric and Complex Calculations, Including Fuzzy Calculations</b> . . . . .	702
Igor Vostroknutov and Yosuke Kaneda	
<b>Fuzzy-Logic Analysis of the State of the Atmosphere in Large Cities of the Industrial Region on the Example of Rostov Region</b> . . . . .	709
G. Vovchenko Natalia, B. Stryukov Michael, V. Sakharova Lyudmila, and V. Domakur Olga	
<b>Application of Expected Utility to Business Decision Making Under U-Number Valued Information</b> . . . . .	716
Konul I. Jabbarova	
<b>Fuzzy-Based Failure Diagnostic Analysis in a Chemical Process Industry</b> . . . . .	724
Mohammad Yazdi and Mahlagha Darvishmotevali	
<b>Fuzzy Differential Equations for Modeling and Control of Fuzzy Systems</b> . . . . .	732
Raheleh Jafari, Sina Razvarz, and Alexander Gegov	
<b>Fuzzy Logic-Based Compositional Decision Making in Music</b> . . . . .	741
Javanshir Guliyev and Konul Memmedova	
<b>Banknote Issuing Country Identification Using Image Processing and Neural Networks</b> . . . . .	746
Adnan Khashman, Waleed Ahmed, and Sadig Mammadli	

**Neural Network Modeling and Estimation of the Effectiveness of the Financing Policy Impact on the Socio-Economic Development of the Socio-Educational System. . . . .** 754  
Alekperov Ramiz Balashirin and Ibrahimova Kyonul Akbar

**Investigation of the “Input-Output” Model of the Azerbaijani Economy in Interval Information Conditions . . . . .** 760  
V. J. Akhundov, S. K. Mammadova, and A. M. Aliyev

**Forecasting Oil and Gas Reservoirs Properties Using of Fuzzy-Logic Based Methods . . . . .** 769  
R. Y. Aliyarov, A. B. Hasanov, M. S. Ibrahimli, Z. E. Ismayilova, and A. J. Jabiyeva

**Application of the Combined State Concept to Behavioral Investment Decisions Under Interval-Valued Information . . . . .** 774  
Khatira J. Dovlatova

**Prediction of Mechanical Lower Back Pain for Healthcare Workers Using ANN and Logistic Regression Models . . . . .** 781  
Nuriye Sancar, Mehtap Tinazli, and Sahar S. Tabrizi

**Optimization of Agricultural Land Use on the Basis of Mathematical Methods of Financial Analysis and the Theory of Fuzzy Sets . . . . .** 790  
V. Sakharova Lyudmila, B. Stryukov Michael, and I. Akperov Gurru

**Deep Learning for Lung Lesion Detection . . . . .** 799  
Ali Işın and Tazeen Sharif

**A Mobile Application to Teach Coding and Computational Thinking in Scratch Programming Language . . . . .** 807  
M. A. Salahli, T. Gasimzadeh, F. Alasgarova, and A. Guliyev

**Study of the Uncertainty Heterogeneous Phase Equilibria Areas in the Binary YbTe-SnTe Alloy System . . . . .** 815  
A. N. Mammadov, Z. S. Aliev, and M. B. Babanly

**Decision Making in Investment Problem by Using Self-confidence Based Preference Relation . . . . .** 823  
Aynur I. Jabbarova

**Global Stability Analysis of HIV+ Model . . . . .** 830  
Farouk Tijjani Saad, Tamer Sanlidag, Evren Hincal, Murat Sayan, Isa Abdullahi Baba, and Bilgen Kaymakamzade

**A New Compound Function-Based Z-number Valued Clustering . . . . .** 840  
B. G. Guirimov and O. H. Huseynov

**Determination of Quality of Plastic Details Under Interval Uncertainty . . . . .** 848  
Djahid A. Kerimov and Naila A. Gasanova

<b>Application of Cloud Technologies for Optimization of Complex Processes of Industrial Enterprises . . . . .</b>	<b>852</b>
N. R. Yusupbekov, F. R. Abdurasulov, F. T. Adilov, and A. I. Ivanyan	
<b>Decision-Making on Restriction of Water Inflows into Oil Wells in Dependence on the Type of Initial Information . . . . .</b>	<b>859</b>
B. N. Koilybayev, A. S. Strekov, K. T. Bissembayeva, P. Z. Mammadov, D. A. Akhmetov, and O. G. Kirisenko	
<b>Classification of Hard-to-Recover Hydrocarbon Reserves of Kazakhstan with the Use of Fuzzy Cluster-Analysis. . . . .</b>	<b>865</b>
D. A. Akhmetov, G. M. Efendiyev, M. K. Karazhanova, and B. N. Koylibaev	
<b>Knowledge-Based Planning for Industrial Automation Systems: The Way to Support Decision Making . . . . .</b>	<b>873</b>
N. R. Yusupbekov, Sh. M. Gulyamov, S. S. Kasimov, and N. B. Usmanova	
<b>Logical-Linguistic Model of Functioning of Computer Systems' Software . . . . .</b>	<b>880</b>
H. Z. Igamberdiev, A. N. Yusupbekov, D. A. Mirzaev, and N. A. Kabulov	
<b>A Novel Technique to Solve Fully Fuzzy Nonlinear Matrix Equations . . .</b>	<b>886</b>
Raheleh Jafari, Sina Razvarz, and Alexander Gegov	
<b>Algebraic Properties of Z-Numbers Under Additive Arithmetic Operations . . . . .</b>	<b>893</b>
Akif V. Alizadeh, Rashad R. Aliyev, and Oleg H. Huseynov	
<b>Construction of Fuzzy Control System Rule-Base with Predefined Specificity . . . . .</b>	<b>901</b>
Nigar E. Adilova	
<b>Application of Neural Networks for Segmentation of Catering Services Market Within the Overall System of Consumer Market on the Model of Restaurant Business with the Aim to Advance the Efficiency of Marketing Policy . . . . .</b>	<b>905</b>
Aleksperov Ramiz Balashirin and Iskenderli Ilhama Tarlan	
<b>Detecting Adverse Events in an Active Theater of War Using Advanced Computational Intelligence Techniques . . . . .</b>	<b>914</b>
Jozef Zurada, Donghui Shi, Waldemar Karwowski, Jian Guan, and Erman Çakıt	
<b>Country Selection for Business Location Under Imperfect Information . . . . .</b>	<b>922</b>
R. R. Aliyev	

**Material Selection Methods: A Review** . . . . . 929  
M. B. Babanli, F. Prima, P. Vermaut, L. D. Demchenko, A. N. Titenko,  
S. S. Huseynov, R. J. Hajiyeu, and V. M. Huseynov

**Review on the New Materials Design Methods** . . . . . 937  
M. B. Babanli, F. Prima, P. Vermaut, L. D. Demchenko, A. N. Titenko,  
S. S. Huseynov, R. J. Hajiyeu, and V. M. Huseynov

**Z-Number Based Diagnostics of Parkinson’s Diseases** . . . . . 945  
Elcin Huseyn

**An Integrated MCDM Approach to the Problem of New Graduate  
Job Selection Under Fuzzy Environment** . . . . . 951  
Metin Dagdeviren and Aylin Adem

**Neutrosophic Fuzzy Analytic Hierarchy Process Approach  
for Safe Cities Evaluation Criteria** . . . . . 958  
Serhat Aydın, Ahmet Aktas, and Mehmet Kabak

**Author Index** . . . . . 967