

Xiao-Zhi Gao · Rajesh Kumar · Sumit Srivastava ·  
Bhanu Pratap Soni  
Editors

# Applications of Artificial Intelligence in Engineering

Proceedings of First Global Conference on  
Artificial Intelligence and Applications  
(GCAIA 2020)

 Springer

*Editors*

Xiao-Zhi Gao   
School of Computing  
University of Eastern Finland  
Kuopio, Finland

Sumit Srivastava  
Department of Information Technology  
Manipal University Jaipur  
Jaipur, Rajasthan, India

Rajesh Kumar  
Department of Electrical Engineering  
Malaviya National Institute of Technology  
Jaipur, Rajasthan, India

Bhanu Pratap Soni  
Department of Electrical Engineering  
University of Engineering and Management  
Jaipur, Rajasthan, India

ISSN 2524-7565

ISSN 2524-7573 (electronic)

Algorithms for Intelligent Systems

ISBN 978-981-33-4603-1

ISBN 978-981-33-4604-8 (eBook)

<https://doi.org/10.1007/978-981-33-4604-8>

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2021

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd. The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

# Contents

<b>1</b>	<b>Application of Supervised Learning for Voltage Stability Assessment</b> .....	<b>1</b>
	Asna Akhtar, Ankit Kumar Sharma, Abhishek Kumar Gupta, and Vivek Kumar Jain	
<b>2</b>	<b>Breast DCE-MRI Segmentation for Lesion Detection Using Clustering with Fireworks Algorithm</b> .....	<b>17</b>
	Tapas Si and Amit Mukhopadhyay	
<b>3</b>	<b>Swarm Programming Using Moth-Flame Optimization and Whale Optimization Algorithms</b> .....	<b>37</b>
	Tapas Si	
<b>4</b>	<b>Nonlinear Regression Analysis Using Multi-verse Optimizer</b> .....	<b>45</b>
	Jayri Bagchi and Tapas Si	
<b>5</b>	<b>An Extended ACO Based Routing Algorithm for Cognitive Radio Network</b> .....	<b>57</b>
	Vishal Raj and Mahendra Kumar Murmu	
<b>6</b>	<b>A Review: Image Classification and Object Detection with Deep Learning</b> .....	<b>69</b>
	Aditi and Aman Dureja	
<b>7</b>	<b>Kidney Lesion Segmentation in MRI Using Clustering with Salp Swarm Algorithm</b> .....	<b>93</b>
	Tapas Si	
<b>8</b>	<b>Smart Approach to Optical Character Recognition and Ubiquitous Speech Synthesis Using Real-Time Deep Learning Algorithms</b> .....	<b>107</b>
	Bhargav Goradiya, Yagnik Mehta, Nisarg Patel, Neel Macwan, and Vatsal Shah	

<b>9</b>	<b>Sine Cosine Algorithm with Centroid Opposition-Based Computation</b> .....	119
	Tapas Si and Debolina Bhattacharya	
<b>10</b>	<b>Data Mining Techniques for Fraud Detection—Credit Card Frauds</b> .....	131
	Krishna Kushal, Greeshma Kurup, and Siddhaling Urolagin	
<b>11</b>	<b>Performance Evaluation of <math>\beta</math> Chaotic Map Enabled Grey Wolf Optimizer on Protein Structure Prediction</b> .....	147
	Akash Saxena, Shalini Shekhawat, Ajay Sharma, Harish Sharma, and Rajesh Kumar	
<b>12</b>	<b>Transmission Expansion Planning Using Teaching and Learning Based Optimization Approach</b> .....	161
	Jitesh Jangid, Aishwarya Mehta, Akash Saxena, Shalini Shekhawat, Rajesh Kumar, and Ajay Sharma	
<b>13</b>	<b>Harmonic Estimator Design Using Teaching Learning Based Optimization</b> .....	173
	Aishwarya Mehta, Jitesh Jangid, Akash Saxena, Shalini Shekhawat, and Rajesh kumar	
<b>14</b>	<b>Real-Time Frame-to-Frame Jitter Removing Video Stabilization Technique</b> .....	187
	Madhura R. Shankarpure and Deepa Abin	
<b>15</b>	<b>A Review of Nature-Inspired Routing Algorithms for Flying Ad Hoc Networks</b> .....	197
	Amrita Yadav and Seema Verma	
<b>16</b>	<b>Performance Analysis of Different Machine Learning Classifiers in Detection of Parkinson's Disease from Hand-Drawn Images Using Histogram of Oriented Gradients</b> .....	205
	Akalpita Das, Himanish Shekhar Das, Anupal Neog, B. Bharat Reddy, and Mrinoy Swargiary	
<b>17</b>	<b>Coal Mine Monitoring Smart Rover Using LabVIEW and Wireless Sensor Network</b> .....	217
	Das Udeshta and Das Nipan Kumar	
<b>18</b>	<b>A Survey on Spatiotemporal Co-occurrence Pattern Mining Techniques</b> .....	225
	S. Sharmiladevi, S. Siva Sathya, and Nangi Ramesh	
<b>19</b>	<b>The Classification and Comparative Study of Real-Time Task Scheduling Algorithms Based on Various Parameters</b> .....	239
	Jayna Donga, M. S. Holia, and N. M. Patel	

<b>20 Behavioral Analysis Using Gamification and Data Visualization</b> .....	247
Lavina Kunder and Siddhaling Urolagin	
<b>21 Smart Agricultural Monitoring and Decision Support System</b> .....	267
Shahnaz Akhtar Hussain and Papu Moni Saikia	
<b>22 Characterizing Shoulder Implants in X-Ray Images</b> .....	277
Sudarshan S. Chawathe	
<b>23 Human-Understandable Classifiers for COPD from Biosensor Data</b> .....	289
Sudarshan S. Chawathe	
<b>24 Dimensionality Prediction for Word Embeddings</b> .....	301
Korrapati Sindhu and Karthick Seshadri	
<b>25 Classification of ECG Arrhythmia Using Different Machine Learning Approach</b> .....	319
Asma Parveen, R. M. Vani, P. V. Hunagund, and Maisoun Ali Soher-wardy	
<b>26 Role of Cloud Computing to Support Big Data and Big Data Analytics for Education Par Excellence</b> .....	327
Anjum Zameer Bhat, Baldev Singh, and Teba Fadhil	
<b>27 Comprehensive Survey for Energy-Efficient Routing Protocols on WSNs Based IoT Applications Enhancing Fog Computing Paradigm</b> .....	339
Loveleen Kaur and Rajbir Kaur	
<b>28 A Review on Applications of Machine Learning in Health Care</b> .....	355
Aikendrajit Ningthoujam and R. K. Sharma	
<b>29 Face Mask Detection Using VGG-16 Net for Low Computation Power Devices</b> .....	365
V. Narmadha and R. Bharath Raam	
<b>30 Mining Morphological Similarities for Translation Lexicon Augmentation</b> .....	375
Kavitha Mahesh Karimbi, Vaishnavi Naik, Sahana Angadi, Sandra Satish, Suman Nayak, and Evita Coelho	
<b>31 Spade to Spoon: An IoT-Based End to End Solution for Farmer Using Machine Learning in Precision Agriculture</b> .....	387
Mahendra Swain, Rajesh Singh, and Md. Farukh Hashmi	
<b>32 Bacteria Foraging Optimization-Based Geographical Routing Scheme in IoT</b> .....	397
J. Shreyas, Chethana S. Reddy, P. K. Udayaprasad, Dhramendra Chouhan, and S. M. Dilip Kumar	

<b>33</b>	<b>Face Expression-Based Result Prediction in Talent Shows Using Deep Learning</b> .....	409
	Vakada Naveen, Nekkhalapu Anvitha, G. P. Sri Harsha, and K. L. Sailaja	
<b>34</b>	<b>Performance-Based Adaptive Learning Rate Scheduler Algorithm</b> .....	417
	Vakada Naveen, Yaswanth Mareedu, Neeharika Sai Mandava, Sravya Kaveti, and G. Krishna Kishore	
<b>35</b>	<b>Urdu QA: Question Answering System for Urdu Language</b> .....	435
	Mohammad Khalid Pandit and Azra Nazir	
<b>36</b>	<b>Review of Classifiers Used for Identification and Classification of Plant Leaf Diseases</b> .....	445
	G. Gangadevi and C. Jayakumar	
<b>37</b>	<b>Artificial Intelligence-Based Job Applicant Profile Quality Assessment and Relevance Ranking Using Clusters in Talent Acquisition Process</b> .....	461
	G. M. Sridevi and S. Kamala Suganthi	
<b>38</b>	<b>A Survey on the ZigBee Protocol, It's Security in Internet of Things (IoT) and Comparison of ZigBee with Bluetooth and Wi-Fi</b> .....	473
	Malvika Gupta and Shweta Singh	
<b>39</b>	<b>Application of Machine Learning in App-Based Cab Booking System: A Survey on Indian Scenario</b> .....	483
	Prerona Saha, Soham Guhathakurata, Sayak Saha, Arpita Chakraborty, and Jyoti Sekhar Banerjee	
<b>40</b>	<b>Churn Prediction in Telecom Industry Using Machine Learning Algorithms with K-Best and Principal Component Analysis</b> .....	499
	K. V. Anjana and Siddhaling Urolagin	
<b>41</b>	<b>A Hybrid Forecasting Model Based on Equilibrium Optimizer and Artificial Neural Network for Assessment of PM10 Concentration</b> .....	509
	Shalini Shekhawat, Akash Saxena, A. K. Dwivedi, and Rajesh Kumar	
<b>42</b>	<b>An Intelligent Path Estimation Technique for Transportation of Heterogeneous Droplets in Digital Micro Fluidic Biochips (DMFB)</b> .....	521
	Rupam Bhattacharya, Abhijit Sarkar, and Pranab Roy	

<b>43</b>	<b>MLP-WOA Neural Network-Based Automated Grading of Fruits and Vegetable Quality Detection for Food Industry Using Artificial Intelligence Techniques (Computer Vision—Image Recognition)</b> .....	<b>539</b>
	Syed Sumera Ershad Ali and Sayyad Ajij Dildar	
<b>44</b>	<b>A Comparison of Sentiment Analysis Techniques on Movie Reviews</b> .....	<b>563</b>
	Brenden Carvalho and Siddhaling Urolagin	
<b>45</b>	<b>A Comprehensive Review of the Available Microgrid Protection Schemes and Their Challenges</b> .....	<b>573</b>
	Subhojit Paul, Nirmalya Maity, Samhita Sinha, Shounak Basu, Supriya Mondal, and Rohan Porel	
<b>46</b>	<b>Personalized Recommender Systems: An Empirical Analysis</b> .....	<b>597</b>
	Poonam Tijare, S. Athreya Uppili, M. Ajay, Anisha Rao, and K. K. Chaithra	
<b>47</b>	<b>Feature Selection on Linked Data: A Review</b> .....	<b>615</b>
	Tanjina Das, Srikanta Paitnaik, and Smita Prava Mishra	
<b>48</b>	<b>NAARI: An Intelligent Android App for Women Safety</b> .....	<b>625</b>
	Shreya Chakraborty, Debabrata Singh, and Anil Kumar Biswal	
<b>49</b>	<b>Performance Benchmarking of GPU and TPU on Google Colaboratory for Convolutional Neural Network</b> .....	<b>639</b>
	Vijeta Sharma, Gaurav Kumar Gupta, and Manjari Gupta	
<b>50</b>	<b>A Study on Steam Cleaning Devices and Its Impact on Health and Hygiene</b> .....	<b>647</b>
	Amrita Dey and Sasthi Charan Hens	
<b>51</b>	<b>Video Description Based YouTube Comment Classification</b> .....	<b>667</b>
	Asha Shetty, Bryan Abreo, Adline D'Souza, Akarsha Kondana, and Kavitha Mahesh Karimbi	
<b>52</b>	<b>Internet of Things: Current Research, Challenges, Trends and Applications</b> .....	<b>679</b>
	Dipankar Debnath and Sarat Kr. Chettri	
<b>53</b>	<b>The Possibilities of Artificial Intelligence in the Hotel Industry</b> .....	<b>695</b>
	Sunil Sharma and Yashwant Singh Rawal	
<b>54</b>	<b>Automated Vehicle Emergency Support Using Edge Computing Concept</b> .....	<b>703</b>
	Anonyo Sanyal, Pijush Das, Pratik Gon, and Sutirtha Kumar Guha	

<b>55</b>	<b>Majority Voting Machine Learning Approach for Fault Diagnosis of Mechanical Components</b> .....	713
	Priyanka S. Patil, Mahadev S. Patil, S. G. Tamhankar, Sangram Patil, and Faruk Kazi	
<b>56</b>	<b>Simulation of Colour Image Processing Techniques on Verilog</b> .....	723
	A. Shaikh Abuzar and S. Patil Mahadev	
<b>57</b>	<b>Integrated Multi-biometric Template Security Based on Hybridization of Feature Transformation and Image Transformation</b> .....	737
	Sonali Patil and Pallavi Dhade	
<b>58</b>	<b>Classifying Chromosome Images Using Ensemble Convolutional Neural Networks</b> .....	751
	Muna Al-Kharraz, Lamiaa A. Elrefaei, and Mai Fadel	
<b>59</b>	<b>Power Loss Sensitivity and GWO-Based Approach for Optimal Capacitor and DG Allocation in Distribution System</b> .....	765
	Kingshuk Roy, Laxmi Srivastava, and Shishir Dixit	
<b>60</b>	<b>Real-Time COVID-19 Detection and Prediction Using Chest X-rays and CT Scan: A Comparative Study Using AI</b> .....	781
	Dhwani Trivedi, Meha Dave, Rutvik Patel, Vatsa Dave, and Ghansyam Rathod	
<b>61</b>	<b>Heart Disease Prediction—An Online Consultation Software</b> .....	791
	Monalisa Dey, Anupam Mondal, and Darothi Sarkar	
<b>62</b>	<b>Evaluating Snort Alerts as a Classification Features Set</b> .....	801
	Anas I. Al Suwailem, Mousa Al-Akhras, and Kareem Kamal A. Ghany	
<b>63</b>	<b>A System Design for Combined Approach of WCID and Wavelet Transformation to Optimize the Underwater Image Enhancement</b> .....	813
	Shrinivas Shirkande and Madhukar Lengare	
<b>65</b>	<b>Daily Plant Load Analysis of a Hydropower Plant Using Machine Learning</b> .....	819
	Krishna Kumar, Ravindra Pratap Singh, Prashant Ranjan, and Narendra Kumar	
<b>66</b>	<b>Enhanced Medical Monitoring Wireless Sensors Networks Using Proposed Greedy Multipoint Relays Protocol Algorithm</b> .....	827
	C. Naveeth Babu and V. S. Prakash	
<b>67</b>	<b>Streetlight Management and Control System Using IOT</b> .....	835
	A. R. Aswatha and J. Shwetha	



<b>68</b>	<b>Comprehensive Analysis of Classification Techniques Based on Artificial Immune System and Artificial Neural Network Algorithms</b> .....	<b>845</b>
	Kirti Bala Bahekar	
<b>69</b>	<b>Low Cost IoT-Based Smart Wheelchair for Type-2 Diabetes and Spine-Disorder Patients</b> .....	<b>855</b>
	Sayanti Dutta, Anusha Chaudhuri, and Arindam Chakraborty	
<b>70</b>	<b>Digital Image Forgery Detection Approaches: A Review</b> .....	<b>863</b>
	Mohassin Ahmad and Farida Khursheed	
<b>71</b>	<b>A Framework Based on Latent Neighbourhood and Tensor Based Method for Recommender System</b> .....	<b>883</b>
	Shital Gondaliya and Kiran Amin	
<b>72</b>	<b>An Optimal Demand Response Strategy Using Gray Wolf Optimization</b> .....	<b>893</b>
	Ankit Kumar Sharma, Akash Saxena, Dheeraj Kumar Palwalia, and Bhanu Pratap Soni	
<b>73</b>	<b>Electricity Bill Saving Using Solar Rooftop PV Cell for a Residential Complex in Our Locality—A Case Study</b> .....	<b>909</b>
	Rehan Aziz, Nirban Chakraborty, and Raubins Kumar	
<b>74</b>	<b>Low Cost IoT Based Runaway Syndrome Tracking System</b> .....	<b>919</b>
	Soham Bose and Arindam Chakraborty	
<b>75</b>	<b>Application of Robotic Process Automation</b> .....	<b>929</b>
	Krishna Kumar, Rachna Shah, Narendra Kumar, and Ravindra Pratap Singh	
	<b>Author Index</b> .....	<b>939</b>

# Chapter 11

## Performance Evaluation of $\beta$ Chaotic Map Enabled Grey Wolf Optimizer on Protein Structure Prediction



Akash Saxena, Shalini Shekhawat, Ajay Sharma, Harish Sharma,  
and Rajesh Kumar

### 1 Introduction

Proteins are basic building blocks of cells. Proteins are responsible for all cell activities. Proteins are complex macro-molecules that are formed with amino acids and combined with peptide bonds. During synthesis, amino acid sequences can form a three-dimensional structure. The knowledge of this structure helps doctors to disease prediction. Moreover, the information of this structure is inevitable for drug design, pharmaceuticals and for other clinical investigations. Accurate knowledge of this structure is inevitable and evolved methodologies for finding these, have paramount importance in computational biology stream. The final 3-D structure obtained by protein represented as conformation of peptide chains considering freedom of rotations. This final structure is called native structure of protein and possess minimal free energy value [1].

---

A. Saxena (✉) · S. Shekhawat  
Swami Keshvanand Institute of Technology Management and Gramothan, Jaipur, India  
e-mail: aakash.saxena@hotmail.com

S. Shekhawat  
e-mail: shekhawatshalini17@gmail.com

A. Sharma  
Government Engineering College, Jhalawar, India  
e-mail: ajay\_2406@yahoo.com

H. Sharma  
Rajasthan Technical University, Kota, India  
e-mail: hsharma@rtu.ac.in

R. Kumar  
Malaviya National Institute of Technology Jaipur, Jaipur, India  
e-mail: rkumar.ee@mnit.ac.in