Lecture Notes in Electrical Engineering 796

Manish Kumar Bajpai
Koushlendra Kumar Singh
George Giakos *Editors*

Machine Vision and Augmented Intelligence—Theory and Applications

Select Proceedings of MAI 2021

Springer

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Editors
Manish Kumar Bajpai
Department of Computer Science
and Engineering
IIITDM Jabalpur
Jabalpur, India

George Giakos
Department of Electrical and Computer
Engineering
Manhattan College
New York, NY, USA

Koushlendra Kumar Singh
Department of Computer Science
and Engineering
National Institute of Technology
Jamshedpur
Jamshedpur, India

ISSN 1876-1100 ISSN 1876-1119 (electronic)
Lecture Notes in Electrical Engineering
ISBN 978-981-16-5077-2 ISBN 978-981-16-5078-9 (eBook)
https://doi.org/10.1007/978-981-16-5078-9

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The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Contents

Stock Market Predictions Using FastRNN, CNN, and Bi-LSTM-Based Hybrid Model 1
Konark Yadav, Milind Yadav, and Sandeep Saini

Feature Extraction and Comparison of EEG-Based Brain Connectivity Networks Using Graph Metrics 11
Mangesh Ramaji Kose, Mithilesh Atulkar, and Mitul Kumar Ahirwal

Mathematical Model with Social Distancing Parameter for Early Estimation of COVID-19 Spread 23
Saroj Kumar Chandra, Avaneesh Singh, and Manish Kumar Bajpai

NVM Device-Based Deep Inference Architecture Using Self-gated Activation Functions (Swish) 33
Afroz Fatima and Abhijit Pethe

Development of Universal Polynomial Equation for All the Sub-phases of Human Gait 45
Astha Verma, Vijay Bhaskar Semwal, and Koushlendra Kumar Singh

Application of Equipment Utilization Monitoring System for ICU Equipment Using Internet of Things (IoT) 57
Barath Kumar Babu and Bhoomadevi A

Suryanamaskar Pose Identification and Estimation Using No Code Computer Vision 85
Ujjayanta Bhaumik, Siddharth Chatterjee, and Koushlendra Kumar Singh

A Review on Digital Watermarking-Based Image Forensic Technique 91
Sanjay Kumar and Binod Kumar Singh

An IoT-Enabled Smart Waste Segregation System 101
Subham Divakar, Abhishek Bhattacharjee, Vikash Kumar Soni, Rojalina Priyadarshini, Rabindra Kumar Barik, and Diptendu Sinha Roy

Ear Localization and Validation Using Ear Candidate Set 109
Ayushi Rastogi, Ujjayanta Bhoumik, Chhavi Choudhary, Akbar Sheikh Akbari, and Koushlendra Kumar Singh

Study of Communication Pattern for Perfect Difference Network 121
Sunil Tiwari, Manish Bhardwaj, and Rakesh Kumar Katare

An Approach for Denoising of Contaminated Signal Using Fractional Order Differentiator 129
Koushlendra Kumar Singh, Ujjayanta Bhaumik, Anand Sai, Kornala Arun, and Akbar Sheikh Akbari

Performance Analysis of Machine Learning-Based Breast Cancer Detection Algorithms 145
Sanjay Kumar, Akshita, Shivangi Thapliyal, Shiva Bhatt, and Naina Negi

Static Gesture Classification and Recognition Using HOG Feature Parameters and k-NN and SVM-Based Machine Learning Algorithms 157
C. V. Sheena and N. K. Narayanan

Multiagent-Based GA for Limited View Tomography 167
Raghavendra Mishra and Manish Kumar Bajpai

A Transfer Learning-Based Multi-cues Multi-scale Spatial–Temporal Modeling for Effective Video-Based Crowd Counting and Density Estimation Using a Single-Column 2D-Atrous Net 179
Santosh Kumar Tripathy and Rajeev Srivastava

Modeling and Predictions of COVID-19 Spread in India 195
Saurav Karmakar, Dibyanshu Gautam, and Purnendu Karmakar

A Machine Learning Model for Automated Classification of Sleep Stages Using Polysomnography Signals 209
Santosh Kumar Satapathy, Hari Kishan Kondaveeti, D. Loganathan, and S. Sharathkumar

Improved Performance Guarantees for Orthogonal Matching Pursuit and Application to Dimensionality Reduction 223
Munnu Sonkar, Latika Tiwari, and C. S. Sastry

Epileptic Seizure Prediction from Raw EEG Signal Using Convolutional Neural Network 235
Ranjan Jana and Imon Mukherjee

Social Media Big Data Analytics: Security Vulnerabilities and Defenses 245
Sonam Srivastava and Yogendra Narain Singh

Deep Convolutional Neural Network Based Hard Exudates Detection 255
R. Deepa and N. K. Narayanan

Transparent Decision Support System for Breast Cancer (TDSSBC) to Determine the Risk Factor 265
Akhil Kumar Das, Saroj Kr. Biswas, and Ardhendu Mandal

Deep-Learning-based Malicious Android Application Detection 275
Vikas K. Malviya and Atul Gupta

A New Adaptive Inertia Weight Based Multi-objective Discrete Particle Swarm Optimization Algorithm for Community Detection 287
Ashutosh Tripathi, Mohona Ghosh, and Kusum Kumari Bharti

Automatic Diagnosis of Covid-19 Using Chest X-ray Images Through Deep Learning Models 303
Siddharth Gupta, Palak Aggarwal, Sumeshwar Singh, Shiv Ashish Dhondiyal, Manisha Aeri, and Avnish Panwar

Density-Assessment for Breast Cancer Diagnosis Using Deep Learning on Mammographic Image: A Brief Study 313
Shaila Chugh, Sachin Goyal, Anjana Pandey, Sunil Joshi, and Mukesh Azad

Classification of Land Cover and Land Use Using Deep Learning 321
Suraj Kumar, Suraj Shukla, K. K. Sharma, Koushlendra Kumar Singh, and Akbar Sheikh Akbari

Three-Dimensional Fractional Operator for Benign Tumor Region Detection 329
Saroj Kumar Chandra, Abhishesk Shrivastava, and Manish Kumar Bajpai

Hybrid Features Enabled Adaptive Butterfly Based Deep Learning Approach for Human Activity Recognition 341
Anagha Deshpande and Krishna K. Warhade

A Secure Color Image Encryption Scheme Based on Chaos 365
Rajiv Ranjan Suman, Bhaskar Mondal, Sunil Kumar Singh, and Tarni Mandal

Simulation of Groundwater level by Artificial Neural Networks of Parts of Yamuna River Basin 377
Saad Asghar Moeeni, Mohammad Sharif, Naved Ahsan, and Asif Iqbal

Diabetes Prediction Using Deep Learning Model 393
Nishq Poorav Desai, Utkarsha, Avanish Sandilya, Krishna Kalpesh Patel, and Kanchan Lata Kashyap

Object Detection Using YOLO Framework for Intelligent Traffic Monitoring 405
I. C. Amitha and N. K. Narayanan

A Convolutional Neural Network Model to Predict Air and Water Hazards 413
A. Akshayarathna, K. Divya Darshini, and J. Dhalia Sweetlin

Deep Learning in Quadratic Frequency Modulated Thermal Wave Imaging for Automatic Defect Detection 433
G. T. Vesala, V. S. Ghali, R. B. Naik, A. Vijaya Lakshmi, and B. Suresh

Omni-Directional Zeroth Order Resonator (ZOR) Antenna for L-Band Applications 443
Komal Roy, Rashmi Sinha, Chetan Barde, Sanjay Kumar, Prakash Ranjan, and Anubhav Jain

Detection of Acute Lymphoblastic Leukemia by Utilizing Deep Learning Methods 453
Gundepudi V. Surya Sashank, Charu Jain, and N. Venkateswaran

Feature Optimization of Digital Image Watermarking Using Machine Learning Algorithms 469
Manish Rai, Sachin Goyal, and Mahesh Pawar

Diabetes Classification Using Machine Learning and Deep Learning Models 487
Lokesh Malviya, Sandip Mal, Praveen Lalwani, and Jasroop Singh Chadha

An Efficient Algorithm for Web Log Data Preprocessing 505
Vipin Jain and Kanchan Lata Kashyap

Classification of Idioms and Literals Using Support Vector Machine and Naïve Bayes Classifier 515
J. Briskilal and C. N. Subalalitha

Modeling Indian Road Traffic Using Concepts of Fluid Flow and Reynold's Number for Anomaly Detection 525
V. Varun Kumar, Alankrita Kakati, Mousumi Das, Aarhisreshtha Mahanta, Puli Gangadhara, Chandrajit Choudhury, and Fazal A. Talukdar

Computer-Aided Malaria Detection Based on Computer Vision and Deep Learning Approach 541
Kartik Kumar, Gaurav Chandiramani, and Kanchan Lata Kashyap

Embedded Vision-Based Intelligent Device for the Visually Impaired 553
Mohammad Farukh Hashmi, Sasweth C. Rajanarayanan, and Avinash G. Keskar

Genetic Algorithm Based Resident Load Scheduling for Electricity Cost Reduction 565
J. Jeyaranjani and D. Devaraj

CORO-NET: CNN Architecture to Diagnose COVID-19 Disease Using Chest X-ray Images 575
Rachi Jain and Devendra Kumar Medal

Stochastic Gradient Descent with Selfish Mining Attack Parameters on Dash Difficulty Adjustment Algorithm 589
Jeyasheela Rakkini and K. Geetha

Visualizing and Computing Natural Language Expressions: Through a Typed Lambda Calculus λ 599
Harjit Singh

Non-destructive Fusion Method for Image Enhancement of Eddy Current Sub-surface Defect Images 613
Anil Kumar Soni, Ranjeet Kumar, Shrawan Kumar Patel, and Aradhana Soni

Histogram-Based Image Enhancement and Analysis for Steel Surface and Defects Images 623
Ranjeet Kumar, Anil Kumar Soni, Aradhana Soni, and Saurav Gupta

Predicting Depression by Analysing User Tweets 633
Abhay Kumar, Vaibhav Pratihar, Sheshank Kumar, and Kumar Abhishek

Alzheimer's Disease Diagnosis Using Structural MRI and Machine Learning Techniques 645
Samir Shrihari Yadav and Sanjay Raghunath Sutar

Supervised Machine Learning-Based DDoS Defense System for Software-Defined Network 667
Gufran Siddiqui and Sandeep K. Shukla

A Pluggable System to Enable Fractal Compression as the Primary Content Type for World Wide Web 683
Bejoy Varghese and S. Krishnakumar

Non-destructive Fusion Method for Image Enhancement of Eddy Current Sub-surface Defect Images

Anil Kumar Soni, Ranjeet Kumar, Shrawan Kumar Patel, and Aradhana Soni

1 Introduction

Non-destructive Evaluation (NDE) techniques are broadly used in various industries in order to assess the immaculacy and adequacy of materials and structure components without disturbing the functional properties and worth. The EC testing technique works in the principle of electromagnetic induction for inspection of the metallic materials. EC testing technique is used for detection and sizing of defects in the metallic material, but due to the skin effect phenomenon, penetration of eddy currents into the metallic material is limited and detection of sub-surface defects is challenging [1]. Use of large diameter EC probe and lower excitation frequency increase the detection sensitivity for sub-surface defects by increasing the deeper penetration of eddy current into the material [2–4]. However, the use of large diameter probe and lower excitation frequency cause the blurring or oversizing in defect images and also decrease in resolution as well as SNR [1]. In this regard, combining of defect information (image) from different excitation frequencies as well as different diameter probe are beneficial.

The process of combining two or more images containing complementary as well as redundant information into a single image is called image fusion. Image

A. K. Soni (✉) · S. K. Patel
Department of Electronics and Communication, SoS (E&T), Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh 495009, India
e-mail: anilsoni@ggu.ac.in

R. Kumar
School of Electronics Engineering, Vellore Institute of Technology, Chennai Campus, Chennai 600127, India

A. Soni
Department of Information Technologies, SoS (E&T), Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh 495009, India

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M. K. Bajpai et al. (eds.), *Machine Vision and Augmented Intelligence—Theory and Applications*, Lecture Notes in Electrical Engineering 796,
https://doi.org/10.1007/978-981-16-5078-9_50