

THE FUTURE OF MULTIDISCIPLINARY RESEARCH IN GLOBAL DEVELOPMENT



Editors

Dr. Neeta Baglari

Dr. S. Valli Devasena

Dr. M. Renuka Devi

Ms. Zaiba Khan

Ms. Aaziya A

THE FUTURE OF MULTIDISCIPLINARY RESEARCH IN GLOBAL DEVELOPMENT

Dr. Neeta Baglari

Assistant Professor, Department of Education
Cotton University, Guwahati

Dr.S.Valli Devasena

Assistant Professor
Department of Commerce
Research and Extension Centre
Mother Teresa Women's University, Madurai

Dr.M.Renuka Devi

Professor
School of Information Science
Presidency University, Bangalore

Ms.Zaiba Khan

Assistant Professor (FOBAS-CSE)
RNB Global University, Rajasthan
S.T.Hindu College, Kanyakumari, Tamilnadu

Ms.Aaziya A

Assistant Professor (SG)
Department of Management Studies
Nehru Institute of Engineering and Technology, Coimbatore



www.multispectrum.org

Content

S.No	Title and Authors	Page No
1	The Importance of Emotional Intelligence in Today's Education System <i>Dr. Bhavnabahen Kiritkumar Bhavsar</i>	1-7
2	Disease Diagnosis using Generative AI Y Lalitha Kameswari & Sonu Kumar	8-17
3	Partnerships and Collaborations for Sustainability in Higher Education <i>Dr J. Maria Prema</i>	18-21
4	AI for Carbon Credits: A Comprehensive Review of Innovations and Future Perspectives <i>Vivekanand B. Jadhav</i>	22-26
5	Ephemeral Moments, Lasting Impressions: Aesthetic and Thematic Adaptations of Indian Short Stories in Films <i>Dr. Hirenkumar Dineshbhai Patel</i>	27-44
6	Breeding for the Future: Innovations in Crop Improvement <i>Krishan Pal & Mahendra Kr. Yadav</i>	45-51
7	Comprehending the Fundamental Ideas of AI: Data, Models, and Algorithms <i>S. Sangeetha, N. Annalakshmi & Dr. R. Sujatha</i>	52-58
8	Impacts of Aquatic weed (Eichornia crassipes) to Aquatic Ecosystems <i>Wasudha J. Meshram</i>	59-62
9	Information Technology <i>Ms. Akshaya Sri.D</i>	63-71
10	Library and Women Empowerment <i>Chinmoy Kalita</i>	72-74

11	Comprehending the impact of Citibank's exit on retail customers in Mumbai: A bird's Eye View. <i>Mr. Shaswat Shetty & Mr. Abdullah Shaikh</i>	75-89
12	NEP 2020 : A Paradigm Shift in Indian Education- Opportunities and Challenges <i>Ms. Taranjeet Kaur, Ms. Garima & Mr. Gourav Kamboj</i>	90-98
13	Optimization Techniques and Genetic Algorithms in AI <i>Dr.V.Priyalakshmi & Dr. K. Nandhini</i>	99-103
14	Piperazine Derivatives: A comprehensive review of the latest developments in medicinal chemistry <i>Dr.Pramod Nagraj Patil</i>	104-109
15	Responsible Rural Tourism in the Digital Era <i>Dr. Kanika Mittal</i>	110-116
16	<i>Sesamum indicum</i> : A superfood for sports person-A Review <i>Priyanka Sharma & Dr. Shilpi Sharma</i>	117-121
17	Spinel phase mixed-metal oxides as chemical gas sensor: Review on its surface mechanisms and criteria of selection. <i>Umesh Sankpal</i>	122-125
18	A statistical Study on online shopping: a case study <i>Dr. Prakash Rajaram Chavan</i>	126-130
19	The Impact of Fluoride Exposure on Thyroid Function: A Review of Mechanisms and Consequences <i>Dr. Partha Ghosh</i>	131-133
20	Population Growth and Its Impact on Employment <i>Lavita Saloi</i>	134-139
21	Urban Horticulture: A Sustainable Solution for Growing Cities <i>Mahendra Kumar Yadav</i>	140-147

22	Revolutionizing Early Disease Detection with NLP: AI-Powered Text Analysis in Healthcare Diagnostics <i>A.Ruba & G.Gayathri</i>	148-150
23	AI-Powered Early Detection of Neurological Disorders: A Paradigm Shift in Predictive Healthcare <i>S. Rethinavelan & B. Rajalingam</i>	151-154
25	Watershed Management in India: A Sustainable Approach to Rainfed Agriculture <i>Gayathri. P.M</i>	155-159
26	Perception of farmers towards inheritance farming <i>B. S. Yenagi, Laxmi C. Patil, Rohini Sugandhi, Gurupad Balol, S. V. Hugar, Sridevi Aluri, Geetha L & M. B. Antheravalli</i>	160-163
27	“Study on Fish Marketing System of Dahiwadi Village Tal. Man, Dist. Satara (M.S) India.” <i>A.N. Dede</i>	164-168
28	“The Role of Gender in Workplace Leadership and Economic Growth” <i>Ms Abarna P, Ms.Bavashree R & Ms.Lohitha K</i>	169-171
29	Research on Digital Image Processing Technology and Its Application <i>Gayathri.V & Mythili. D</i>	172-182
30	Women in Indian Agriculture: Pillars of Food Security and Rural Economy <i>Gayathri. P.M</i>	183-186
31	The Intersection of Psychology and Science: Enhancing Research Discovery and Communication <i>D.Sher Meena</i>	187-189
32	Role of Artificial Intelligence in Hydrological Modelling <i>Nida Fatma, Amina Jafri, Monowar Alam Khalid & Arpit Chouksey</i>	190-193

33	Biological Significance and Pharmacological Potential of Plant Resins <i>Sarabjan Deori & Mayur Mausoom Phukan</i>	194-203
34	AI-Powered Chatbot in Financial Services: A Game Changer for Rural Banking <i>Mr.Ragul G, Ms.Rohinipriya K & Ms.Vikashini G</i>	204-207
35	Inter-cycle between Education, Innovation and Entrepreneurship <i>Dr. Deepak A. Nikam</i>	208-211
36	AI-driven analysis of faculty emotions and job satisfaction in hospitality education industry through facial expressions <i>Prof. Prashant Adsule & Mrs. Sneha Prashant Adsule</i>	212-215
37	Chatbot Development Using Retrieval Augmented Generation <i>Dr. A. Vaideghy, Abhijith M & Nirmal Sudhakar J</i>	216-219
38	Contactless Doorbell System <i>Dr. S. Geetharani & Angelin Nidia</i>	220-222
39	A Review of Water Analysis its Concepts <i>P Bhargav Bhusan Rao , K Narendra Kumar Reddy , K Achutha Kumar , K Rajesh, Averineni Ravi Kumar, M. Chinna Eswaraiah</i>	223-233
40	Biofortified Cereal Crops in India <i>Dr. Ravi Kumar & Appy</i>	234-238
41	An Empirical Analysis of HR Decision-Making Processes Using Artificial Intelligence in HRM Practices <i>Dr. V. A. Ragavendran, Dr. P. Sunantha & Dr. S. Vennilaa Shree</i>	239-249
42	Augmented Reality (AR) and Virtual Reality (VR) in Education <i>Ms Zaiba Khan</i>	250-258

43	Eradicating Child Labor in Agriculture: Strengthening Laws and Empowering Communities <i>Ms. Tanaya Wageshwari</i>	259-268
44	Breeding for the Future: Innovations in Crop Improvement <i>Krishan Pal & Mahendra Kr. Yadav</i>	269-276
45	Case Studies and Success Stories in Crop Improvement in India <i>Dr. Ravi Kumar</i>	277-280
46	Data Privacy and Ethical AI <i>Ms Zaiba Khan</i>	281-285
47	Natural Language Processing (NLP) and Conversational AI <i>Ms Zaiba Khan</i>	286-291
48	Quantum Computing: Concepts and Applications <i>Ms Zaiba Khan</i>	292-296
49	The Listening Advantage: How Feedback Shapes Business Evolution <i>Mr. Jayanto Das</i>	297-307
50	The Power of Marketing Automation: Boosting Efficiency and Impact <i>Mr. Jayanto Das</i>	308-317
51	The Role of Quality Seed in Crop Production <i>Dr. Ravi Kumar</i>	318-321
52	Quantum-Driven Resilient Pathway Discovery for Optimized Security and Performance in MANETs under Adversarial Conditions: A Multidisciplinary Approach with IoT and 5G Integration <i>A. Aravind & Dr.A.Poongodi</i>	322-328
53	Transformative Technological Innovations for Sustainable Development: Integrating Green Computing, Smart Systems, and Environmental Informatics <i>Dr.S.Shanthi</i>	329-335

54	Next-Gen Agriculture: Integrating 5G, IoT, and AI for Precision Farming and Soil Health Management <i>Dr. Medikonda Swapna</i>	336-339
55	Innovative IoT and AI Solutions for Early Detection and Prediction of Pancreatic Disease Severity <i>Dr.Sridevi Tharanidharan</i>	340-344
56	Enabling Smart Agriculture through 5G-Connected IoT and AI for Real-Time Crop Insights <i>Likhith SR</i>	345-350
57	Advanced Genomic Approaches for Silkworm Classification and Breeding Optimization <i>Ms.Kumari K</i>	351-355
58	Decoding Silkworm Genomes: A Novel Approach to Species Classification and Genetic Insights <i>Ms.Kumari K & Nithishree K</i>	356-360
59	Multidisciplinary Approaches to Predictive Analytics Using Deep Learning and Reinforcement Learning in Dynamic Data Streams <i>Dr.T.Lalitha</i>	361-365
60	Enhancing Smart City Infrastructure through Edge Computing: Optimizing Real-Time Data Processing for Efficient Urban Management <i>Dr.M.Vanitha Lakshmi</i>	366-370
61	AI and Edge Computing for Real-Time Data Processing in Smart Agriculture and IoT Systems <i>Dr. Vinutha C B</i>	371-374
62	AI and Multidisciplinary Approaches in Kidney Stone Prediction for Personalized Healthcare <i>Sathiyapriya Kannaiyan & Dr.M.Renuka Devi</i>	375-378
63	Multidisciplinary Approach to Early Disease Detection Using Toenail Analysis with Advanced Deep Learning and Computer Vision Techniques <i>Mr. V J. Rajakumar & Dr.A.Somasundaram</i>	379-382

Role of Artificial Intelligence in Hydrological Modelling

Nida Fatma

Department of Environmental Science, Integral University, Lucknow

Amina Jafri

Department of Environmental Science, Integral University, Lucknow

Monowar Alam Khalid

Department of Environmental Science, Integral University, Lucknow

Arpit Chouksey

Water Resources Department, Indian Institute of Remote Sensing, Dehradun

Introduction

Hydrological modelling involves simulating the movement, distribution and behaviour of water within a watershed or catchment area using mathematical equations and computational tools. It uses simplified representations of realworld systems to understand, predict, and manage water resources, encompassing processes like precipitation, runoff, river discharge, evaporation, infiltration, flood forecasting and groundwater flow. These models are useful in water resource management, flood control, drought assessment, and climate change impact studies. These models are useful in predicting the quantity and quality of water in a watershed necessary for the effective management of water resources [Kambarbekov and Baimaganbetov, 2024]. There are many traditional hydrological models developed to apply on numerous watersheds to find out the impact of climate and soil properties on hydrology and water resources [Devia et al., 2015]. The best model is the one that gives close to reality results with the use of the least parameters and the complexity of the model [Devia et al., 2015]. These models are classified into the following types:

1. Empirical Models which are based on observed data and statistical relationships (e.g., Artificial Neural Network, Regression Models).
2. Conceptual Model- These models represent hydrological processes using simplified equations. E.g. SWAT, HEC-HMS).
3. Physically-Based Models- They used detailed physical laws to simulate water flow. (e.g. MIKE-SHE, SHEMAT).

Hydrological systems, spanning from individual river segments to global scales, are becoming increasingly complex due to the dynamic interactions between natural processes and human activities. Traditional hydrological methods struggle to address the inherent non-linearity in these systems. Additionally, analysing large-scale hydrological processes requires managing vast amounts of real-time data [Devia et al., 2015]. In recent years, artificial intelligence (AI), particularly deep learning, has proven to be a powerful tool for handling large datasets and solving complex nonlinear hydrological challenges. AI's potential extends beyond hydrology to fields such as computer vision, bioinformatics, and climate science, where it has shown performance comparable to, or even surpassing, human expertise [Volpi et al., 2023].

Role of AI in hydrological modelling

Artificial Intelligence (AI) has revolutionized hydrological modelling by offering tools to handle complex, nonlinear processes inherent in hydrology. The advantages of using AI over traditional methods includes:

Data-Driven Insights: AI models can analyse vast datasets to identify patterns and relationships that traditional models might overlook.

Enhanced Prediction Accuracy: By learning from historical data, AI models improve the precision of hydrological forecasts.

Real-Time Processing: AI algorithms can process real-time data swiftly, facilitating timely decision-making. [Devia et al., 2015]

Common AI techniques used in hydrology

The most widely utilized AI techniques in hydrological modelling include artificial neural networks (ANNs) and support vector machines (SVMs). ANNs consist of interconnected nodes that process information and adapt through learning from past experiences. On the other hand, SVMs are machine learning algorithms designed for both classification and regression tasks. The most common AI techniques being used are:

Artificial Neural Networks (ANNs): Mimic human brain functions to model complex hydrological processes.

Support Vector Machines (SVMs): Classify and regress hydrological data for pattern recognition.

Random Forests: Utilize ensemble learning for robust predictions.

Deep Learning Models: Capture spatial and temporal dependencies in hydrological data.

AI-driven hydrological models have been applied to various challenges, including flood forecasting, drought monitoring, and water quality assessment. For instance, AI-based flood prediction models have been designed to deliver real-time forecasts of flood events (Figure 1). These models integrate radar and satellite data to estimate rainfall, utilizing artificial neural networks (ANNs) to predict river and stream flood levels.

Similarly, AI-powered drought monitoring models leverage remote sensing data to assess vegetation health and soil moisture, enabling early drought detection and improved water management strategies [Devia et al., 2015]

In water quality modelling, AI techniques such as support vector machines (SVMs) are used to predict pollutant concentrations in water bodies, aiding in pollution source identification and guiding management practices for water quality improvement. [Hosseini Baghanam et al., 2022] explored the selection of key large-scale climate variables in statistical downscaling, incorporating wavelet coherence transforms and ANNs. Additionally, de Moura et al. (2022) assessed the effectiveness of Long Short-Term Memory (LSTM) networks for discharge prediction under shifting climate conditions, shedding light on the strengths and limitations of AI-based models [Natel de Moura et al., 2022]. Nourani (2022)