COGNITION

NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR

G.E. ROAD, RAIPUR - 492 010

CONTENTS

COGNITION

Editorial Note : COGNITION
Volume 3, Issue 1

Dear Reader,

We are delighted to bring to you Volume 3, Issue 1 of Cognition!

As witnessed, NIT Raipur is steadily marching on in creating a strong culture of academics, learning, research, andinnovation. This issue shares the important efforts made in this direction by the Institute fraternity during the quarter January-March 2023.

This issue includes a list of research articles and chapters that have been published in various high-impact factor journals and with reputed publishers. It will, thus, provide you with information on the key research areas in which the institute is making constant progress. It will also share information on the various research projects that have either been approved or sanctioned in this quarter. It also spotlights other research-oriented activities such as awarding of patents; signing of MoUs; conferences, seminars, and STTPs organized. Further, it will feature various start-ups that have been initiated during the quarter.

We are hopeful that these glimpses of the consistent efforts made by the NIT fraternity in academics and research will be a source of pertinent information for you.

We are grateful to Dr. (Mrs) A.B. Soni, Director, NIT Raipur, for her extraordinary and persistent engagement in guiding and inspiring us toward achieving academic success and relevant research outputs.

We are also grateful to our respected Deans, Heads of all the departments, faculty, researchers, scholars, and administrative and non-teaching staff for their support.

You may reach out to us at cognition@nitrr.ac.in for any queries, inputs, or concerns.

Team Cognition wishes you all the very best in your endeavours!

Warm regards!

Editorial Team
Cognition

HEAD	MEMBER	MEMBER	MEMBER

Dr. Ayush Khare
Associate Professor
Department of Physics

Dr. A. K. Dash
Assistant Professor
Department of ME

Dr. Moksha Singh
Assistant Professor
Department of HSS

Dr. Deepak Singh
Assistant Professor
Department of CSE

Graphic Support by :

X-PERT GRAPHICS, Raipur (C.G.)

PATENTS GRANTED TO NIT RAIPUR

1. **Title:** Smart Luggage with Person Carrier
    Names of inventor(s): Dr. Animesh Agrawal and Dr. Suraj Kumar Mukti
    Patent granting authority: Indian Patent
    Patent No.: 377066-001
    Status: Granted
    Month and year of granting: January, 2023
    Summary of the invention:

    We have invented a new design of a SMART LUGGAGE WITH PERSON CARRIER as set forth in the following specification. The claimed portion of the design of the SMART LUGGAGE WITH PERSON CARRIER consists of a compartment, an extendable handle and wheels equipped under a broad body on which a person can sit. Here the suitcase can be used to carry clothes and pulled using the handle to carry it from one place to another using the wheels. In addition, the broad body of the suitcase is capable to hold a person, that is the person can sit on the suitcase, and another person can drag that person while dragging the suitcase. So the suitcase can be converted into a chair on wheels.

2. **Title:** Systems and Methods for Generation and Matching for Biometric Template
    Names of inventor(s): Dr. Narendra D. Londhe, Ishan Bharadwaj and Sunil Kumar Kopparapu
    Patent granting authority: Indian Patent
    Patent No.: 421686
    Status: Granted
    Month and year of granting: February, 2023
    Summary of the invention:

    The inventors have devised a method for generation of biometric template comprising various steps, such as receiving a biometric scan as input; associating plurality of minutiae points on said biometric scan; identifying a core point on said biometric scan. They are creating one or more hypothetical concentric circles taking said core point as center; assigning, to said concentric circle of said one or more concentric circles, said minutiae points; and forming a block based on said concentric circle and said minutiae points that is assigned to said concentric circle; and forming said biometric template based on said block.

    The biometric scan is of one or a combination of finger, face, eye. The method wherein the step of forming said biometric template comprising stacking said block on a stack. In this method of minutiae points for each respective concentric circle form spikes of said circle for formation of respective block, and wherein said spikes depict one or a combination of alignment, position, length, angle, dimensions, and attributes of said minutiae points with respect to said circle. The said multiple blocks are shuffled before arranging onto a stack, based on a transformation key.

PUBLISHED BOOKS & BOOK CHAPTERS

Title of book: Antimicrobial Resistance in Wastewater and Human Health
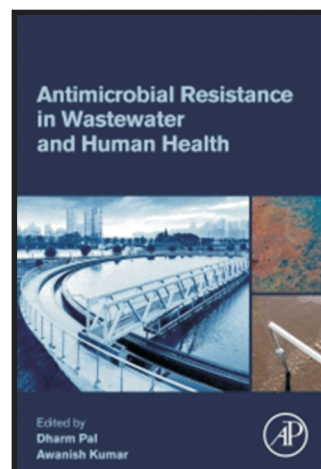
Publisher: Academic Press

ISBN: 9780323994835

Month and year of publication: January 2023

Authors: Dharm Pal and Awanish Kumar

About the book

Antimicrobial Resistance in Wastewater and Human Health provides updated knowledge on the human health risks associated with antimicrobial resistance of wastewater. The book's chapters address commonly found bacteria and drug resistant genes in wastewater, treatment plant problems and challenges, human health hazards, and gaps in current literature. Written for researchers, scientists, graduate and PhD students in the areas of Public Health, Biotechnology, Chemical Engineering, and Environmental Science, this will be an ideal resource.

Title of book: Spaceborne Synthetic Aperture Radar Remote Sensing: Techniques and Applications

Title of book chapter: Extraction and Evaluation of Lineaments from DEMs Generated from Different Bands of Microwave Data and Optical Data: A Case Study for Jahazpur Area, Bhilwara, India

Publisher: Taylor and Francis

ISBN: 9781032069050

Month and year of publication: January 2023

Authors: Shashi Kumar, Paul Siqueira, Himanshu Govil and Shefali Agrawal

About the book

Antimicrobial Resistance in Wastewater and Human Health provides updated knowledge on the human health risks associated with antimicrobial resistance of wastewater. The book's chapters address commonly found bacteria and drug resistant genes in wastewater, treatment plant problems and challenges, human health hazards, and gaps in current literature. Written for researchers, scientists, graduate and PhD students in the areas of Public Health, Biotechnology, Chemical Engineering, and Environmental Science, this will be an ideal resource.
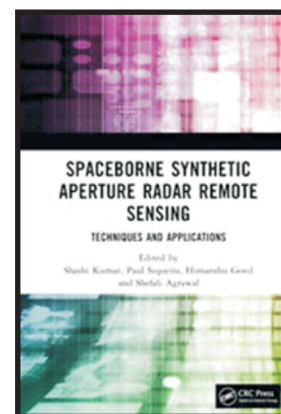
Title of book: Peninsula Geology and Environment

Title of book chapter: Hydrogeological Characteristics of Deccan Trap and Vindhyan Rocks in Sagar City, Madhya Pradesh, India

Publisher: Oxford Book Company

ISBN: 9789355240606

Month and year of publication: January 2023

Authors : D.C. Jhariya, Arun Kumar Shandilya and L.P. Chourasia

About the book

The book PENINSULA GEOLOGY AND ENVIRONMENT, is a compilation of wide spectrum of researches carried out in our country on Peninsular India by the officers/scientists of Geological Survey of India, (GSI), Atomic Mineral Directorate (AMD), Central Ground water Board (CGWB), Mining corporations, Directorate of Geology and Mining (DGM), Manganese Ore India Ltd. (MOIL), National Mineral Development Corporation (NMDC) Coal India Ltd. (CIL), professor/associate professors, research scientists, research scholars of various universities and post graduate colleges. The peninsular region has been studied in the geological past on the various aspects of geology by the geo fraternity and their findings were quite encouraging to youngsters to carry out the future researches in these region.
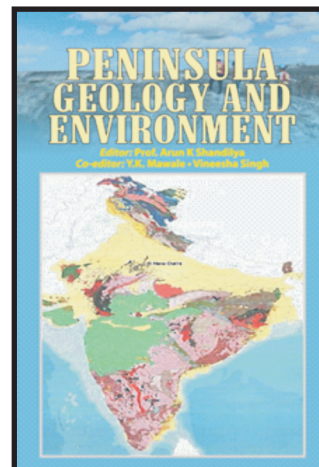
Title of book: Water, Land, and Forest Susceptibility and Sustainability

Title of book chapter: Assessment of COVID-19 Lockdown Impact on Surface water Quality Using Remote Sensing Techniques in Raipur, Chhattisgarh, India

Publisher: Elsevier

ISBN: 978-0-443-15847-6

Month and year of publication: February 2023

Authors: Tanushri Jaiswal, D.C. Jhariya and Rakesh Dewangan

About the book

Water, Land, and Forest Susceptibility and Sustainability, Volume 1: Geospatial Approaches & Modeling brings an interdisciplinary perspective to solving complex problems in sustainability, utilizing the latest research and technologies, and includes case studies that emphasize the applications of remote sensing, GIS, and image processing for addressing the current state and future needs to achieve sustainability. As forests, land, and water are among the most precious resources on earth, emphasizing the need to conserve them for future generations and, of course, a safe and sustainable planet. The assessment of the susceptibility of all these three precious resources must therefore be addressed to inform their sustainable management.
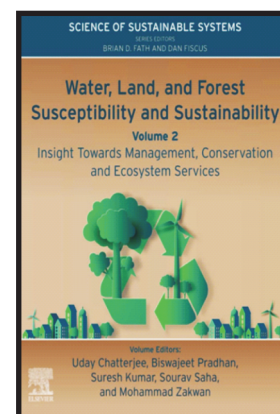
AWARD AND RECOGNITION
(January 2023-March 2023)

Dr. Narendra D. Londhe has recently received global research excellence award at the IEEE IAS Global Conference on Renewable Energy and Hydrogen Technology (GlobConHT2023) conducted at The Male National University, Male, Maldives from 11-12 March 2023. Dr. Narendra D. Londhe is an active researcher since last 14 years in the field of Medical Signal and Image Processing, Medical Informatics, Artificial Intelligence, Speech Processing, Biometrics. He has published more than 160 papers in reputed journals and conference proceedings. He has 01 patent, investigated 06 externally sponsored projects, and supervised 11 PhDs and 21 MTech dissertations. He has been appointed as referee to many conferences and journals, and has delivered numerous invited talks all across the globe.

Memorandum of Understanding (MoU)
(January 2023-March 2023)

Name of Organization: Central Power Research Institute, Bangalore and National Institute of Technology, Raipur

Date of MOU: January 13, 2023

Purpose of MOU

For research purpose to execute the CPRI Sponsored Research Scheme on Power (RSOP) project for Research & Development in the Indian Power sector entitled "Design and Development of Artificial Intelligence Based Short Term Load Forecasting Model".

SPONSORED RESEARCH PROJECTS
(January 2023-March 2023)

Title of the project: Detailed Analytical and Computational Studies of Waiting Time Distribution in Various Queueing Systems

Sponsoring agency: SERB-DST, New Delhi

Duration: January 2023-December 2025

Sanctioned Amount: Rs. 6.60 Lakhs

Principal Investigatior (PI): Dr. Sujit Kumar Samanta, Department of Mathematics

Co-PI: NA

Project Summary

Queueing theory is becoming more and more popular in many organizations such as flexible manufacturing and service systems, transportation systems, computer and telecommunication networks, and healthcare systems in hospital due to the rapid advance of computer technology. The waiting time analysis of these systems is needed to serve customers at a satisfactory level. This is also extremely significant in computer communication system for real-time video and audio traffics. These traffics do not perform well if delay is greater than some threshold limit. To execute and eventually improve the performance and efficiency of these systems, the detailed analytical investigation of waiting time distribution of queueing systems is important.

Title of the project: Design and Development of Artificial Intelligence Based Short Term Load Forecasting Model

Sponsoring agency: Central Power Research Institute, Bangalore

Duration: February 2023-January 2025

Sanctioned Amount: Rs. 20.54 Lakhs

Principal Investigatior (PI): Dr. Anamika Yadav, Department of Electrical Engineering

Co-PI: Dr. Shubhrata Gupta

Project Summary

The objective of the project is the design and development of AI-based load forecasting scheme and numerical techniques to predict the future load demand using real time data set collected from Chhattisgarh state power utilities.

PUBLISHED RESEARCH ARTICLES
(January 2023 - March 2023)

Title: A new wave-based fault detection scheme during power swing

Authors: Pazoki M., Chaitanya B.K., Yadav A.

Journal: Electric Power Systems Research

Volume & year: 216,109077,2023

Web link: https://doi.org/10.1016/j.epsr.2022.109077

Title: Traveling Wave-Based Fault Localization in FACTS-Compensated Transmission Line via Signal Decomposition Techniques

Authors: Mishra S., Gupta S., Yadav A., Abdelaziz A.Y.

Journal: Energies

Volume & year: 16(4),1871 (2023)

Web link: https://doi.org/10.3390/en16041871

Title: Teager energy assisted variational mode decomposition-based fault location technique for STATCOM compensated system

Authors : Mishra S., Gupta S., Yadav A.

Journal : International Journal of Numerical Modelling: Electronic Networks, Devices and Fields

Volume & year : 2023

Web link : https://doi.org/10.1002/jnm.3093

Title: Random Forest Regression-Based Fault Location Scheme for Transmission Lines

Authors: Bhatnagar M., Yadav A., Swetapadma A.

Journal: Lecture Notes in Networks and Systems

Volume & year: 443 (2023)

Web link: DOI: 10.1007/978-981-19-2764-5_17

Title: Torque on the slow rotation of a slightly deformed slip sphere in a Brinkman medium

Authors : Krishna Prasad Madasu and Priya Sarkar

Journal: Pramana – J. Phys.

Volume & year: 97:44 (2023)

Web link : https://doi.org/10.1007/s12043-022-02505-w

Title: Parallel and perpendicular flows of a couple stress fluid past a solid cylinder in cell model: Slip condition

Authors: Priya Sarkar and Krishna Prasad Madasu

Journal: Physics of Fluids

Volume & year: 35, 033101 (2023)

Web link: https://doi.org/10.1063/5.0135866

Title: PsLSNetV2: End to end deep learning system for measurement of area score of psoriasis regions in color images

Authors: Ritesh Raj, Narendra D. Londhe, Rajendra Sonawane

Journal: Biomedical Signal Processing and Control

Volume & year: 79 (2023)

Web link: https://doi.org/10.1016/j.bspc.2022.104138

Title: Armed conflict, children and institution-based rehabilitation - who decides? A qualitative study on decision making capabilities of children in residential care in the state of Chhattisgarh in India

Author: Moksha Singh

Journal: Residential Treatment for Children & Youth

Volume & year: 3 (2023)

Web link: https://doi.org/10.1080/0886571X.2023.2186306

Title: Evaluating the stability of the relationship between land surface temperature and land use/land cover indices: a case study in Hyderabad city, India

Authors: Guha S. and Govil H.

Journal: Geology, Ecology, and Landscapes

Year : 2023

Weblink: https://doi.org/10.1080/24749508.2023.2182083

Title: EEG based classification of children with learning disabilities using shallow and deep neural network

Authors: NP Guhan Seshadri, Sneha Agrawal, Bikesh Kumar Singh, B Geethanjali, V Mahesh, Ram Bilas Pachori

Journal: Biomedical Signal Processing and Control

Volume & year : 82 (2023)

Weblink: https://doi.org/10.1016/j.bspc.2022.104553

Title: Early prediction of pathological complete response to neoadjuvant chemotherapy in breast cancer MRI images using combined Pre-trained convolutional neural network and machine learning

Authors: Priyanka Khanna, Mridu Sahu, Bikesh Kumar Singh, Vikrant Bhateja

Journal: Measurement

Volume & year : 207 (2023)

Weblink: https://doi.org/10.1016/j.measurement.2022.112269

Title: An improved feature selection approach using global best guided Gaussian artificial bee colony for EMG classification

Authors: Padmini Sahu, Bikesh Kumar Singh, Neelamshobha Nirala

Journal: Biomedical Signal Processing and Control

Volume & year : 80 (2) (2023)

Weblink: https://doi.org/10.1016/j.bspc.2022.104399

Title: A dual-modality evaluation of computer-aided breast lesion segmentation in mammogram and ultrasound using customized transfer learning approach

Authors: Kushangi Atrey, Bikesh Kumar Singh, Abhijit Roy, Narendra Kuber Bodhey

Journal: Signal, Image and Video Processing

Year : 2023

Weblink: https://link.springer.com/article/10.1007/s11760-022-02408-8

Title: A new wave-based fault detection scheme during power swing

Authors: Pazoki M., Chaitanya B.K., Yadav A.

Journal: Electric Power Systems Research

Volume & year : 216 (2023)

Weblink: https://www.sciencedirect.com/science/article/abs/pii/S0378779622011269

Title: Traveling Wave-Based Fault Localization in FACTS-Compensated Transmission Line via Signal Decomposition Techniques

Authors: Mishra S., Gupta S., Yadav A., Abdelaziz A.Y.

Journal: Energies

Volume & year : 16 (4) (2023)

Weblink: https://www.mdpi.com/1996-1073/16/4/1871

Title: Empirical Wavelet Transform- Based Differential Protection Scheme for Micro-Grid

Authors: Chaitanya, B.K., Yadav, A.

Journal: International Journal of Numerical Modelling: Electronic Networks, Devices and Fields

Volume & year : 104 (2023)

Weblink: https://link.springer.com/article/10.1007/s40031-023-00869-0

Title: Development of 3D network of Zn-oxide nanorods assisted with PbO2/Pb electrode for electrochemical oxidation of methylene blue in aqueous phase

Authors: Shambhoo Sharan, Ravi Shankar, Ankit Tyagi, Prateek Khare and Ayush Khare

Journal: Journal of the Taiwan Institute of Chemical Engineers

Volume & year : 144 (2023)

Weblink: https://www.sciencedirect.com/science/article/abs/pii/S187610702300069X

Title: An investigation of defects, band-offset, and Schottky barrier height for boosting the performance of Formamidinium mixed cation mixed halide based Perovskite Solar Cell: Theoretical approach

Authors: Neetika Yadav, Priyanka Roy and Ayush Khare

Journal: Materials Science & Engineering B

Volume & year : 293 (2023)

Weblink: https://www.sciencedirect.com/science/article/abs/pii/S0921510723002003

Title: High throughput bioanalytical techniques for elucidation of Candida albicans biofilm architecture and metabolome

Authors : Kumar D., Kumar A.

Journal : Rendiconti Lincei

Volume & year : 34 (2023)

Weblink: https://www.scopus.com/record/display.uri?eid=2-s2.0-85142653353&origin=resultslist&sort=plf-f

Title: Biochemical aspects of effects of mesenchymal stem cell treatment in chronic wounds progressive healing

Authors: Athenery A, Verma N R, Bhargava P, Amle D, Patra P K, Kumar A,

Journal: Cell and Tissue Banking

Volume & year: 24 (1) (2023)

Weblink: https://www.scopus.com/record/display.uri?eid=2-s2.0-85134481101&origin=resultslist&sort=plf-f

Title: Six Phase Transmission Line Protection Using Bat Algorithm Tuned Stacked Sparse Autoencoder

Authors: Rao Althi T., Koley E., Ghosh S., Shukla S.K.

Journal: Electric Power Components and Systems

Volume & year: 51 (2) (2023)

Weblink: https://www.scopus.com/record/display.uri?eid=2-s2.0-85146651912&origin=resultslist&sort=plf-f

Title: Study of dynamical behaviour of prepared mechanoluminescence impact sensor based on ZnS:Mn and SrAl2O4:Eu, Yb phosphors

Authors: Jha P., Khare A., Singh P., Chandra V.K.

Journal: Journal of Luminescence

Volume & year: 258 (2023)

Weblink: https://www.scopus.com/record/display.uri?eid=2-s2.0-85150047710&origin=resultslist&sort=plf-f

Title: Efficient hardware implementations of lightweight Simeck Cipher for resource-constrained applications

Authors: Raja K.P., Mishra Z., Singh P., Acharya B.

Journal: Integration

Volume & year: 88 (2023)

Weblink: https://www.scopus.com/record/display.uri?eid=2-s2.0-85141315713&origin=resultslist&sort=plf-f

Title: A hybrid data-level sampling approach in learning from skewed user-click data for click fraud detection in online advertising

Authors: Sisodia D., Sisodia D.S.

Journal: Expert Systems

Volume & year: 40(2) (2023)

Weblink: https://www.scopus.com/record/display.uri?eid=2-s2.0-85138376909&origin=resultslist&sort=plf-f

Title: A hybrid approach for predicting missing follower–followee links in social networks using topological features with ensemble learning

Authors: Bhattacharya R., Nagwani N.K., Tripathi S.

Journal: Data Technologies and Applications

Volume & year: 57(1) (2023)

Weblink: https://www.scopus.com/record/display.uri?eid=2-s2.0-85134046365&origin=resultslist&sort=plf-f

Title: Underground mine deformation monitoring using Synthetic Aperture Radar technique: A case study of Rajgamar coal mine of Korba Chhattisgarh, India

Authors: Monika, Govil H., Guha S.

Journal: Journal of Applied Geophysics

Volume & year: 209 (2023)

Weblink: https://www.scopus.com/record/display.uri?eid=2-s2.0-85145260781&origin=resultslist&sort=plf-f

Title: DLTIF: Deep Learning-Driven Cyber Threat Intelligence Modeling and Identification Framework in IoT-Enabled Maritime Transportation Systems

Authors: Kumar P., Gupta G.P., Tripathi R., Garg S., Hassan M.M.

Journal: IEEE Transactions on Intelligent Transportation Systems

Volume & year: 24(2) (2023)

Weblink: Scopus - https://ieeexplore.ieee.org/document/9617134

Title: A blockchain-orchestrated deep learning approach for secure data transmission in IoT-enabled healthcare system

Authors: Kumar P., Kumar R., Gupta G.P., Jolfaei A., Najmul Islam A.K.M.
Journal: Journal of Parallel and Distributed Computing

Volume & year: 172 (2023)

Weblink: https://www.sciencedirect.com/science/article/pii/S0743731522002106

Title: Load Forecasting Models in Smart Grid Using Smart Meter Information: A Review

Authors: Dewangan F., Abdelaziz A.Y., Biswal M.

Journal: Energies

Volume & year: 13(3) (2023)

Weblink: https://www.mdpi.com/1996-1073/16/3/1404

Title: EEDCS: Energy Efficient Data Collection Schemes for IoT Enabled Wireless Sensor Network

Authors: Pandey S., Dubey K., Dubey R., Kumar S.

Journal: Wireless Personal Communications

Volume & year: 129(2) (2023)

Weblink: https://link.springer.com/article/10.1007/s11277-023-10190-0

Title: Gradual Electronic Pole Changing Technique to Minimize the Circulating Currents During Pole/Mode Transition in Induction Motor Drive

Authors: Ch Phani Kumar, S.V.S. Sonti, V., Jain S.

Journal: IEEE Transactions on Industry Applications

Volume & year: 59(1) (2023)

Weblink: https://ieeexplore.ieee.org/abstract/document/9896150

Title: A boosting-based transfer learning method to address absolute-rarity in skin lesion datasets and prevent weight-drift for melanoma detection

Authors: Singh L., Janghel R.R., Sahu S.P.

Journal: Data Technologies and Applications

Volume & year: 57(1) (2023)

Weblink: https://www.emerald.com/insight/content/doi/10.1108/DTA-10-2021-0296/full/html

Title: Machine-learning- and deep-learning-based streamflow prediction in a hilly catchment for future scenarios using CMIP6 GCM data

Authors: Singh D., Vardhan M., Sahu R., Chauhan P., Liu S.

Journal: Hydrology and Earth System Sciences

Volume & year: 77(5) (2023)

Weblink: https://hess.copernicus.org/articles/27/1047/2023/

Title: Anaerobic digestion of fruit and vegetable waste: a critical review of associated challenges

Authors: Agrawal A., Chaudhari P.K., Ghosh P.

Journal: Environmental Science and Pollution Research

Volume & year: 30(10) (2023)

Weblink: https://link.springer.com/article/10.1007/s11356-022-21643-7

Title: Thermo-mechanical deformation and stress analysis of a rotating FG hollow cylindrical body

Authors: Sondhi L., Sahu R.K., Bhowmick S., Madan R.

Journal: International Journal of Structural Integrity

Volume & year: 14(2) (2023)

Weblink: https://www.emerald.com/insight/content/doi/10.1108/IJSI-09-2022-0120/full/html

Title: Limit angular speed analysis of porous functionally graded rotating disk under thermo-mechanical loading

Authors: Madan R., Bhowmick S., Hadji L., Alnujaie A.

Journal: Multidiscipline Modeling in Materials and Structures

Volume & year: 19(2) (2023)

Weblink: Scopus - https://www.emerald.com/insight/content/doi/10.1108/MMMS-09-2022-0197/full/html

Title: Substantial relation between the bacterial biofilm and oncogenesis progression in host

Authors: Upadhyay A., Pal D., Kumar A.

Journal: Microbial Pathogenesis

Volume & year: 175 (2023)

Weblink: Scopus - https://www.sciencedirect.com/science/article/abs/pii/S0882401022005794

Conferences / STTPs / FDPs / Workshops Organized
(January 2023-March 2023)

Title of event: One Day Workshop on "Development of CADx System for Psoriasis Area and Severity Index (PASI) Measurement ofPsoriasis Patients from 2D Digital Images"

Duration: January 21, 2023

Organizing department: Electrical Engineering, Funded by DST-SERB Under SSR activity

Organizing Secretary: Dr. Narendra D. Londhe

Course Fee: No Registration Fee

Brief information about the event

The Department of Electrical Engineering at NIT Raipur recently organized a one-day workshop on the development of a Computer Aided Diagnosis (CADx) System for Psoriasis Area and Severity Index (PASI) on 21 January 2023. The workshop was sponsored by the Department of Science and Technology - Science and Engineering Research Board (DST-SERB) under their SSR activity. This workshop was attended by 25 faculty members from different colleges of Raipur. The aim of this workshop was to discuss the challenges associated with developing a CADx system that can accurately diagnose psoriasis. The experts discussed the potential cases for such a system and proposed solutions to address the challenges faced in developing it. Overall, this workshop was a great opportunity for participants to gain knowledge about developing a CADx system and its potential applications in medical diagnosis.

Title of event: International Conference on Biomedical Engineering Science and Technology: Roadway from Laboratory to Market (ICBEST 2023)

Duration: February 10-11, 2023

Organizing department: Department of Biomedical Engineering

Organizing Secretaries: Dr. Saurabh Gupta, Dr. Nishant Kumar Singh and Dr. M. Marieswaran

Chairman: Dr. Bikesh Kumar Singh

Brief information about the event

The second international conference, ICBEST 2023 was organized in hybrid mode. Theme of the conference was computing in Biomedical Research. The event was inaugurated by the chief guest, Padma Shri Dr. Arun T. Dabke, special guest, Dr. Prabhat Diwan, Dean (Research & Consultancy), and the conference chairman, Dr. Bikesh Kumar Singh (HOD, Biomedical Engineering). Two eminent academicians, Prof. Guoan Zheng from the University of Connecticut, USA, and Prof. Sanjeev Kumar Mahto from IIT-BHU, India talked about recent trends in biomedical research as keynote speakers. Research articles focused on Artificial Intelligence in Healthcare, Computational Mechanics in Healthcare and Health Informatics. In two days of the conference, 33 participants from different institutions presented their research work in five different technical sessions. Prof. (Dr.) Narendra K. Bodhey from AIIMS Raipur was the chief guest for the valedictory function of the conference. He expressed his pleasure to see the response of the participants and congratulated the Department of Biomedical Engineering for organizing such an event.

Title of event: One Week Short Term Training Programme (STTP) on Enhancing Personality and Employability amongst Youth

Duration: February 24 -28, 2023

Organizing department: Department of Humanities and Social Sciences

Organizing Secretaries: Dr. Shashikanta Tarai and Dr. Sandip Sarkar

Chairperson: Dr. Jaya Dwivedi

Course Fee: No Registration Fee

Brief information about the event

The entire five-days short term training program was broadly divided into five sessions. The first session commenced with the oral communication and presentation skills, which was delivered by Dr. Smita Sharma, Pt. Ravishankar Shukla University, Raipur. Dr. Shresha Yadav, IIIT Naya Raipur also delivered a lecture and conducted various activities on team management skills. After delivering an invited lecture on interpersonal and leadership skills, Dr. Suparna K., Amity University, Raipur conducted various activities on enhancing the maker instinct, clarity, bio-empathy and immersive learning. At the end of the training session, Dr. Sandip Sarkar provided the evaluation forms to the participants for collecting their feedbacks on the program. Overall, all the activities were meticulously conducted to fulfil all the proposed objectives of the program. The expert lectures were delivered by Dr. Anoop Kumar Tiwari, Dr. Chetna S. Rajput, Dr. Anil Majhi, Dr. Shashikanta Tarai, Dr. Moksha Singh, Dr. Y.V. Babu and Dr. Bidyut Mazumdar.

Title of event: One Week Online STTP on "Quantum Computing and its Applications: Modern Approaches and Practices"

Duration: February 27 - March 3, 2023

Organizing department: Department of Information Technology

Organizing Secretaries: Dr. Rakesh Tripathi and Dr. Chandrashekar Jatoth

Chairman: Dr. Rakesh Tripathi

Course Fee: No Registration Fee

Brief information about the event

The aim of this STTP was to provide up-gradation of knowledge and skills for students/research scholars/faculties/scientists involved in active research in the area of Quantum Computing and its Applications: Modern Approaches and Practices. The course provided in depth exposure to them. This STTP was inaugurated by Chief Guest Dr. Buddha Chandrashekhar, Chief Coordinating Officer (AICTE), Prof. Prabhat Diwan, Dean (R&C), Guest of Honor Dr. Sudhakar Pandey and Dr. S.P. Sahu, Associate Professors, Dept. of IT. The lectures were delivered by Prof. Prasanta K. Panigraphi, Director, IISER Kolkata, Prof. R. K. Shyamasundar, Fellow of IEEE and ACM, ACM Distinguished Speaker, JC Bose National Fellow, IIT Bombay, Prof. Virendra singh, Professor, IIT Bombay, Prof. Vimal Bhatia, IIT Indore, Er. SudeepSateesan, AVP-Technology, First Source Solutions Ltd., Dr. Vignesh Sivaraman, IIT BHU, and Dr. Adam Aglos, Quantum Systems of Informatics Group, Poland. The participants were from various reputed institutes across the India. This one-week STTP coursecomprised of lectures, special case studies in the areas of application of Quantum Computing and its Applications along with the hands-on experiments using distributed platform such as IBM Quantum Computing suite. The valedictory function was conducted in the presence of Chief Guest Prof. Shirish Verma, Dean (Academics), Guest of Honor Dr. Subhojit Ghosh, Chairman (CEC) and Dr. Sudhakar Pandey, Associate Professor, Department of IT.

Title of event: One Day Research Facility Training Program under SERB-DST project titled "Hydrothermal Synthesis of Redox Nanomaterials and Their Characterization"

Duration: March 16, 2023

Organizing department: Department of Biotechnology

Organizing Secretary: Dr. Chinmaya Mahapatra

Chairperson: Dr. Lata Upadhyay

Course Fee: No Registration Fee

Brief information about the event

National Institute of Technology Raipur, Department of Biotechnology organized an one day Research Facility Training Program under SERB-DST project titled "Hydrothermal Synthesis of Redox Nanomaterials and Their Characterization" on 16th March 2023. The key objective of this program was to discuss some critical concepts and fundamental understanding of the state-of-the-art research work. The program offered learning of nanoscale properties and biosensor device design and development including nanomaterial synthesis to material characterizations, and etc. This program was organized by Dr. Chinmaya Mahapatra, Principal Investigator (SERB-SRG Project) and Assistant Professor, Department of Biotechnology, NIT Raipur.

The program started with an inaugural ceremony followed by 5 training sessions on topics "Electrical and Optical Properties of Nanomaterial" by Dr. Ayush Khare, Associate Professor, Department of Physics, "Magnetic nanoparticles and their fabrication" by Dr. Kavita Tapadia, Associate Professor, Department of Chemistry, NIT Raipur, "Nanoparticle based Biosensors" by Dr. Lata Upadhyay, "Hands on training of nanoparticle Characterization" by Dr. Sharda Bharti, Assistant Professor, Department of Biotechnology, NIT Raipur, "Hands on training of hydrothermal synthesis of redox nanoparticles" by Dr. Chinmaya Mahapatra. The program concluded with a valedictory session graced by Dr. J. Anand Kumar , Associate Dean (R&C), where researchers shared their positive feedback and experiences.

Title of event: College and School Students Visit under Scientific Social Responsibility

Duration: March 17, 2023

Organizing department: Applied Geology

Organizing Secretary: Dr. D.C Jhariya

Course Fee: No Registration Fee

Brief information about the event

National Institute of Technology Raipur organized a one-day institute visit of college and school students under Scientific Social Responsibility funded by the Science and Engineering Research Board, Department of Science and Technology, Government of India on 17th March 2023. The research project was funded to Dr. D.C Jhariya, Associate Professor, Department of Applied Geology by SERB-DST. Students from various prestigious colleges and schools of Raipur, Durg and Rajnadgaon attended this program. This one-day visit was aimed to sensitize participants to the various approaches being adopted in the ongoing research work to find out a holistic, well-planned long-term strategy for sustainable water resources development and management in Raipur city. The participants were exposed to various advanced tools and techniques being adopted to carry out hydrogeological and geological studies at the NIT Raipur. The whole program was coordinated Mr. Mayank Shrivastava, Ms. Priyanka Arya and Ms. Jalina Subhdarsini and Laxman Kumar under the guidance of Dr D.C. Jhariya and Dr. Neeraj Vishwakarma, Head, Department of Applied Geology.

UPCOMING EVENTS
(Conference/Seminar/STTP/Workshop, etc.)

1. **Title of event:** Certificate Course in Applied Data Analytics: A Practical Approach

   Duration: May 22- June 21, 2023

   Organizing department: Continuing Education Cell

   Organizing secretaries: Dr. Govind Gupta and Dr. Mridu Sahu

   Chairman: Dr. Subhojit Ghosh

   Course fee: Students of NIT Raipur: Rs. 750 + 18% GST, Outside Students (other than NIT Raipur): Rs. 1000 + 18% GST, Faculty/ Industry Personnel: Rs. 2500 + 18% GST

   Brief information about the event

   The main objective of the course is to help the participants in developing a solid understanding of the Data Science and Analytics techniques like data pre-processing, predictive analysis, fundamental of data statistics, machine learning techniques and data visualization etc., with the help of emerging data analytics tools like Python/R. The mathematical foundation for analyzing the data will add more knowledge about the data and this will help for decision support systems. This certificate course will help to enhance the knowledge of the participants in the field of Data Science and Analytics.

2. **Title of event:** 6th International and 21st National Conference on Machines and Machanisms (iNaCoMM-2023)

   Duration: December 7 - 9, 2023

   Organizing department: Mechanical Engineering

   Organizing secretaries: Dr. S. Sanyal, Dr. R. Suresh Kumar and Dr. N. V. Swamy Naidu

   Chairperson: Director, NIT Raipur

   Course fee: Students and Research Scholars: Rs. 3000, Faculty: Rs. 6000, Industry Personnel: Rs. 8000, IFToMM members: Rs. 5000

   Brief information about the event

   Department of Mechanical Engineering, NIT Raipur under the aegis of Association for Machines and Mechanisms (AMM) is organizing the iNaCoMM-2023 at NIT Raipur. The conference aims at bringing together researchers, industry experts and students working in various aspects of design and analysis of machines and mechanisms. The conference also includes a Students' Mechanism Design Contest (SMDC) where the students from India will participate and produce the mechanisms developed by them in the event.

ARTICLES OF PRIME RELEVANCE

Depression Detection for Students in Higher Education using Social Media Analysis

J.K. Rout

Department of Computer Science and Enggineering, NIT Raipur

Depression is a common mental health condition that affects people of all ages, including college students. College life can be stressful and overwhelming, and it is important to identify and address depression early on. Social media analysis can be a useful tool for detecting depression in college students.

Two students from Indian Institutes of Technology (IITs) died by suicide on February 12 and 13, 2023 [1]. As per a report [2], 122 students of IITs, IIMs, central universities and other centrally funded higher educational institutions committed suicide during 2014-21. As per the same report, the highest number of student suicides were from central universities (37), followed by National Institutes of Technology (NITs) which reported 30 incidents of student suicides. A study by Chakraborty et al. (2021) [3] focused on identifying factors that contribute to suicidal ideation among Indian youth using social media data. The study found that individuals who expressed negative emotions and exhibited social isolation on social media were more likely to experience suicidal ideation. Similarly, a study by Prakash et al. (2021) [4] used sentiment analysis of social media posts to identify individuals at risk of suicide with an accuracy of 85%. Despite these promising results, there is a need for further research and development in the field of social media analytics for depression detection and suicide prevention in India.

Social media platforms like Facebook, Twitter, and Instagram have become an integral part of college students' daily lives. These platforms provide an avenue for students to share their thoughts, feelings, and experiences with their friends and followers. However, social media can also be a source of stress and anxiety, and it can exacerbate feelings of depression.

Social media analysis involves collecting and analyzing data from social media platforms to identify patterns and trends. Researchers can use social media analysis to detect depression in college students by analyzing their social media activity, including their posts, comments, and likes. This approach is non-invasive and does not require students to participate in a traditional clinical assessment.

The process of social media analysis for depression detection in college students can be broken down into the following steps:

1. Data collection: The first step in social media analysis is to collect data from social media platforms. This can be done using various data collection methods, such as web scraping or API calls. The data collected may include students' posts, comments, likes, and other social media activity.

2. Data cleaning and preprocessing: Once the data has been collected, it needs to be cleaned and preprocessed. This involves removing irrelevant or duplicate data, correcting errors, and standardizing the data format. This step is important to ensure the accuracy and consistency of the data.

3. Feature extraction: The next step is to extract relevant features from the data. This involves identifying key words, phrases, or topics that may be indicative of depression. For example, words or phrases like "sad", "alone", or "worthless" may be indicative of depression.

4. Analysis and modeling: Once the relevant features have been extracted, the data is analyzed and modeled using machine learning algorithms. The goal is to identify patterns and trends that may be indicative of depression. The algorithms can be trained on a labeled dataset to learn how to identify these patterns and trends.

5. Interpretation and reporting: The final step is to interpret the results and report them. The results may be presented in various forms, such as a report or dashboard. The report may include insights into the prevalence of depression among college students, the demographic groups that are at higher risk, and the key features that are indicative of depression.
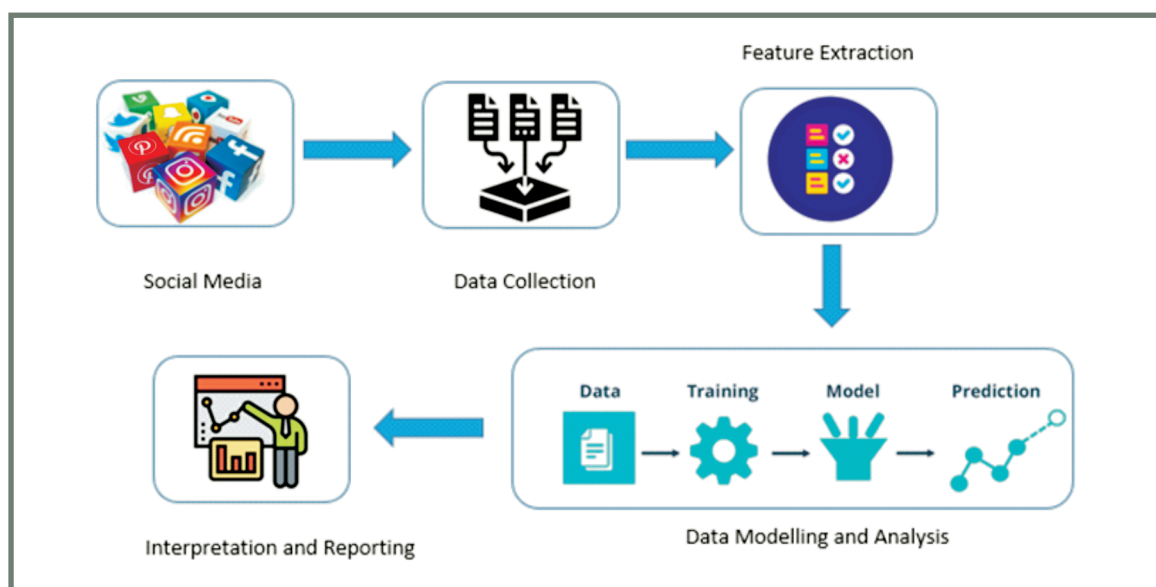

Figure 1 Basic steps of social media analysis for depression detection in college students

There are several benefits to using social media analysis for depression detection in college students. Firstly, social media analysis can provide a wealth of data on students' thoughts, feelings, and behaviors. This data can be analyzed using machine learning algorithms to identify patterns and trends that may indicate depression. Secondly, social media analysis is a cost-effective and time-efficient way to screen large numbers of students for depression. Traditional clinical assessments can be time-consuming and expensive, and many students may not seek help due to stigma or lack of resources.

Another benefit of social media analysis for depression detection in college students is its ability to identify high-risk groups. Research has shown that certain demographic groups, such as LGBTQ+ students, are at a higher risk of depression. Social media analysis can help identify these groups by analyzing their social media activity and detecting patterns and trends that may be indicative of depression.

Despite these benefits, there are also limitations to using social media analysis for depression detection in college students. Firstly, social media analysis is reliant on students' willingness to share their thoughts and feelings on social media. Some students may not use social media, or they may choose not to share their feelings online. This could lead to an underrepresentation of certain groups, which could impact the accuracy of the results. Secondly, social media analysis is not a substitute for a clinical assessment. While social media analysis can be a useful screening tool, it cannot replace a comprehensive assessment by a trained mental health professional.

In conclusion, social media analysis has the potential to be a useful tool for detecting depression in college students. Social media platforms provide a wealth of data that can be analyzed to identify patterns and trends that may indicate depression. Social media analysis is cost-effective, time-efficient, and can identify high-risk groups. However, it is important to recognize the limitations of social media analysis and to use it in conjunction with traditional clinical assessments. By using social media analysis to complement traditional methods of depression detection, we can improve our ability to identify and address depression in college students.

References

[1] https://news.careers360.com/nit-calicut-student-found-dead-3-btech-students-iit-bombay-madras-nit-die-suicide-4-days.

[2] https://www.business-standard.com/article/current-affairs/122-students-of-iits-iims-committed-suicide-in-seven-years-govt-121122000884_1.html.

[3] Chakraborty, T., Nandi, A. K., & Chattopadhyay, A. (2021). Social media and suicide ideation among the Indian youth: A content analysis. Journal of Social and Clinical Psychology, 40(2), 101-109.

[4] Prakash, R., Mukherjee, S., & Bhatia, T. (2021). Suicide detection using sentiment analysis: A comparative study. Journal of Medical Systems, 45(6), 1-9.

Role of Biomarkers in Life Sciences

Khemraj Deshmukh and Arupjyoti Kakati

Research Scholars, Department of Biomedical Enggineering, NIT Raipur

A biochemical, molecular, or cellular alteration that is detectable in biological media, such as tissues, cells, or fluids, has been described as a biological marker (Hulka and Garrett, 1993). Biomarkers can be categorised according to a variety of factors, such as their properties, such as imaging biomarkers (such as those used in computed tomography, positron emission tomography, and magnetic resonance imaging) or molecular biomarkers. Non-imaging biomarkers with biophysical properties that enable measurement in biological samples are referred to as molecular biomarkers. These include nucleic acid-based biomarkers like gene mutations or polymorphisms and quantitative gene expression analysis as well as peptides, proteins, lipid metabolism, and other small molecules. Biomarkers can also be categorised according to how they are used, such as diagnostic biomarkers, disease staging biomarkers, disease prognosis (cancer biomarkers), and biomarkers for tracking the clinical outcome of an intervention. Those utilised in decision-making during the early stages of drug development fall under another category of biomarkers. For example, pharmacodynamic biomarkers are indicators of a particular pharmacological reaction and are particularly relevant to dose optimisation studies [1].

The two subcategories of biomarkers of exposure are internal dose and physiologically effective dosage. The purpose of biomarkers of internal dose is to identify a substance or its metabolites in bodily fluids such as blood, urine, breast milk, and saliva. The existence of genetic polymorphisms for metabolic enzymes and other sources of exposure to that substance can also be revealed by them. Biomarkers of biologically effective dosage evaluate how substances interact with cellular targets such DNA and protein receptors (e.g., measurement of DNA and protein adducts in urine and serum). DNA adducts have grown in popularity and importance as one of the most crucial exposure biomarkers since their existence may be an indication of the risk related to the exposure, despite the fact that the presence of these adducts is easily tested [2].

Biomarkers are molecules that show whether a process in your body is normal or abnormal and may be an indication of a disease or underlying issue [figure 1]. Since each of these molecules reveals something regarding your health, many sorts of molecules, including DNA (genes), proteins, and hormones, can be used as biomarkers. In response to cancer, the body's cells or the cancer tissue itself may release biomarkers. They can be found in various tissues and biological fluids, including the blood, faeces, urine, tumour tissue, and others. It's noteworthy that biomarkers are not just for cancer. Heart disease, multiple sclerosis, and many other illnesses have biomarkers. Understanding the significance of biomarkers in cancer requires having a fundamental understanding of DNA, RNA, and proteins. Deoxyribonucleic acid, or DNA, is a molecule found inside cells that transports genetic data and transmits it from one generation to the next. Information that has been replicated from DNA is found in RNA, also known as ribonucleic acid. Several distinct kinds of RNA molecules are produced by body cells and are required for the creation of protein molecules. For instance, tRNA, or transfer RNA molecules, transport the amino acid residues to the ribosome whereas messenger RNA, or mRNA, molecules act as templates for the creation of proteins from amino acid building blocks.
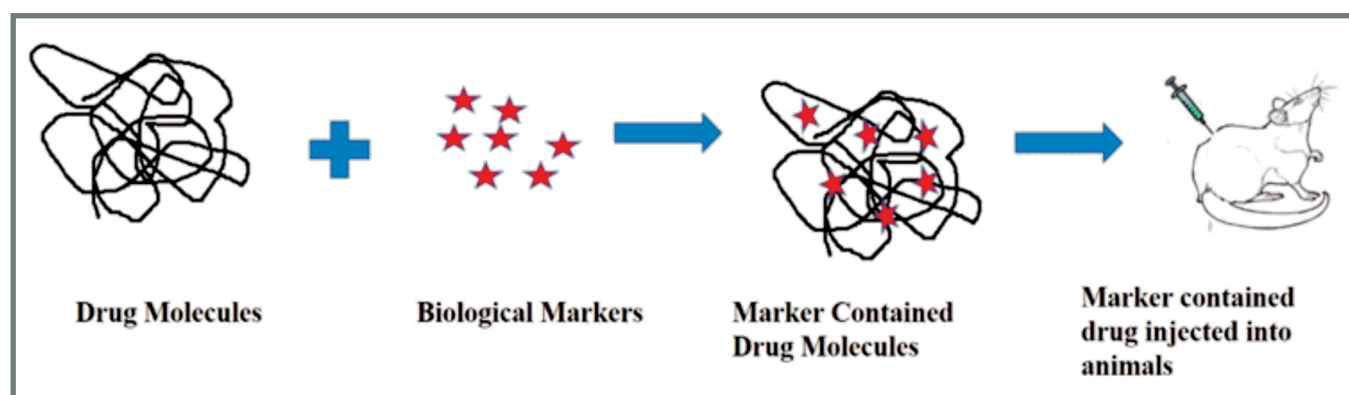

Figure 1 Insertion process of markers in living bodies

Translation occurs when the tRNA "reads" the mRNA template inside the ribosome, an organelle where proteins are generated. Proteins are the building blocks of the body's structures like skin and hair and aid in optimal bodily function. They perform a variety of tasks inside the human body. Enzymes speed up chemical reactions; cytokines influence immune system performance; and antibodies set off particular immunological reactions in response to antigens, potentially hazardous substances that the body must occasionally fight against.

Cancer biomarkers can include:

- Proteins

- Gene mutations (changes)

- Gene rearrangements

- Extra copies of genes

- Missing genes

- Other molecules

When individuals discuss cancer biomarkers, they typically mean proteins, genes, and other substances that have an impact on how cancer cells develop, proliferate, perish, and react to environmental factors in the body. In recent years, researchers have begun to consider DNA alterations and gene expression patterns as potential cancer indicators. The most promising application of cancer biomarkers today is to determine which treatments a specific patient's cancer may or may not respond to. While some cancer biomarkers can be used to predict how aggressively your cancer will grow and are thus useful for assessing your prognosis (outlook), this is not the case for all cancers [3].

The challenge of Biomarker research and development:

Biomarkers are essential instruments in personalised treatment and have wide use across the entire field of biomedicine [Food and Drug Administration (FDA), 2010; Institute of Medicine (IOM), 2010a]. They can help with disease diagnosis, disease risk assessment, or disease prognosis. Biomarkers may be used in the development of drugs to show how a disease pathway is affected by a prospective therapeutic target, how a drug interacts with its target, if a drug is likely to be safe in humans, and at what dose. Before beginning expensive clinical trials, including biomarkers early in the research process to predict which medications are likely to succeed or fail in certain patients has shown promise for increasing the effectiveness of drug development (Eck and Paul, 2010). Biomarkers can be used in personalised medicine to categorise individuals for clinical research or forecast each patient's unique sensitivity to negative medication reactions. The degree to which a certain patient, let's say, has a particular genetic profile, can be predicted using some markers administered at the point of care. In order to decide who should receive a drug or to establish the right dosage, biomarkers that have been sufficiently described and tested for such reasons may be included in a "companion" diagnostic test that is offered alongside a drug. Over the past ten years, the

rate of discovery of new biomarkers has significantly increased due to the development of molecular medicine and the explosion of new "-omics" technologies (such as proteomics and metabolomics) (Ghosh and Poisson, 2009).Almost one million possible biomarkers of interest have been calculated (Vangala and Tonelli, 2007), and the literature mentions hundreds of novel markers every year. Yet, a large number of biomarkers are called but only a few numbers are selected for approved therapeutic usage.

Each year, only a relatively limited number of biomarkers are identified, and even fewer have been consistently dependable enough to receive the necessary regulatory permits for clinical application. Although the number of drug labels containing genomic biomarkers has significantly increased over the past ten years, the FDA only recognised 41 different pharmacogenomic biomarkers as legitimate markers for inclusion in drug labels as of early 2012. Also, the challenges and false starts related to the discovery of biomarkers have long been discussed and reported (Fleming and De Mets, 1996; Lindpaintner, 2010). The science of biomarker discovery and validation is still quite young, which can be partly blamed for the dearth of validated biomarkers. The discovery of additional -omics approaches is far more recent than the human genome sequence, which is only a decade old. The FDA, for instance, did not release its draught guidance document outlining a formal procedure to "qualify" biomarkers for use in drug development until late 2010 Regulatory science has taken even longer to catch up (FDA, 2010). Yet, the fact that the process of developing a biomarker is inherently difficult, iterative, and resource-intensive is another explanation for the dearth of clinically approved biomarkers. This is especially valid for biomarkers that are permitted for usage in conjunction with pharmaceuticals. Even the simplest biomarker development can involve a thorough understanding of disease risk, natural history, and outcomes, execution of multi-site reproducibility studies to test and standardise analytical platforms, and analysis of data from a large number of samples from well-characterized patients (Zerhouni et al., 2007). When a biomarker is useful for different medications or disease pathways, these criteria rise significantly.

References

[1]   Huss, R., 2015. Biomarkers. In Translational regenerative medicine (pp. 235-241). Academic Press.

[2]   Coelho, P.C.S. and Teixeira, J.P., 2014. Biomarkers, Human Health.

[3]   https://doi.org/10.1016/B978-0-12-382227-7.00043-4
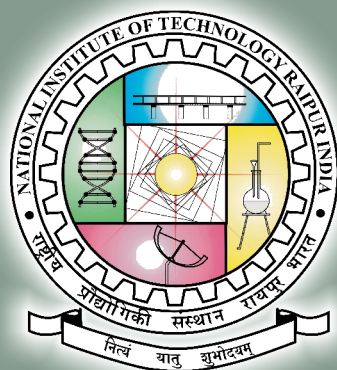
NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR
(An Institute of National Importance)
G. E. Road, Raipur - 492 010 Chhattisgarh
Phone : +91 771-2254200, Website : www.nitrr.ac.in