Himanshu Mittal, Ph.D.

Computer Vision · Bio-medical Image Analysis ·
Machine Learning · Evolutionary Algorithms

himanshurepo.github.io/Himanshu-Mittal
himanshu.mittal224@gmail.com
Mob. No.: +91-9958687894

Research & Development Grant

Science and Engineering Research Board (SERB), India *Rs. 28,18,178/-*

- *Design and Development of a Cognitive System for Leukocytes Identification in Hematoxylin and Eosin Stained Rat Skin Images.* ***Co-Principal Investigator*** *March, 2017 – 2020*
  - Automatic quantification and classification of leukocytes in microscopic images are of paramount importance in the perspective of disease identification, its progress and drugs development. Extracting numerical values of leukocytes from microscopic images of blood or tissue sections represents a tricky challenge. Despite the increasing sophistication of modern diagnostic tools, pathological anatomy is still the principal means by which most of the diagnosis proceeds. Therefore, this project focuses on automating the identify of leukocytes, transmigrated into skin, for reducing time consumption and providing quantitative data for biologist/scientist of preclinical drug development. It includes three phases, namely classification of leukocyte image through deep learning models, segmentation of leukocytes through evolutionary algorithms, and quantification of the identified leukocytes.

List of Publications

JOURNALS

- **Himanshu Mittal** and Mukesh Saraswat, *"A new fuzzy cluster validity index for hyper-ellipsoid or hyper-spherical shape close clusters with distant centroids"*, IEEE Transactions on Fuzzy Systems. (10.1109/TFUZZ.2020.3016339) *(IF: 12.02, SCIE)*
- Raju Pal, Mukesh Saraswat, and **Himanshu Mittal**, *"Improved Bag-of-Features using Grey Relational Analysis for Classification of Histology Images"*, Complex & Intelligent Systems, Springer, vol. 7, pp. 1429-1443, 2021. *(IF: 4.92, SCIE)*
- **Himanshu Mittal**, Avinash Chandra Pandey, Raju Pal, and Ashish Kumar Tripathi, *"A new clustering method for the diagnosis of CoVID19 using medical images"*, Applied Intelligence, Springer, vol. 51, pp. 2988-3011, 2021. *(IF: 5.08, SCIE)*
- **Himanshu Mittal**, Avinash Chandra Pandey, Mukesh Saraswat, Sumit Kumar, Raju Pal, and Garv Modwel, *"A comprehensive survey of image segmentation: clustering methods, performance parameters, and benchmark datasets"*, Multimedia Tools and Applications, Springer, pp. 1-26, 2021. *(IF: 2.75, SCIE)*
- Ashish Kumar Tripathi, **Himanshu Mittal**, Pranav Saxena, and Siddharth Gupta, *"A new recommendation system using map-reduce-based tournament empowered Whale optimization algorithm"*, Complex & Intelligent Systems, Springer, pp. 1-13, 2020. *(IF: 4.92, SCIE)*
- **Himanshu Mittal**, Ashish Tripathi, Avinash Chandra Pandey, and Raju Pal, *"Gravitational search algorithm: a comprehensive analysis of recent variants"*, Multimedia Tools and Applications, Springer, pp. 1-28, 2020. *(IF: 2.75, SCIE)*
- **Himanshu Mittal** and Mukesh Saraswat, *"An automatic nuclei segmentation method using intelligent gravitational search algorithm based superpixel clustering"*, Swarm and Evolutionary Computation, Elsevier, vol. 45, pp. 15-32, 2019. *(IF: 7.17, SCIE)*
- **Himanshu Mittal** and Mukesh Saraswat, *"An optimum multi-level image thresholding segmentation using non-local means 2D histogram and exponential Kbest gravitational search algorithm"*, Engineering Applications of Artificial Intelligence, Elsevier, vol. 71, pp. 226-235, 2018. *(IF: 6.21, SCIE)*
- **Himanshu Mittal** and Mukesh Saraswat, *"An image segmentation method using logarithmic kbest gravitational search algorithm based superpixel clustering"*, Evolutionary Intelligence, vol. 12, pp. 1-13, 2018. *(Scopus Indexed)*

CONFERENCES

- **Himanshu Mittal**, Mukesh Saraswat, Jagdish Bansal and Atulya Nagar, *"Feature selection for Fake-Face Image Classification using Improved Quantum-Inspired Evolutionary Algorithm"*, in Proc. of IEEE Symposium Series on Computational Intelligence, Australia, pp. 989-995, 2020. *(Scopus Indexed)*
- **Himanshu Mittal**, Raju Pal and Mukesh Saraswat, *"Histopathological Image Classification by Optimized Neural Network using IGSA"*, in Lecture Notes of Springer International Conference on Distributed Computing and Internet Technology, pp. 429-436, 2020. *(Scopus Indexed)*
- Avinash Chandra Pandey, Ashish Kumar Tripathi, Raju Pal, **Himanshu Mittal**, and Mukesh Saraswat, *"Spiral Salp Swarm Optimization Algorithm"*, in Proc. of IEEE International Conference on Information Systems and Computer Networks, India, pp. 722-727, 2019. *(Scopus Indexed)*
- Raju Pal, **Himanshu Mittal**, and Mukesh Saraswat, *"Optimal Fuzzy Clustering by Improved Biogeography-based Optimization for Leukocytes Segmentation"*, in Proc. of IEEE International Conference on Image Information Processing, India, pp. 74-79, 2019. *(Scopus Indexed)*
- Tejasv Agarwal and **Himanshu Mittal**, *"Performance Comparison of Deep Neural Networks on Image Datasets"*, in Proc. of IEEE International Conference on Contemporary Computing, India, pp. 1-6, 2019. *(Scopus Indexed)*
- Yajurv Bhatia, Aman Bajpayee, Deepanshu Raghuvanshi, and **Himanshu Mittal**, *"Image Captioning using Google's Inception-resnet-v2 and Recurrent Neural Network"*, in Proc. of IEEE International Conference on Contemporary Computing, India, pp. 1-6, 2019. *(Scopus Indexed)*
- **Himanshu Mittal** and Mukesh Saraswat, *"Classification of histopathological images through bag-of-visual-words and gravitational search algorithm"*, in Lecture Notes of Springer International Conference on Soft Computing for Problem Solving, India, pp. 231-241, 2019. *(Scopus Indexed)*
- **Himanshu Mittal** and Mukesh Saraswat, *"cKGSA based fuzzy clustering method for image segmentation of RGB-D images"*, in Proc. of IEEE International Conference on Contemporary Computing, India, pp. 1-6, 2018. *(Scopus Indexed)*
- Vibhor Gupta, Avneet Singh, Kapil Sharma, and **Himanshu Mittal**, *"A Novel Differential Evolution Test Case Optimisation (DETCO) Technique for Branch Coverage Fault Detection"*, in Lecture Notes of Springer International Conference on Smart Computing and Informatics, India, pp. 245-254, 2018. *(Scopus Indexed)*
- Kartikeya Jaiswal, **Himanshu Mittal**, and Sonia Kukreja, *"Randomized grey wolf optimizer (RGWO) with randomly weighted coefficients"*, in Proc. of IEEE International Conference on Contemporary Computing, India, pp. 1-3, 2017. *(Scopus Indexed)*
- Pavit Singh Sapra and **Himanshu Mittal**, *"Secured LSB Modification using Dual Randomness"*, in Proc. of IEEE International Conference on Recent Advances and Innovations in Engineering, India, pp. 1-4, 2016. *(Scopus Indexed)*
- **Himanshu Mittal**, Raju Pal, Ankur Kulhari, and Mukesh Saraswat, *"Chaotic Kbest gravitational search algorithm (CKGSA)"*, in Proc. of IEEE International Conference on Contemporary Computing, India, pp. 1-6, 2016. *(Scopus Indexed)*
- Raju Pal, **Himanshu Mittal**, Avinash Pandey, and Mukesh Saraswat, *"BEECP: Biogeography optimization-based energy efficient clustering protocol for HWSNs"*, in Proc. of IEEE International Conference on Contemporary Computing, India, pp. 1-6, 2016. *(Scopus Indexed)*
- Ankur Kulhari, Avinash Pandey, Raju Pal, and **Himanshu Mittal**, *"Unsupervised data classification using modified cuckoo search method"*, in Proc. of IEEE International Conference on Contemporary Computing, India, pp. 1-6, 2016. *(Scopus Indexed)*
- **Himanshu Mittal**, *"Diffie-Hellman Based Smart-Card Multi-server Authentication Scheme"*, in Proc. of IEEE International Conference on Computational Intelligence and Communication Networks, India, pp. 14-16, 2014. *(Scopus Indexed)*

BOOK CHAPTERS

- Raju Pal, **Himanshu Mittal**, Avinash Pandey, and Mukesh Saraswat, *"An Efficient Bag-of-Features for Diseased Plant Identification"*, Computer Vision and Machine Learning in Agriculture, Springer, pp. 159-172, 2021. *(Scopus Indexed)*

Work Experience

- **Assistant Professor (Sr. Grade)** March, 2020 - Present
  Jaypee Institute of Information Technology *Noida, India*
- **Assistant Professor (Grade-II)** April, 2015 - Feb., 2020
  Jaypee Institute of Information Technology *Noida, India*
- **Assistant Professor (Grade-I)** Feb., 2013 - March, 2015
  Jaypee Institute of Information Technology *Noida, India*
- **Assistant Professor (Grade-I)** July, 2012 - Feb., 2013
  Galgotias University *Gr. Noida, India*

Education

- **Ph.D. in Computer Science** Aug., 2014 – Feb., 2020
  Jaypee institute of Information Technology *Noida, India*
  - Supervisor: Dr. Mukesh Saraswat [mukesh.saraswat@jiit.ac.in]
- **M. Tech. in Software Engineering** Aug., 2010 – July, 2012
  Delhi Technological University (DTU) *New Delhi, India*
  - Supervisor: Dr. Daya Gupta [d.gupta@dce.ac.in]
- **B.Tech. in Information Technology** Aug., 2006 – July, 2010
  Gautam Buddh Technical University *Gr. Noida, India*

Ph.D. Thesis

- **Design and Development of Efficient Clustering Methods for Image Segmentation.**
  - A novel cluster validity index has been proposed to identify the optimal cluster number.
  - A meta-heuristic based superpixel clustering method has been developed to perform segmentation.
  - A new non-local means 2D histogram has been proposed for multi-level image segmentation.

Research Interests

- Computer Vision, Machine Learning, Deep Learning, Evolutionary Algorithms, Clustering, Reinforcement Learning, Image Analysis

Thesis Guided

- **M. Tech.: Kartikeya Jaiswal** 2015 - 2017
  Topic: Measuring Dimensions of an Object Using a Novel Variant based on Grey-wolf Optimiser

Professional Activities

EVENTS ORGANIZED

- **Member of Publicity Committee, *International Conference on Communication and Intelligent Systems*** Dec., 26-27, 2020
  Virtual Platform
- **Member of Session Management Committee, *Congress on Intelligent Systems (CIS)*** Sept., 05-06, 2020
  Virtual Platform

- **Member of Organizing committee,** ***International conference on contemporary computing (IC3)*** Aug., 8-10, 2013
  JIIT, Noida.
- **Member of Organizing committee,** ***Two-weeks workshop on intelligent internet of things*** June, 24-06, 2019
  JIIT, Noida.
- **Member of Organizing committee,** ***National workshop on computational intelligence*** Dec., 01-02, 2017
  JIIT, Noida.
- **Member of Organizing committee,** ***Faculty development program on Information System Frontiers*** June, 05-10, 2017
  JIIT, Noida.
- **Faculty Coordinator,** ***National workshop on wireless sensor networks and its applications*** Mar., 16-18, 2017
  JIIT, Noida.
- **Faculty Coordinator,** ***National workshop on computational intelligence*** May, 26-28, 2016
  JIIT, Noida.
- **Member of Organizing committee,** ***National workshop on mobile technology*** Mar., 17-18, 2016
  JIIT, Noida.
- **Member of Organizing committee,** ***Faculty development program on mobile technology*** July, 13-18, 2015
  JIIT, Noida.
- **Member of Organizing committee,** ***Faculty development program on wireless sensor networks*** July, 21-26, 2014
  JIIT, Noida.

ADMINISTRATIVE EXPERIENCE

- **Module Coordinator,** ***National Assessment and Accreditation Council (NAAC)*** July, 2020 - Till Now
  JIIT, Noida.
- **Committee member,** ***Departmental data and publication*** July, 2019 - Till Now
  JIIT, Noida.
- **Course Coordinator,** ***Different courses taught*** July, 2014 - Till Now
  JIIT, Noida.
- **Committee member,** ***Institutional Discipline Committee*** July, 2015 - June, 2017
  JIIT, Noida.

EXPERT TALKS

- ***TEQIP-III sponsored FDP on "Applications of AI in Health Care"***
  Topic: Fake-Face Image Classification *Jan. 30-31, 2021*
  Arya College of Engineering and Information Technology, Jaipur, India
- ***TEQIP-III sponsored FDP on "Deep Learning for Industry Applications"***
  Topic: Deep Learning through Python *Jan. 17-20, 2021*
  Rajasthan Technical University, Kota, India
- ***TEQIP-III sponsored Workshop on "Machine Learning: Practical Approach for beginners"***
  Topic: Overview of Python Basics *Aug. 14-19, 2020*
  Global Institute of Technology, Jaipur, India

- ***FDP on Artificial Intelligence and Machine learning using Python***
  Topic: Introduction to Python and its basics *Aug. 10, 2020*
  Jaypee Institute of Information Technology, Noida, India

- ***TEQIP-III sponsored FDP on Artificial Intelligence & Data Analytics***
  Topic: Overview of MATLAB Basics *Aug. 08-09, 2020*
  Srinathji Institute of Technology & Engineering, Nathdwara, India

- ***National Workshop on "Machine Learning and IOT"***
  Topic: Particle Swarm Optimization and its applications *Dec. 13, 2019*
  JIMS Engineering Management Technical Campus, Gr. Noida, India

- ***FDP on "Optimization Techniques and applications"***
  Solving Travelling Salesman Problem using Ant Colony Optimization *July 4, 2019*
  Jaypee Institute of Information Technology Noida, India

- ***Workshop on Deep Learning and its Apllications***
  Programming in Deep Learning *Feb. 26, 2019*
  University of Delhi, New Delhi, India

- ***TEQIP-III sponsored FDP on "Research Methodology and LaTeX"***
  Topic: Research Paper Writing - Tools and Techniques *Sept. 07, 2018*
  B.K. Birla Institute of Engineering &Technology, Pilani, India

- ***TEQIP-III sponsored FDP on "NIA for Engineering Applications"***
  Topic: Overview of optimization algorithms *July 22, 2018*
  Govt. Engineering College, Ajmer, India

EDITED BOOK

- Applied Intelligence for Medical Image Analysis, AAP CRC Press, a Taylor & Francis Group

REVIEWER

- Future Generation Computer Systems, Elsevier
- International Journal of Machine Learning and Cybernetics, Springer
- Electronics and Telecommunications Research Institute (ETRI), Wiley
- International Journal of Intelligent Engineering Informatics, Inderscience

SESSION CHAIR

- Session Chair at "International Conference on Communication and Intelligent Systems", Conference in Virtual Format, Dec., 26-27, 2020.
- Session Chair at "Congress on Intelligent Systems", Conference in Virtual Format, Sept. 05-06, 2020.

EDITORIAL MEMBER

- Technical program committer member of "International Conference on Communication and Intelligent Systems", Conference in Virtual Format, Dec., 26-27, 2020.
- Technical program committer member of "International Conference Communication & Artificial Intelligence", India, Sept. 17-18, 2020.
- Technical program committer member of "Congress on Intelligent Systems", Conference in Virtual Format, Sept. 05-06, 2020.
- Technical program committer member of "International Conference on Cloud Computing, Data Science & Engineering", India, Jan. 29-31 2020.

Programming Skills

- Python, MATLAB, PyTorch, Tensorflow, Keras, OpenCV, Flask, NodeJs, Java, C, C++

Projects

- **Sleeve Classification and GradCAM visualization:** Sleeve Classification using deep convolutional neural network along with visualization of regions that effect the classification process using Grad-CAM method.
- **Color segmentation using evolutionary based clustering:** Evolutionary algorithm based clustering is quite efficient. This project performs color clustering using evolutionary algorithm.
- **Neuroevolution using Evolutionary Algorithm:** This project includes a neural network and evolves it using an evolutionary algorithm to train the network optimally which is further used for classification of IRIS dataset.
- **2D histogram multi-level threshold image segmentation:** This project generates a 2D histogram of a color image using Non-local means which is partitioned according to optimal thresholds which identified through evolutionary algorithm and Renyi Entropy.
- **Classification and feature selection:** To eliminate redundant features in a data, the project selects optimal features using evolutionary algorithm. The selected optimal features train a machine learning model like support vector machine to perform the classification.
- **QR code Generator for Opened Tabs:** This project generates the QR code for all the tabs opened in a browser. This helps in transferring the links from system to another.
- **Road Detection using Superpixel and Neural Network:** This project uses Superpixel method to identify uniform regions in an image which are further analysed for the detection of road using neural network.
- **GUI for BibTex Key Extractor:** This GUI extracts the BibTex key for all the list of research papers saved in a file from Google scholar.
- **Shape Classification in an image:** Segmenting objects in an image using evolutionary algorithm which are further classified into various shapes using Support Vector Machine.

References

- **Dr. Mukesh Saraswat** mukesh.saraswat@jiit.ac.in
  Associate Professor, Department of Computer Science
  Jaypee Institute of Information Technology, Noida, India
- **Dr. Jagdish Chand Bansal** jcbansal@sau.ac.in
  Associate Professor, Department of Mathematics
  South Asian University, New Delhi, India