Dr. Himanshu Mittal

Ph.D. in Computer Vision
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Research & Development Project

- **Design and Development of a Cognitive System for Leukocytes Identification in Hematoxylin and Eosin Stained Rat Skin Images. *(Ongoing)***
  Co-Principal Investigator, SERB-DST, New Delhi
  - 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 focus on automating the identify of leukocytes, transmigrated into skin, for reducing time consumption and providing quantitative data for biologist/scientist of preclinical drug development.

Ph.D. Thesis

- **Design and Development of Efficient Clustering Methods for Image Segmentation.**
  Supervisor: Dr. Mukesh Saraswat, Jaypee Institute of Information Technology, Noida
  - 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.

Publications

- **Himanshu Mittal** and Mukesh Saraswat, *"An automatic nuclei segmentation method using intelligent gravitational search algorithm based superpixel clustering"*, Swarm and Evolutionary Computation, vol. 45, pp. 15-32, 2019. (SCI Indexed. Impact Factor: 6.3)

- **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, vol. 71, pp. 226-235, 2018. (SCI Indexed. Impact Factor: 3.6)

- **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.)

- **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.

- **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, 2018.

- **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.

- **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. 11-13, 2016.

- **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.

- **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. *(Communicated)*
- **Himanshu Mittal**, Mukesh Saraswat, and Raju Pal, "An automatic clustering based image segmentation framework for vision-based IoT devices", Applied Soft Computing. *(Communicated)*
- **Himanshu Mittal**, Mukesh Saraswat, Raju Pal, Ashish Tripathi, and Avinash Pandey, "Feature selection for Fake-Face Image Classification using Improved Quantum-Inspired Evolutionary Algorithm", IEEE CEC 2020. *(Communicated)*

Professional Experience

- **Jaypee Institute of Information Technology** — Noida, India
  Assistant Professor (Sr. Grade) — *Feb., 2013 - Present*
- **Galgotias University** — Gr. Noida, India
  Assistant Professor — *Aug., 2012 - Feb., 2013*

Previous Education

- **M. Tech. in Software Engineering** — Aug., 2010 – July, 2012
  University: Delhi Technological University (Formerly Delhi College of Engineering) — *New Delhi, India*
- **B.Tech. in Information Technology** — Aug., 2006 – July, 2010
  University: Gautam Buddh Technical University — *Gr. Noida, India*

Projects

- **Neuroevolution using Evolutionary Algorithm:** The program evolves the neural network using a evolutionary algorithm to obtain the optimal parameters of the considered network on a particular application.
- **Unsupervised learning using Evolutionary Algorithm:** The program generates optimal clusters using a evolutionary algorithm to perform unsupervised learning.
- **2D histogram multi-level threshold image segmentation using Non-local means and Evolutionary Algorithm:** The program generates a 2D histogram of a color image using Non-local means which is partitioned according to optimal thresholds which identified through exponential kbest gravitational search algorithm and Renyi Entropy.
- **Classification and feature selection using Evolutionary Algorithm:** To eliminate redundant features in a data, the program selects optimal features using gravitational search algorithm. The optimal feature set is used to train a machine learning model like support vector machine to perform the classification.
- **QR code Generator for Opened Tabs:** This program generates the QR code for all the tabs opened in a browser.
- **Road Detection using Superpixel and Neural Network:** This program uses Superpixel 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.
- **Object Classification and Image Segmentation using Evolutionary Algorithm:** Segmenting ROI in an image using differential evolution which are further classified as objects of various shapes using Support Vector Machine.

Research Interests

- Computer Vision, Machine Learning, Deep Learning, Evolutionary Algorithms, Pattern Recognition

Programming Skills

- Python, MATLAB, Tensorflow, Keras, Javascript, HTML, node.js, Java, C

References

- **Dr. Mukesh Saraswat** mukesh.saraswat@jiit.ac.in
  Associate Professor, Jaypee Institute of Information Technology, Noida
- **Dr. Daya Gupta** d.gupta@dce.ac.in
  Professor, Department of Computer Science, DTU, New Delhi