Dr. Prerana Mukherjee

Contact Information

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Employment

Assistant Professor, Dept. of Computer Science, Nov, 2018-.

- **Indian Institute of Information Technology, Sri City**, Andhra Pradesh, India.

Education

Ph.D., Computer Vision, 2018, (CGPA 8.467/10).

- **Indian Institute of Technology Delhi**, New Delhi, India.
- Thesis title: *Saliency and feature based visual object characterization for segmentation and localization*
- Advisor: Dr. Brejesh Lall, Professor
- Coursework: Computer Vision, Soft Computing, Multimedia Systems, Image Processing

M.Tech, Information Systems, 2013 (CGPA 8.8/10)

- **Delhi Technological University**, Delhi, India
- Thesis topic: *Multimodal Personal Authentication Using Gaussian Mixture Model and Support Vector Machine*
- Advisor: Dr. Anil Singh Parihar

B.Tech, Computer Science and Engineering, 2011 (81.54%)

- Guru Gobind Singh Indraprastha University

12^{th}, CBSE, 2007 (88.2%)

- DL DAV MODEL School, Delhi

10^{th}, CBSE, 2005 (91.2%)

- DL DAV MODEL School, Delhi

Current Research Activities

- Design of robust object features for multiclass object classification: with Dr. Brejesh Lall, IIT Delhi. In this respect, we have developed a novel set of features namely using a combination of KAZE and SIFT keypoints termed as SIKA features (**SI**FT-**KA**ZE). We have shown the efficacy of this feature set for object classification. SIKA features were designed to effectively characterize the objects. This is achieved by SIKA because these features serve as a good combination for boundary (KAZE) and saliency (SIFT) information. We have also shown that SIFT and KAZE are complementary features.
- Robust segmentation framework using saliency and object features: with Dr. Brejesh Lall, IIT Delhi. As, saliency map alone cannot always give the best segmentation because at times some background regions can be marked as salient. Also, the segmentation should closely fit the object contours to get neat segmentation. To overcome these issues, the technique is based on saliency and image features (Scale Invariant Feature Transform (SIFT), KAZE etc.) for characterization of objects and subsequent segmentation.

- Object localization: with Dr. Brejesh Lall, IIT Delhi. We are working on the improvement of the object localization capability of the existing algorithms based on saliency and object features.
- Road Safety Video Analytics & Temporal air quality forecasting: with Dr. Brejesh Lall, IIT Delhi and Dr. Aakanksha Chowdhery (2012 Marconi Society Young Scholar and currently affliated with Google AI). In 2017, we worked on increasing road safety by using video analytics from network of cameras mounted on vehicle dashboards in a more complex and chaotic environment like Indian roads particularly Delhi. In 2018, project expanded to air quality assessment in Delhi. Role: Celestini Project India Director. The project page is: **CELESTINI PROJECT INDIA**
- Projective Desktop Varnamala Trainer for interactive learning: with Dr. Brejesh Lall and Dr. Saha (Mechanical Department, IIT Delhi). We would be working on an interactive platform designed to improve the learning by children through an interactive audio visual feedback system. This device uses a projector to render a virtual display, which permits production of large interactive displays.
- Mattress Detection: with Mr. Siddharth Srivastava (CDAC Noida). We would be working on creating an automated solution for mattress detection on a conveyor belt. Using camera and distance sensor the size of the mattress L,B,H (object resolution) is to be estimated.

Refereed Journal Publications

1. Srivastava, S., Mukherjee, P., and Lall, B., **"Characterizing objects with SIKA features for multiclass classification"**, *Applied Soft Computing, Elsevier*, 2015 (Impact Factor:3.541).
2. Mukherjee, P., and Lall, B., **"Saliency and KAZE features assisted object segmentation"**, *Image and Vision Computing, Elsevier*, 2017 (Impact Factor: 2.671).
3. Mukherjee, P., and Lall, B., **"Conditional Random Field based salient proposal set generation and its application in content aware seam carving"**, *submitted to Pattern Recognition*, 2018.

Conference Publications

1. Kaushik, V., **Mukherjee, P.** and Lall, B., "Nrityantar: Pose oblivious Indian classical dance sequence classification system", *in IUPRAI ICVGIP, 2018*, IIIT, Hyderabad (India).
2. **Mukherjee, P.**, Lall, B. and Lattupally S., "Object cosegmentation using deep Siamese network", *in IEEE ICPRAI, 2018*, Montreal, Canada.
3. Srivastava, S., **Mukherjee, P.**, Jaiswal K. and Lall, B., "Object Classification using Ensemble of Local and Deep Features.", *in IAPR ICAPR, 2017*, IISc Bangalore (India).
4. Garg, N., Janveja, I., Malhotra, D., Chawla, C., Gupta, P., Bansal, H., Chowdhery, A., **Mukherjee, P.** and Lall, B., "DRIZY- Collaborative Driver Assistance Over Wireless Networks", *in MobiCom, 2017*, Snowbird, Utah, USA.
5. **Mukherjee, P.**, Lall, B. and Tandon S., "SalProp: Salient object proposals via aggregated edge cues", *accepted in ICIP, 2017*, Beijing, China.
6. **Mukherjee, P.**, Srivastava, S. and Lall, B., "Salient Keypoint Selection for Object Representation", *accepted in Twenty Second National Conference on Communication (NCC), pp. 1-6, 2016*, IIT Guwahati (India).
7. Srivastava, S., **Mukherjee, P.**, and Lall, B., "Adaptive Image Compression Using Saliency and KAZE Features", *International Conference on Signal Processing and Communications (SPCOM), pp. 1-5, 2016*, IISc Bangalore (India).

8. **Mukherjee, P.**, Lall, B., and Shah, A., "Saliency map based improved segmentation", *International Conference on Image Processing (ICIP), Quebec (Canada)*, pp. 1290–1294, 2015.

9. **Mukherjee, P.**, Srivastava, S., Lall, B., Asolkar, S. and Pai, M., "Adaptive Crypto-Steganosystem for videos based on Information Content and Visual Perception", *National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics (NCVPRIPG), pp. 1-4, IIT Patna (India)*, 2015.

10. Qazi, T., **Mukherjee, P.**, Srivastava, S., Lall, B., and Chauhan, N. R., "Automated ball tracking in tennis videos.", *International Conference on Image Information Processing (ICIIP), JUIT, Shimla (India)*, pp. 236-240, 2015.

11. Yadav, H., Srivastava, S., **Mukherjee, P.**, and Lall, B., "A real-time ball trajectory follower using Robot Operating System.", *International Conference on Image Information Processing (ICIIP), JUIT, Shimla (India)*, pp. 511-515, 2015.

12. Srivastava, S., **Mukherjee, P.**, and Lall, B. , "imPlag: Detecting image plagiarism using hierarchical near duplicate retrieval.", *INDICON, Delhi (India)*, pp. 1-6, 2015.

13. Parihar, A. S., Kumar, A., Verma, O. P., Gupta, A., **Mukherjee, P.**, and Vatsa, D., "Point based features for contact-less palmprint images.", *International Conference on Technologies for Homeland Security (HST), Waltham, Massachusetts*, pp. 165-170, 2013.

Book Chapters

1. Agrawal, A., **Mukherjee, P.**, Srivastava, S. and Lall B., "Enhanced Characterness for Text Detection in the Wild", *accepted in CVIP-WM, 2017*, Springer, IIT Roorkee (India).

2. **Mukherjee, P.** and Lall, B., "What is the relation between Artificial Intelligence and Pattern Recognition?", *accepted in book series on "Language Processing, Pattern Recognition, and Intelligent Systems"* by World Scientific.

Doctoral Symposium

1. **Mukherjee, P.**, and Lall, B. , "Object Characterization using saliency and object features", Extended Abstract accepted for **Doctoral Symposium**, ICVGIP 2016, IIT Guwahati (India).

Awards

- Qualified UGC NET in December, 2012. Qualified GATE in February, 2011.
- Received IEEE SPS Travel Grant for ICIP 2015 and ICIP 2017 Conference.
- Received scholarship for securing second position during M.Tech. (Information Systems).
- Received GATE (Graduate Aptitude Test in Engineering) scholarship [2011 - 2013].
- Received IIT-Delhi (MHRD) institute fellowship [July, 2013 to till date]
- Got 3rd position in tech quiz in college fest-CORONA(BPIT), 2nd position technical sloganeering in Fervour(BVP), 2nd position c++ showdown in Fervour(BVP).
- Received Travel Grant from IIT Guwahati for presenting work at ICVGIP 2016 Conference.
- Received IIT Delhi IRD Travel Grant of 1Lac for ICIP 2017 Conference.
- 2nd position in ICPRAI 2018 conference competition.
- Selected for MLSS 2018, Spain (150/500 candidates worldwide selected).
- Shortlisted for NASA Frontier Development Lab 2018 Challenge.

Professional Societies

- Member of IACSIT (International association of computer science and information technology), Indian Unit for Pattern Recognition and Artificial Intelligence (IUPRAI) Life Member, Computer Vision Foundation (CVF) member, INSTICC member and IEEE SPS student member.
- Offered membership by Machine Intelligence and Research (MIR) Labs, Greater Seattle Area,Washington, U.S.

Academic Services

- Media coverage in IITD Press Release on IoT Lab Establishment and Navbharat Times on IoT Lab.
- Media coverage for Celestini Project India 2018 Award Ceremony by top media houses BusinessWire, Financial Express, Hindustan Times, Business Standard, India Today and FirstPost.
- **Research guidance** to B.Tech.(19). and M.Tech.(5) students for internships and thesis projects in domain areas of image processing, computer vision and IoT.
- Actively involved in guiding and assisting many B.Tech. and M.Tech. students in domain areas of image processing, computer vision and IoT during PhD.
- **Reviewer** for IndiCon 2015, Pattern Recognition, Image and Vision Computing, IET Image Processing, WIML 2018 (NIPS Workshop).
- Drafting research grant proposals.
- **Director** Celestini Project India 2017 & 2018. Guided and mentored student teams, organized the final award ceremony, and assisted in design of the problem statement and datasets for student teams. Recognition by Marconi Society.
- **Lead, Organizing team** for Celestini Project India, 2017 competition Award Ceremony held at 10 Nov, 2017 at Bharti School of Telecom Technology and Management, IIT Delhi.
- **Master of Ceremony** for 5G Awareness Workshop held at 15 June, 2018 at Bharti School of Telecom Technology and Management, IIT Delhi.
- **Master of Ceremony & Lead, Organizing Team** for Celestini Project India, 2018 competition Award Ceremony held at 1 Nov, 2018 at Amar Nath and Sashi Khosla School of IT, IIT Delhi.

Publications in preparation

- "Real time video analytics on dashcams to track pedestrians in chaotic traffic conditions.", Prerana Mukherjee, Aakanksha Chowdhery and Brejesh Lall (Conference paper).

Workshops

- Attended Deep Learning Institute workshop organized by NVIDIA at IIT Delhi, 28 Nov, 2017.
- Attended "Deep Learning Summer School for Computer Vision (SSDLCV) 2016" at IIIT Hyderabad.
- Attended MATLAB, Digital Image and Video Processing workshop organized by GRAD at DELHI TECHONOLOGICAL UNIVERSITY, 15-16 Oct, 2011.
- Attended Machine Learning Summer School (MLSS 2018) in Spain from Aug 27, 2018-Sept 7 2018.

Industrial Training

- Completed 6 week Industrial Summer training at CMC Limited, 2008.
- Completed 6 week Industrial Summer training at Almamate Info Tech Private Limited, 2009.
- Completed 2 month Summer Training at ISSA, DRDO, May 2010-June 2010.

Areas of Interest

Image Processing, Computer Vision, Biometrics, Machine Learning, Pattern Recognition, Data Mining.

Skills

Software Packages and Programming Languages

MATLAB, OpenCV, Python, C, C++, C#, Java(Basics), CUDA (for GPU platforms), TensorFlow, Torch, Caffe, NVIDIA Jetson Tx2, Scipy, Numpy, Anaconda, Spider, WEKA, PHP, CSS3, HTML5, ASP (familiar), MySQL (familiar), iPython, Microsoft Visual Studio.NET, Eclipse, MS Office, Latex, ffmpeg.

Teaching and Research Experience

Research Scholar July 2013-present
Dept. of Electrical Engineering, Computer Technology Group
Indian Institute of Technology Delhi
Supervisor: Dr. Brejesh Lall.

Teaching Assistant

- Digital Image Processing — Spring, 2015 and Spring, 2014
  Indian Institute of Technology Delhi
  Instructor: Dr. Brejesh Lall.
- Computer Vision — Fall, 2016
  Indian Institute of Technology Delhi
  Instructor: Dr. Brejesh Lall.
- Data Structures — Fall, 2012
  Delhi Technological University
  Instructor: Ms. Ritu Agarwal.
- Computer Networks — Spring, 2012
  Delhi Technological University
  Instructor: Ms. Anamika Chauhan.