

Gaurav Goswami

Image Analysis and Biometrics lab
IIIT-Delhi
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Research Interests

Computer Vision, Image Processing, Biometrics, Machine Learning.

Education

Ph.D. Computer Science **June 2012 - Present**
Indraprastha Institute of Information Technology Delhi (IIIT-Delhi), India

B. Tech. Computer Science & Engineering **August 2008 - May 2012**
Indraprastha Institute of Information Technology Delhi (IIIT-Delhi), India

Professional Experience

Visiting Research Scholar **Jan 2016 - May 2016**
Dr. Nalini K. Ratha, IBM TJ Watson Research Center, New York, USA

- Design and development of deep learning based face recognition algorithms.

Graduate Research Assistant **June 2012 - Present**
Undergraduate Research Assistant **January 2011-May 2012**
Research Intern **May 2010-July 2010**
Dr. Mayank Vatsa and Dr. Richa Singh, IIIT-Delhi, India

- Video Face Recognition: Designed an algorithm using automated memorability prediction of face images in conjunction with deep learning to perform video face recognition. Initial results show improvement in performance on two benchmark video face datasets, Youtube Faces and PaSC (Point and Shoot Challenge).
- Face Recognition using Kinect: Designed an algorithm to utilize RGB-D images produced by Kinect for face recognition. The algorithm outperformed various other descriptors on multiple datasets.
- Sketch Recognition: Designed a sketch recognition system based on a combination of local texture features and characteristic attributes. The algorithm outperformed the existing state-of-the-art on multiple datasets including extended gallery environments.
- Face Recognition CAPTCHA: Designed a CAPTCHA based on using face recognition as Turing test. The developed CAPTCHA demonstrated high human performance and robustness towards automated algorithms.
- Local Image Descriptor for Face Recognition: Designed a novel local image descriptor for the purpose of face recognition using entropy, visual saliency and Steven's power law. The descriptor outperformed various other algorithms on two datasets pertaining to different types of face recognition challenges.

Visiting Research Scholar

May 2011 - July 2011

Dr. Afzel Noore, Lane Department of Computer Science and Electrical Engineering, West Virginia University, USA

- Face Detection CAPTCHA: Designed a CAPTCHA based on human face detection in an image. The developed CAPTCHA showcased excellent human accuracy and resilience towards automatic face detectors.

Awards/Achievements

- Recipient of the IBM PhD fellowship award for 2015-2016.
- Ranked 3rd at the IDRBT (Institute for Development and Research in Banking Technology) Doctoral Colloquium held in December 2014.
- Recipient of best Doctoral Consortium presentation award at IEEE/IAPR International Joint Conference on Biometrics (IJCB, 2014).
- Recipient of best poster award for the paper "On RGB-D Face Recognition using Kinect" at IEEE International Conference on Biometrics: Theory, Applications and Systems (BTAS, 2013).
- Qualified for the ACM Inter-Collegiate Programming Contest (ICPC) National Level, Amritapuri, December 2010. Ranked 49 out of 130 Teams.
- Recipient of IIT-Delhi scholarship in 2008 on basis of merit in entrance exam.

IP Disclosure/Patent

- Two patents currently under internal review at IBM TJ Watson Research Center, New York, 2016.
- B. Powell, G. Goswami, M. Vatsa, R. Singh and A. Noore, Optimized Distortion: Face Detection and Face Recognition CAPTCHAs, 2014 (IP disclosure accepted)

Publications

Journals

- **G. Goswami**, M. Vatsa, and R. Singh, Video Face Verification via Learned Representation on Feature-Rich Frames, 2016. (Submitted, under review)
- P. Mittal, A. Jain, **G. Goswami**, M. Vatsa, and R. Singh, Composite sketch recognition using saliency and attribute feedback, Information Fusion, Volume 33, Pages 86-99, 2017, Impact Factor: 4.353.
- A. Sankaran, **G. Goswami**, M. Vatsa, R. Singh, and A. Majumdar, Class Sparsity Signature based Restricted Boltzmann Machines, Pattern Recognition, 2016. Impact Factor: 3.399. (Available online, <http://dx.doi.org/10.1016/j.patcog.2016.04.014>)
- **G. Goswami**, P. Mittal, A. Majumdar, M. Vatsa, and R. Singh, Group Sparse Representation based Classification for Multi-feature Multimodal Biometrics, Information Fusion, Volume 32(B), Pages 3-12, 2016, Impact Factor: 4.353.
- **G. Goswami**, M. Vatsa, and R. Singh, RGB-D Face Recognition with Texture and Attribute Features, IEEE Transactions on Information Forensics and Security, Volume 9(10), Pages 1629-1640, October 2014, Impact Factor: 2.441.
- **G. Goswami**, B. Powell, M. Vatsa, R. Singh, and A. Noore, FR-CAPTCHA: CAPTCHA Based on Recognizing Human Faces. PLoS ONE, Volume 9, 2014, Impact Factor: 3.234.
- B. Powell, **G. Goswami**, M. Vatsa, R. Singh, and A. Noore, fgCAPTCHA: Genetically Optimized Face Image CAPTCHA, IEEE Access, Volume 2, Pages 473-484, 2014, Impact Factor: 1.249.

- **G. Goswami**, B. Powell, M. Vatsa, R. Singh, and A. Noore, FaceDCAPTCHA: Face detection based color image CAPTCHA, Future Generation Computer Systems, Volume 31, Pages 59-68, 2014, Impact Factor: 2.430.

Book Chapters

- **G. Goswami**, M. Vatsa, and R. Singh, Face Recognition with RGB-D images using Kinect, in Face Recognition across the Imaging Spectrum, Springer International Publishing, 2016, pp. 281-303.
- T.I. Dhamecha, **G. Goswami**, R. Singh, and M. Vatsa, On Frame Selection for Video Face Recognition, in Advances in Face Detection and Facial Image Analysis, Springer International Publishing, 2016, pp. 279-297.
- **G. Goswami**, R. Singh, and M. Vatsa, Automated Spam Detection in Short Text Messages, in Machine Intelligence and Signal Processing, Springer India, 2016, pp. 85-98.

Conferences

- **G. Goswami**, N. Ratha, M. Vatsa, and R. Singh, Improving Classifier Fusion via Pool Adjacent Violators Normalization, 23rd International Conference on Pattern Recognition, 2016. **Oral Presentation**
- B. Powell, **G. Goswami**, M. Vatsa, R. Singh, and A. Noore, A Multibiometrics-based CAPTCHA for Improved Online Security, 6th IEEE International Conference on Biometrics: Theory, Applications and Systems, 2016.
- R. Bhardwaj, **G. Goswami**, R. Singh and M. Vatsa, Harnessing Social Context for Improved Face Recognition, IAPR International Conference on Biometrics, 2015.
- A. Jain, P. Mittal, **G. Goswami**, M. Vatsa and R. Singh, Person Identification at a Distance via Ocular Biometrics, In Proceedings of IEEE International Conference on Identity, Security and Behavior Analysis, 2015.
- **G. Goswami**, R. Bhardwaj, M. Vatsa, and R. Singh, MDLFace: Memorability augmented deep learning for video face recognition, IEEE/IAPR International Joint Conference on Biometrics, 2014. **(Oral Presentation)**
- P. Mittal, A. Jain, **G. Goswami**, M. Vatsa, and R. Singh, Recognizing Composite Sketches with Digital Face Images via SSD Dictionary, IEEE/IAPR International Joint Conference on Biometrics, 2014.
- **G. Goswami**, S. Bharadwaj, M. Vatsa, and R. Singh, On RGB-D Face Recognition using Kinect, 6th IEEE International Conference on Biometrics: Theory, Applications and Systems, 2013 **(Received the Best Poster Award)**.
- **G. Goswami**, R. Singh, M. Vatsa, B. M. Powell, and A. Noore, Face Recognition CAPTCHA, 5th IEEE International Conference on Biometrics: Theory, Applications and Systems, pages 412-417, 2012.

Technologies Developed/Transferred

- Face Detection and Recognition CAPTCHA Organization: West Virginia University, USA, 2014.
- Face Recognition System for Pose, Illumination and Expression Variations Organization: Department of Electronics and Information Technology, India, 2013.

Teaching Experience

Semester	Course	Role	Level
Winter 2013	Data Structures and Algorithms	Senior Teaching Assistant	UG
Monsoon 2012	Image Analysis	Teaching Assistant	UG
Monsoon 2012	Machine Learning	Teaching Assistant	UG/G
Monsoon 2010	Introduction to Programming	Teaching Assistant	UG

Undergraduate Research Students

Name	Research Topic	Year
Ekampreet Kalsy	Object Recognition CAPTCHA	May 2015 - April 2016
Abhishek Gupta and Jatin Thapar	Biometric CAPTCHA	Jan 2014 - April 2015
Romil Bhardwaj	Social context and video face recognition	Jan 2014 - April 2015
Aishwarya Jain and Paritosh Mittal	Composite sketch recognition	May 2013 - Jan 2016

Professional Activities

- Student Member - IEEE
- Reviewer for
 - IEEE Transactions on Image Processing
 - IEEE Transactions on Human-Machine Systems
 - Information Fusion
 - Pattern Recognition Letters
 - IEEE/IAPR International Joint Conference on Biometrics