UPAL MAHBUB Ph.D.

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RESEARCH INTEREST

Computer vision and machine learning for detection and multi-modal authentication.

EDUCATION

- **Ph.D. in Electrical and Computer Engineering**,   *2013 - 2018*
  University of Maryland College Park, Maryland. Advisor: Prof. Rama Chellappa.
- **M.Sc. in Electrical and Computer Engineering**,   *2013 - 2017*
  University of Maryland College Park, Maryland.
- **M.Sc. in Electrical & Electronic E01ngineering**,   *2009 - 2011*
  Bangladesh Univ. of Engineering & Technology, Dhaka, Bangladesh.
- **B.Sc. in Electrical & Electronic Engineering**,   *2004 - 2009*
  Bangladesh Univ. of Engineering & Technology, Dhaka, Bangladesh.

AWARDS, HONORS AND SCHOLARSHIPS

1. **Best Paper Award**, 7th IEEE UEMCON, 2016. (http://www.ece.umd.edu/news/news_story.php?id=10051)
2. **Best Poster Award,** 8th IEEE BTAS, 2016. (http://www.ece.umd.edu/news/news_story.php?id=9971)
3. **Distinguished Graduate Fellowship**, A. James Clerk School of Engineering, UMD, 2013
4. **Best Paper Award** in IEEE Int'l Conf. Computer and Information Technology (ICCIT), 2011

EMPLOYMENT AND ASSISTANTSHIP

- **Senior Engineer**, QCT MMR&D, Qualcomm Technologies Inc., San Diego, CA *Sep 2018 – present*
- **Graduate Research Assistant** under Prof. Rama Chellappa at UMD   *Fall 2014 – Summer 2018*
- **Research Intern,** C*omcast Applied AI Research Group, Washington DC, USA.   Jun. 2017 – Aug. 2017*
- **Visiting Researcher,** *Google Advanced Technology and Projects Group ("ATAP") Authentication Research ("Sprint") 2015, Tech Corner, Sunnyvale, CA. Google ATAP assembled twenty-five researchers from sixteen research institutions and private companies to foster research in the field of multimodal authentication by facilitating cross-pollination of ideas among disciplines.*   *Jan. 2015 - Apr. 2015*
- **Biometric Research Intern,** *Digital Signal Corporation, Chantilly, VA, USA*   *Jun. 2014 – Aug. 2014*
- **Faculty at** *Dept. of Electrical and Electronic Eng., BUET, Dhaka, Bangladesh.*
    - **Assistant Professor**   *Oct. 2012 – Aug. 2018*
    - **Lecturer**   *Nov. 2009 – Sep. 2012*

RESEARCH EXPERIENCES

Active Authentication
1. Developed the facial segments-based face detector (FSFD) during the **Google ATAP sprint** for detecting partial and occluded facial images captured with frontal camera of a cell-phone under various illumination (ICIP 2016).
2. Developed improved partial face detection algorithms, namely the SegFace (FG 2017), DeepSegFace (FG 2017), and DRUID (Elsevier IVC - Under Review), that outperforms most of the state-of-the-art face detectors. Introduced the concept of "Segment Dropout".
3. Coordinated the collection of University of Maryland Active Authentication Dataset 02 (UMDAA-02) using Google research phones and produced benchmark results (BTAS 2016).
4. Developed **Marginally Smoothed Hidden Markov Model (MSHMM)** for continuous authentication using location history data from smartphones (IEEE UEMCON 2016, **Best paper award**).
5. Developed a unique **facial segment-based deep CNN architecture** namely, SPLITFACE, for detecting attributes from partially visible faces (IEEE Affective Computing – Under Review).

Face Recognition, Verification and Image Processing, Neural Network Analysis

1. Working on the IARPA sponsored **JANUS project**. Developed novel facial attribute detection networks based on facial segments (IEEE TAFFC 2018).
2. Significant contribution in developing UPSET and ANGRI **adversarial Networks** for fooling high performance deep classifiers (S. Sarkar, A. Bansal, U. Mahbub and R. Chellappa, 2017. https://arxiv.org/abs/1707.01159).
3. Developed a complete **face verification framework** for home surveillance that works in real-time using open source tools and a novel feature matching technique (Internship at Comcast, 2017).
4. Analysis of convolutional neural networks and an interesting investigation of the discriminative power of the features obtained from the discriminator network of a **Generative Adversarial Network (GAN)**. (Deep Learning Coursework reports: https://drive.google.com/open?id=0B0HErE59aYeEVDNrc3YxbXpIVXc).
5. Face recognition from occluded 3D scans using sparse representations, fine alignment of 3D faces using ICP and other methods (Internship at Digital Signal Corporation, 2014).
6. Implemented image and video compression techniques using DCT and embedded zero tree, and more. Codes and reports: http://upalmahbub.webnode.com/news/image-and-video-processing/).

Other Research Experiences

1. Action localization and recognition by statistical analysis of optical flow (**best paper award in ICCIT, 2011**).
2. One Shot Learning Gesture Recognition employing Motion History Image (Elsevier PRL 2013)
3. Efficient adaptive filter-based single channel acoustic echo canceller using both time and frequency domain techniques (CSSP, Springer, 2014; Advances in Electrical Engineering, Hindawi, 2014).
4. Wavelet based and prosody related features for voice disorder detection (AJBET 2015, ISCAS 2012).

PUBLICATIONS

1. **Mahbub, U.**; Komulainen, J.; Ferreira, D.; Chellappa, R., "Continuous Authentication of Smartphones Based on Application Usage," in *IEEE Transactions on Biometrics, Behavior, and Identity Science*, vol. 1, no. 3, pp. 165-180, July 2019 (IEEE T-BIOM 2019).
2. **Mahbub, U.**; Sarkar, S.; Chellappa, R., "Segment-based Methods for Facial Attribute Detection from Partial Faces," in *IEEE Transactions on Affective Computing*, 2018 (IEEE TAFFC 2018).
3. **Mahbub, U.**; Sarkar, S.; Chellappa, R., "Pooling Facial Segments to Face: The Shallow and Deep Ends", The 12th IEEE Conference on Automatic Face and Gesture Recognition, 2017 (FG2017).
4. **Mahbub, U.**; Chellappa, R., "PATH: Person Authentication using Trace Histories", The 7th IEEE Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (IEEE UEMCON), 2016
5. **Mahbub, U**.; Sarkar, S.; Patel, V. M; Chellappa, R., "Active User Authentication for Smartphones: A Challenge Data Set and Benchmark Results", 8th IEEE Int'l Conf. on Biometrics: Theory, Applications, and Systems (BTAS), 2016

All publications: https://scholar.google.com/citations?user=IfZ0gLwAAAAJ&hl=en. Bitbucket: https://bitbucket.org/omeecd/

LEADERSHIP AND MANAGEMENT EXPERIENCES

➢ **Editor:** · Book Title: Contactless Human Activity Analysis, Springer Verlag, Germany. 2020. · Advances in Human Action, Activity and Gesture Recognition (AHAAGR), A Virtual Special Issue for Pattern Recognition Letters, Elsevier. 2020
➢ **Track Chair**, 4th Int. Conf. on Imaging, Vision & Pattern Recognition (IVPR), Japan, 22-25 June, 2020.
➢ **Finance and Registration Secretary** (2012-2014), Intl. Conf. of Informatics, Electronics & Vision (ICIEV) – acknowledged for **exceptional contribution** (ICIEV 2012) and received **'Excellent Organizer- Plaque of Appreciation'** from the conference general chair (ICIEV 2013).
➢ **Chair** (2011-2013) GOLD Affinity Group and **Student Activities Chair**, (2013), IEEE Bangladesh Section
➢ **Faculty Advisor,** BUET Lunabotics Team – BUET Mechatrons, NASA's 4th Annual Lunabotics Mining Competition, 2013 – 15th place in the world ranking, 3rd place in the Luna World-Wide Award

ACTIVITIES AND AFFILIATIONS

1. Reviewer: IEEE TIFS, Springer CSSP, MIS Hindawi, CVIU, IEEE T-BIOM, TVCJ, icIVPR17, IJCVSP, CVPR 2011, ICIEV 2012-16, MIPR 2020.
2. Winner, Digital Card Section, UMD Graduate School Holiday Card Contest 2017 (https://www.gradschool.umd.edu/holidaycard2017).