

Mahmudul Hasan

Senior Researcher, Comcast Labs, Washington, DC

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RESEARCH INTERESTS

- Computer Vision: Activity Recognition, Object Recognition, Video Description, Tracking, and Media Analytics.
- Machine Learning: Active Learning, Deep Learning, and Reinforcement Learning.

EDUCATION

Doctor of Philosophy, Computer Science, Sep 2011 – August 2016
University of California, Riverside. GPA: 3.85/4.00
Dissertation Title: Online Activity Understanding and Labeling in Natural Videos.

Master of Science, Computer Science and Engineering, Jul 2009 - Jun 2011
Bangladesh University of Engineering and Technology (BUET). GPA: 3.75/4.00
Dissertation Title: Automatic Detection and Recognition of Vehicle License Plate in Bangla.

Bachelor of Science, Computer Science and Engineering, Mar 2004 - Dec 2008
Bangladesh University of Engineering and Technology (BUET). GPA: 3.85/4.00

TECHNICAL SKILLS

- Programming Skills: **Python, C/C++, Matlab, Lua**, R, Java, and C#.
- Deep Learning Tools: Torch, Keras, Caffe, and TensorFlow.
- Operating Systems: Windows, Mac OS, and Linux.
- Other Expertise: MS Office, Shell Script, Latex, Docker, CMake, JSON, MySQL, RabbitMQ, ZMQ, HTML, CSS, ffmpeg, OpenCV, libSVM, scikit-learn, etc.

WORK EXPERIENCE

Senior Researcher, Comcast Labs, Washington, DC. Aug 2016 – Present
Manager: Jan Neumann.

- Smart Resume for Xfinity X1 platform that has more than 22 Million subscribers. (C++, Python, and Shell)
 - Researched and developed the core module of the overall system that includes detection of commercial breaks from the streaming video of various TV networks.
 - Collaborated with the engineering team to deliver efficient and optimum solution as a service.
- Video Analytics for Xfinity Home security system. (C++, Python, and Shell)
 - Conducting research in order to obtain the best possible video analytics solution for person detection, pet detection, car detection, theft detection, event detection, video summarization, change detection, etc.
 - Developing algorithms for both cloud based solution and resource constrained camera based solution.

Research Intern, Comcast Labs, Washington, DC. Jun 2015 – Sep 2015
Mentors: Jan Neumann and Jonghyun Choi.

- Anomalous event detection and recognition in videos. (Lua, Python, Shell, and Matlab)
 - Processed a large amount of video data for training and testing. Used Torch7 machine learning framework to train and test autoencoder and recurrent neural networks.

Research Intern, Metaio Inc. (acquired by Apple Inc.), Dallas, TX. Jun 2014 – Sep 2014
Mentor: Jürgen Sturm

- Human pose estimation in video using deep convolutional neural network. (C++, Python, Shell and Matlab)
 - Processed video data for training and testing. Modified the Caffe tool to implement multi-label regression framework based on deep convolutional neural network.

Graduate Student Researcher, Video Computing Group, UC, Riverside, CA.

Jun 2012 – Aug 2016

- Scalable Active Learning for Activity Recognition and Video Description. (Python and C++) Oct 2015 –
 - Used recurrent neural network with LSTM in order to provide better query suggestions to the annotator that can reduce both time and effort for video annotation.
- Active Learning of Context Aware Recognition Models. (Matlab and C++) Oct 2014 – Apr 2015
 - Used conditional random field graphical model for encoding contextual information and devised a novel algorithm based on entropy and mutual information for performing active learning on such models.
- Continuous Learning of Activity Models using Hybrid Features. (Matlab and C++) Dec 2013 – May 2014
 - Designed and implemented a framework for learning human activity models continuously from streaming videos by taking the advantages of local features, deep and shallow auto-encoders, and active learning.
- Incremental activity modeling and recognition in streaming videos. (Matlab and C++) Aug 2013 – Nov 2013
 - Designed and implemented an online incremental human activity recognition framework by leveraging local spatio-temporal features, ensemble of SVM classifiers, and active learning.
- Human and vehicle tracking in unstable aerial videos. (C++ and Matlab) Mar 2013 – Jul 2013
 - Developed a system for multiple object detection and tracking in unstable aerial videos. Used homography transformation for video stabilization, cascaded classifier for target detection, and Kalman filter for tracking.
- Human activity recognition in surveillance videos. (Matlab, C++ and C#) Jul 2012 – Nov 2012
 - Participated in TRECVID SED challenge for detecting and recognizing human activities from a large corpus of surveillance videos using STIP features, Bag-of-Word based feature encoding, and SVM classifier.

Research Lecturer,

May 2009 - Aug 2011

Department of Computer Science and Engineering, East West University, Bangladesh.

- Real time detection and recognition of vehicle license plate in Bangla. (Matlab)
 - Utilized visual symmetry and Canny edge detector for license plate detection. Used feed forward neural network for license plate recognition.
- Automatic traffic sign detection and recognition. (Matlab)
 - Used color segmentation for traffic sign detection and feed forward neural network for recognition.

PUBLICATIONS

1. Tahmida Mahmud, **Mahmudul Hasan**, A. Roy-Chowdhury, *Joint Prediction of Activity Labels and Starting Times in Untrimmed Videos*, International Conference on Computer Vision (ICCV) 2017, Venice, Italy.
2. **Mahmudul Hasan**, Jonghyun Choi, Jan Neumann, Amit K. Roy-Chowdhury, and Larry Davis, *Learning Temporal Regularity in Video Sequences*, Computer Vision and Pattern Recognition (CVPR) 2016, USA.
3. Tahmida Mahmud, **Mahmudul Hasan**, A. Chakraborty, A. Roy-Chowdhury, *A Poisson Process Model for Activity Forecasting*, IEEE International Conf. on Image Processing (ICIP), 2016, Phoenix, USA.
4. **Mahmudul Hasan**, and Amit K. Roy-Chowdhury, *Incremental Learning of Human Activity Models from Videos*, Computer Vision and Image Understanding (CVIU), Vol. 144, Issue C, pp. 24-35, 2016.
5. **Mahmudul Hasan**, and Amit K. Roy-Chowdhury, *Context Active Learning of Activity Recognition Models*, International Conference on Computer Vision (ICCV) 2015, Santiago, Chile.
6. **Mahmudul Hasan**, and Amit K. Roy-Chowdhury, *A Continuous Learning Framework for Activity Recognition Using Deep Hybrid Feature Models*, IEEE Transaction on Multimedia (TMM), Vol. 17, No. 11, pp. 1-14, 2015.
7. **Mahmudul Hasan**, and Amit K. Roy-Chowdhury, *Continuous Learning of Human Activity Models using Deep Nets*, European Conference on Computer Vision (ECCV) 2014, Zurich, Switzerland.

8. **Mahmudul Hasan**, and Amit K. Roy-Chowdhury, *Incremental Activity Modeling and Recognition in Streaming Videos*, Computer Vision and Pattern Recognition (CVPR) 2014, Columbus, Ohio, USA.
9. **Mahmudul Hasan**, Elliot Staudt, and Amit K. Roy-Chowdhury, *Integrating Geometric, Motion and Appearance Constraints for Robust Tracking in Aerial Videos*, Technical report, eScholarship, 2013.
10. **Mahmudul Hasan**, Yingying Zhu, Santhoshkumar Sunderrajan, Niloufar Pourian, B.S. Manjunath, and Amit Roy Chowdhury, *Activity Analysis in Unconstrained Surveillance Videos*, In TRECVID 2012, Maryland, USA.
11. Santhoshkumar Sunderrajan, Niloufar Pourian, **Mahmudul Hasan**, Yingying Zhu, B.S. Manjunath, and Amit Roy Chowdhury, *TRECVID 2012 Instance Search Task: Discriminative Reranking based Video Object Retrieval*, In TRECVID 2012, Maryland, USA.
12. **Mahmudul Hasan**, Shaila Sharmeen, Anisur Rahman, M. Ameer Ali, and Md. Humayun Kabir, *Block Based Image Segmentation*, In the Proceedings of ACEEE-CNC 2012, Chennai, India.
13. Md. Raqibul Hasan, M. Sohel Rahman, Masud Hasan, **Mahmudul Hasan**, and M. Ameer Ali, *An Improved Pipelined Processor Architecture Eliminating Branch and Jump Penalty*, In the Proceeding of IEEECS ICCEA 2010, Bali, Indonesia.
14. **Mahmudul Hasan**, M. Sajjad Hossain, M. Ameer Ali, Md. Humayun Kabir, and A B M Shawkat Ali, *Automatic Road Sign Detection and Recognition*, In the Proceedings of IEEE CIS-RAM 2010, Singapore.
15. **Mahmudul Hasan**, M. Ameer Ali, Md. Humayun Kabir, and G. Sorwar, *Object Segmentation Using Block Based Patterns*, In the proceedings of IEEE TENCON 2009, Singapore.
16. **Mahmudul Hasan** and Amit K. Roy-Chowdhury, *Video Annotation: What is the Label? How Far to Watch?* Submitted to ACM MM 2017.
17. **Mahmudul Hasan**, Sujoy Paul, Anastasios I. Mourikis, and Amit K. Roy-Chowdhury, *Context-Aware Query Selection for Active Learning in Event Recognition*, Submitted to IEEE Transaction on Pattern Analysis and Machine Intelligence 2017.

ACADEMIC PROJECTS

- Multiple moving objects tracking in aerial videos. (Matlab and C++) Feb 2013 – Mar 2013
 - Used Gaussian background subtraction for moving object detection and particle filter for target tracking.
- Automated product rating system based on reviews and comments. (Java) Jan 2012 – Mar 2012
 - Used advanced information retrieval method like BM25 for product ranking according to user's preference.
- Implementation of Victim Cache, Stream Buffer, and LRU cache replacement policy. (C++) Mar 2012
 - Reduced data and instruction cache miss rate in SimpleScalar simulator on benchmark datasets.
- Implementation of a Prototype OS. (C++) Jun 2007 – Sep 2007
 - Implemented several parts of an instructional OS (NachOS) such as scheduler, virtual memory, and LRU.
- Implementation of OSI Layers. (Java) Jan 2008 – Apr 2008
 - Implemented all functionalities of Data Link and Network layers of OSI protocol stack.
- Flight Simulator. (C++ and OpenGL) Jan 2008 – Apr 2008
 - Designed and implemented a virtual world containing airport, runway, trees, buildings, airplanes, and houses. Modeled airplane dynamics considering translation and different rotations such as yaw, pitch, and roll.
- System analysis and design of a large company. (C#, MySQL and ASP.NET) Jan 2008 – Apr 2008
 - Used advanced tools such as requirement analysis, use case diagram, sequence diagram, class diagram, etc.

TEACHING EXPERIENCE

- Teaching Assistant,** Sep 2013 – Dec 2013
 Department of Computer Science and Engineering, University of California, Riverside.
- Conducted lab sessions for the course C++ Programming.
- Research Lecturer,** May 2009 - Aug 2011
 Department of Computer Science and Engineering, East West University, Bangladesh.

- Designed course syllabuses and conducted lectures for Structured Programming (C), Objected Oriented Programming (C++ and Java), Data Structures, Algorithms, and Basic Electric Circuits.

AWARDS and HONORS

- Dissertation year fellowship (DYP) award, University of California, Riverside. Sep 2015 – Dec 2015
- Graduate student fellowship, University of California, Riverside. Sep 2011 – May 2012
- PhD consortium award in ICCV 2015. Dec 2015
- PhD consortium award in CVPR 2016 Jun 2016
- Travel grants to attend TRECVID 2012, CVPR 2014, and ECCV 2014, ICCV 2015, and CVPR 2016.
- University merit scholarship, Bangladesh University of Engineering and Technology. Mar 2005 – Dec 2008
- Dean's list award, Bangladesh University of Engineering and Technology. Mar 2005 – Dec 2008

TALKS and POSTERS

- Learning Temporal Regularity in Video Sequences, CVPR 2016, Las Vegas, USA. Jun 2016
- Context Active Learning of Activity Recognition Models, ICCV 2015, Santiago, Chile. Dec 2015
- Active Learning for Activity Recognition Models, Comcast Labs, Washington, DC. Aug 2015
- Deep Boltzmann Machine and Recurrent Neural Network, Video Computer Group, UC Riverside. Jun 2015
- Human Pose Estimation from Videos, Samsung Research, Richardson, Texas. Sep 2014
- Continuous Learning of Human Activity Models using Deep Nets, ECCV 2014, Switzerland. Sep 2014
- Incremental Activity Modeling and Recognition in Streaming Videos, CVPR 2014, Columbus, USA. Jun 2014
- Continuous Learning of Human Activity Models using Deep Nets, Metaio Inc., Dallas, Texas. Jun 2014
- Activity Analysis in Unconstrained Surveillance Videos, TRECVID 2012, NIST, Maryland, USA. Nov 2012
- An Improved Pipelined Processor Arch. Eliminating Branch and Jump Penalty, ICCEA, Indonesia. Mar 2010

PROFESSIONAL SERVICES

- Reviewer of top tier computer vision journals – TIP, CVIU, TMM, and PAMI.
- Reviewer of top tier computer vision conferences – CVPR, ICCV, ACCV, and ICIP.
- Student volunteer in CVPR 2014.
- Program committee member in CVPR (2017, 2018), ICCV (2017), and ECCV (2018)
- Member IEEE and CVF

REFERENCES

- Available on request.