Asif Salekin

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EDUCATION

UNIVERSITY OF VIRGINIA | PhD Candidate in the Department of Computer Science
Advisor: Professor John A. Stankovic | Expected May 2019

UNIVERSITY OF VIRGINIA | Masters in Computer Science (MCS)
May 2016 | Cum. GPA: 3.98 / 4.0

BANGLADESH UNIV. of ENGG. & TECH. | BSc in Computer Science & Engineering
May 2012 | Cum. GPA: 3.86 / 4.0

EXPERIENCE

NOKIA BELL LABS | Research Intern
BHAG Realization Lab
June 2018 - Aug 2018 | Murray hill, New Jersey, USA.

BOSCH RESEARCH AND TECHNOLOGY CENTER | Research Intern
Human-Machine Interaction Lab | Audio Analytics and Deep Learning
May 2017 - Oct 2017 | Palo Alto, California, USA.

UNIVERSITY OF VIRGINIA | Research Assistant
May 2014 - Present | Charlottesville, VA

AHSANULLAH UNIV. OF SCIENCE & TECH. | Lecturer
Oct 2012-Aug 2013 | Dhaka, Bangladesh

BRAC UNIVERSITY (BRACU) | Lecturer
May 2012 - Oct 2012 | Dhaka, Bangladesh

RESEARCH INTERESTS

Internet of Things (IoT), Pervasive and Ubiquitous Computing, Machine Learning, Cyber-Physical Systems, Connected and Mobile Health.

AWARDS

Graduate Student Award for Outstanding Research , UVA Department of Computer Science, 2018

Nominated for best paper award , (AsthmaGuide) at Wireless health, 2016

Selected for Third Annual Public Days Showcase Event
The Public Days showcase highlights exemplary scholarship, research, and creative work of the University's undergraduate and graduate students, as well as post-docs. Our project, AsthmaGuide, was selected to represent the highest achievements of scholarship, research, and creative work from undergraduate and graduate students across Grounds.

Student Travel Award : SenSys Student Grant, NSF, 2015, and Wireless Health Travel Grant, NIH, 2014

CONTRIBUTIONS TO FUNDED RESEARCH

NSF Smart and Connected Health grant, Award Number: 1838615, 2018
Amount: $1,200,000

DGIST Research and Development Program (CPS Global center) funded by the Ministry of Science, ICT and Future Planning, 2016
Amount: $180,000

PEER REVIEWED FULL PAPERS | PUBLISHED

A Weakly Supervised Learning Framework For Detecting Social Anxiety And Depression
ACM Interactive, Mobile, Wearable, and Ubiquitous Technologies (IMWUT), Vol. 2, Issue. 2 **(Ubicomp 2018)** .
A. Salekin , J. Eberle, J. Glenn, B. Teachman, J. Stankovic

Distant Emotion Recognition
ACM Interactive, Mobile, Wearable, and Ubiquitous Technologies (IMWUT), Vol. 1, Issue. 3 **(Ubicomp 2017)** .
A. Salekin , Z. Chen, M. Ahmed, J. Lach, D. Spruijt-Metz, K. Haye, B. Bell, J. Stankovic

DAVE: Detecting Agitated Vocal Events
IEEE/ACM Conference on Connected Health: Applications, Systems and Engineering technologies (CHASE), 2017.
A. Salekin , H. Wang, K. Williams, J. Stankovic

AsthmaGuide: An Asthma Monitoring and Advice Ecosystem
IEEE Wireless Health 2016. **(Nominated for best paper)**
Co-first authors (**A. Salekin** , H. Ra), H. Yoon, J. Kim, S. Nirjon, D. Stone, S. Kim, J. Lee, S. Son and J. Stankovic

Detection of Chronic Kidney Disease and Selecting Important Predictive Attributes
IEEE International Conference on Healthcare Informatics (ICHI), 2016.
A. Salekin , J. Stankovic

ARASID: Artificial Reverberation-Adjusted Indoor Speaker Identification Dealing with Variable Distances
International Conference on Embedded Wireless Systems and Networks (EWSN), 2019 (accepted).
Z. Chen, M. Ahmed, **A. Salekin** , J. Stankovic

MOBI-COG: A Mobile Application for Instant Screening of Dementia Using the Mini-Cog Test
Wireless Health 2014.
S. Nirjon, I. Emi, A. Mondol, **A. Salekin** , and J. Stankovic

Extracting and Ranking Web Communities
International Conference on Web Intelligence, Mining and Semantics (WIMS), 2013.
A. Salekin , J. Tabassum, M. Hasan

A Novel Approach for Constructing Emulator for Microsoft Kinect XBOX 360 Sensor in the .NET Platform
International Conference on Intelligent Systems, Modelling and Simulation (ISMS), 2013.
MD. Rahman, S. Rahman, R. Hasan, R. Noel, **A. Salekin** , H. Ferdous

A Novel Clustering-Based Ensemble Classification Model for Block Learning
International Conference on Pattern Recognition Applications and Methods (ICPRAM), 2013.
MD. Rahman, MD. Rahman, **A. Salekin** , S.H. Chowdhury, S.A. Anik

A Novel Approach for Generating Clustered Based Ensemble of Classifiers
International Journal of Machine Learning and Computing, Vol. 3, Issue. 1, Page 137, 2013.
MD. Rahman, MD. Rahman, **A. Salekin** , A.S. Andalib

Composite Pattern Matching in Time Series
International Conference on Computer and Information Technology (ICCIT), 2012.
A. Salekin , M. Islam, MD. Rahman

Pattern matching in time series using combination of neural network and rule based approach
International Conference on Electrical and Computer Engineering (ICECE), 2012.
A. Salekin , MD. Rahman

Novel approaches for detecting fabric fault using artificial neural network with k-fold validation
International Conference on Computer and Information Technology (ICCIT), 2012.
A.S. Andalib, **A. Salekin** , M.R. Islam, M. Abdulla-Al-Shami

PATENT

AudioEmergency: Audio Event Detection for Surveillance Systems (submitted)
A. Salekin , S. Ghaffarzadegan, Z. Feng

FIRST-AUTHOR FULL PAPERS | IN SUBMISSION

Sensor Data Integration: A Multidimensional Constrained MIL approach
IPSN, 2019.

AudioEmergency: Audio Event Detection for Surveillance Systems
MobiSys, 2019.

POSTERS, DEMOS AND NEWSLETTER

I Can Hear it in Your Voice: A Weakly Supervised Machine Learning Framework for Detecting Social Anxiety and Depression Symptoms from Features of Speech
ABCT's 52nd Annual Convention, 2018.
A. Salekin , J. Eberle, J. Glenn, B. Teachman, J. Stankovic

Poster Abstract: LifeMaps - An Automated Diary System Based on the Structure of Lives
SenSys, 2016.
A. Mondol, H. Ra, **A. Salekin** , H. Yoon, M. Kubovy, S. Son, J. Stankovic

Poster Abstract: Software architecture for efficiently designing cloud applications using node.js
14th Annual International Conference on Mobile Systems, Applications, and Services Companion, 2016.
H. Ra, H. Yoon, **A. Salekin** , J. Lee, J. Stankovic, S. Son

Demo Abstract: KinVocal: Detecting Agitated Vocal Events
SenSys, 2015.
A. Salekin , H. Wang, J. Stankovic

Demo Abstract: AsthmaGuide: An Ecosystem for Asthma Monitoring and Advice
SenSys, 2015.
H. Ra, **A. Salekin** et al.

A natural user interface classroom based on Kinect
IEEE Learning Technology Newsletter, Volume 13, October 2011.
R. Noel, **A. Salekin** , R. Islam, S. Rahaman, R. Hasan, H.S. Ferdous

SKILLS

Programming Language
Java, Python, C, C++, C#, Android development, Assembly Language (Intel 80x86, MIPS), UNIX shell scripting, SQL, LATEX, TEX

Deep Learning
Tensorflow, keras

Natural Language Processing (NLP)
Apache OpenNLP, gensim, Natural language toolkit (NLTK)

Scientific Computing
Matlab, Octave, R, WEKA

Internet of Things (IoT)
Raspberry pi 3B, UP Board, MATRIX Creator, Sony SmartWatch, Myo Armband, Mycroft.ai

Modeling Language
UML, E-R Diagram

Web Programming
HTML, CSS, PHP, JSP, JavaScript, Ajax, Jquery

Database Management
System (RDBMS): Oracle, MySQL, JSON, MongoDB

Others
OpenGL, Verilog HDL, Quartus, Cisco Packet Tracer

TEACHING EXPERIENCE

Invited lecturer: Two lectures on Machine Learning for IoT and CPS
Course: The Internet of Trillions of Things (Graduate level), UVA, Fall 2018

Invited lecturer: A lecture on Smart Connected Health
Course: Wireless Sensor Networks (Undergraduate level), UVA, Fall 2014

Mentoring (Graduate level)
Two first year PhD students (2015, 2017)
Three Masters students (2014, 2016, 2018)

Graduate Teaching Assistant
Course: Algorithm
UVA, Fall, 2013 and Spring, 2014
Hold office hours and graded homework and exams for over 300 students

Lecturer
Ahsanullah University of Science and Technology (AUST), 2012-2013
Courses: Algorithm, Network Programming, Operating Systems.
Responsibility: lecture planning, taught and instructed courses, assessing students, holding office hours, invigilating examinations

Lecturer
BRAC University (BRACU), 2012
Courses: Operating Systems, Introduction to Programming Language: Java.
Responsibility: lecture planning, taught and instructed courses, assessing students, holding office hours, invigilating examinations

SELECTED TALKS

Workshop Presentation: 'Machine Learning for Constrained Devices with Limited Training Data'
International Workshop on NEXT-GENERATION CYBER-PHYSICAL SYSTEMS, 2018

Invited talk 'Human Machine Interaction', **BR Lab, Nokia Bell Labs** , NJ, USA, 2018

Invited talk 'Machine Learning for IOT and CPS', **ENSA Lab, Nokia Bell Labs** , NJ, USA, 2018

Full Paper Presentation ' Distant Emotion Recognition', **Ubicomp** , 2017

Full Paper Presentation 'Detecting Agitated Vocal Events', IEEE CHASE, July 2017

Invited talk 'Novel Feature Modeling for Audio Analytics', **BOSCH Research and Technology Center** , CA, USA, 2017

Poster Presentation 'LifeMaps - An Automated Diary System Based on the Structure of Lives', **Sensys** , 2016

The Public Days showcase event 'AsthmaGuide : A Complete Asthma Monitoring System', 2016

Full Paper Presentation 'AsthmaGuide: A smartphone and cloud based asthma system', IEEE Wireless Health 2016

Full Paper Presentation 'Chronic kidney disease detection', IEEE ICHI, 2016

Poster and Demo Presentation 'Detecting Agitated Vocal Events', **SenSys** , 2015

Poster and Demo Presentation 'AsthmaGuide: An Ecosystem for Asthma Monitoring and Advice', **SenSys** , 2015

Project Demonstration UVA Open House, 2014, 2015, 2016, 2017

REFEREE/REVIEWER

IMWUT (Ubicomp) 2017, 2018
IFIP Performance 2018
ISSRE 2018

VOLUNTEERING EXPERIENCE

Student Volunteer : Wireless Health 2014, UVA Engineering Alumni Reunions 2014, Hosting Faculty Candidates (2015 & 2016), BUET CSE Festival (2008 & 2011), Bangladesh National Math Olympiad 2008

Co-founder and General Secretary : Association of Bangladeshi Students UVA, 2016-2017

Community Action : Mentored two underprivileged students in their studies, 2014-2016

SELECTED COURSES

University of Virginia
Machine Learning, Spec Top: Computer Science (Machine Learning), Text Mining, Information Retrieval, Theory of Computation, Engineering Logic, Statistics Engrs & Scientists, The Computational Planet, Cyber Physical Systems, Big Data in Health Research, Smart Cities, Homes, Phones, and Beyond (Seminar Course)

High-Performance Computing Bootcamp (2016)

Bangladesh University of Engineering and Technology
Artificial Intelligence, Pattern Recognition, Introduction to machine learning, Algorithm, Data Structures, Database, Compiler, Structured Programming Language, Object Oriented Programming Language, Digital System Design, Discrete Mathematics, Concrete Mathematics, Computer Networks, Computer Graphics, Software Engineering and Information System Design, Mathematical Analysis for Computer Science, Theory of Computation

SELECTED PROJECTS

SENSOR DATA INTEGRATION | A Multidimensional Constrained MIL approach

Dec 2017 – Aug 2018 | **In Submission**

Conventional multi-modality sensor data integration approaches concatenate features from different sensory streams and feed the concatenated feature-set to a supervised learning classifier. Since different sensors perceive only a sub-part of an event, a significant part of the sensory signals, contain irrelevant information, which makes supervised learning classifiers perform poorly. I have developed a novel and general multidimensional constrained multiple instance learning neural network approach to integrate information at the decision-level from multi-modality multi-point wearable sensing data and applied on automated human activity detection task. Conventional multiple instance learning assumption does not entirely hold up to the characteristics of the sensory streams in human activity event detection windows. Hence, I developed a novel Constrained Multiple Instance Learning approach, incorporating the attributes of sensory stream data to perform weakly supervised learning for the targeted task.

DETECTING MENTAL DISORDERS | A Weakly Supervised Learning Framework

Jan 2017 – Feb 2018 | **IMWUT & Ubicomp 2018**

Prior studies on mental disorder detection have focused on fully supervised learning approaches employing strongly labeled data. However, strong labeling of persons high in mental disorder symptoms in speech audio data is impractical, in part because it is not possible to identify with high confidence which regions of a long speech indicate the person's mental disorder symptoms. We proposed a weakly supervised deep learning framework for detecting two mental disorders: social anxiety and depression from long audio clips. Specifically, we have developed a novel feature modeling technique named NN2Vec, which identifies and exploits the inherent relationship between speakers' vocal states and mental disorder symptoms. In addition, we presented a new multiple instance learning adaptation of a BLSTM classifier, named BLSTM-MIL. Our novel framework of using NN2Vec features with the BLSTM-MIL classifier achieves significant higher F-1 scores in detecting speakers high in social anxiety and depression symptoms.

DER | Distant Emotion Recognition

Oct 2016 – May 2017 | **IMWUT & Ubicomp 2017**

Distant emotion recognition (DER) extends the application of speech emotion recognition to the very challenging situation that is determined by variable speaker to microphone distances. The performance of conventional emotion recognition systems degrades dramatically as soon as the microphone is moved away from the mouth of the speaker. This is due to a broad variety of effects such as background noise, feature distortion with distance, overlapping speech from other speakers, and reverberation. This work presented a novel solution for DER, addressing the key challenges by identification and deletion of features from consideration which are significantly distorted by distance, creating a novel, called Emo2vec, feature modeling and overlapping speech filtering technique, and the use of an LSTM classifier to capture the temporal dynamics of speech states found in emotions.

DAVE | Detecting Agitated Vocal Events

Jan 2015 – May 2016 | **CHASE 2017**

DAVE is a system that continuously monitors and detects agitated vocal events, which is useful for the elderly population suffering from dementia. DAVE, using a novel combination of acoustic signal processing and multiple text mining techniques, automatically detects and records the 8 major vocal agitations for dementia patients as defined by the medical community. This includes cursing or verbal aggression, constant unwarranted request for attention or help, negativism, making verbal sexual

advances, crying, screaming, laughing, and talking with repetitive sentences. The novelty of DAVE includes using the text of the vocalizations only when accurate, combining text and acoustic features when necessary, and employing text mining and feature identification. Additionally, to understand the ambiguity of spoken words in natural language, we developed a word sense disambiguation technique (to understand which sense or meaning of a word is used in a spoken sentence).

ASTHMAGUIDE | A smartphone and cloud based asthma system

Jun 2014 – April, 2016 | Wireless Health 2016

There has been an increased use of wireless sensor networks in the medical sector. AsthmaGuide is a system in which a smart phone is used as a hub for collecting physiological, environmental, human input, picture, and video information from several wireless sensors like sensordrone, electronic stethoscope, pulse oximeter, etc. The data, including data over time, is then displayed and analyzed in a cloud web application for both patients and health-care providers to view. AsthmaGuide also provides an advice and alarm infrastructure based on the collected data and parameters set by health-care providers.

EARLY CKD DETECTION | Early Chronic Kidney Disease detection with Machine learning

April 2015 – May 2016 | ICHI 2016

In this study we have considered 24 predictive parameters and have created a machine learning classifier to detect Chronic Kidney Disease (CKD). Using our approach we have achieved 69% reduction of mean square error compare to the state of the art (CKD-EPI equation) GFR estimator. We also have performed feature selection to determine the most relevant attributes for detecting CKD and have ranked them according to their predictability.