Leveraging AI and Machine Learning for Societal Changes

MALVERN, PA

NOVEMBER 13 – 15, 2019

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WELCOME TO THE NINTH ANNUAL COMPLEX ADAPTIVE SYSTEMS CONFERENCE

Welcome, and thank you for joining us at this year's conference. Our participants continue to disseminate current research and industry applications in complex adaptive systems.

Nil H. Ergin, Ph.D.
Conference Chair
Associate Professor of Systems Engineering
Penn State Great Valley
School of Graduate Professional Studies
nhe2@psu.edu

Smart cities, smart grids, connected autonomous vehicles, smart medical devices, wearable sensors, connected home monitoring systems are all key enablers for addressing today's societal challenges. Big data and data analytics are vital for managing these complex systems, and designing the systems requires a variety of perspectives. Artificial Intelligence (AI) and machine learning methods provide adaptability capability for many of these continuously-evolving systems. Designing these distributed systems necessitates systems thinking perspective which we can attain through modeling and simulation. Resilience, safety, and cybersecurity are some of the important systemic properties for these systems and this year's conference brings these concepts together.

I would like to express my gratitude to the plenary speakers and industry panel participants for their invaluable contributions through their presentations. I also want to thank all authors for their contributions and presentations, and the referees for their technical expertise, comments, and suggestions provided during paper reviews. Thank you also to the conference sponsors for bringing real life dimension, issues, and engineering problems to the meeting.

CONFERENCE SUPPORT PROVIDED BY PENN STATE GREAT VALLEY

Lee Doughterty,
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CONFERENCE ORGANIZED BY

PENN STATE GREAT VALLEY ENGINEERING DIVISION
30 East Swedesford Road | Malvern, PA 19355 | 610-648-3277

CONFERENCE SCHEDULE *AT A GLANCE*

Wednesday, November 13

8:00 – 9:00 AM
Breakfast & Conference Registration *(Art Gallery)*

9:00 – 10:00 AM
Opening Session *(206/207)*
Welcoming Remarks & Keynote Presentation: Natural Language Processing: Interpretability, Trust, and Robustness
Speaker: Prasenjit Mitra, Ph.D.

10:00 – 11:00 AM
Session 1 *(205)*
AI & ML Applications 1
Session Chair: Michael Richman

11:00 – 11:15 AM
Morning Break *(Art Gallery)*

11:15 AM – 12:15 PM
Session 2 *(205)*
Data Analytics 1
Session Chair: Satish Srinivasan

12:15 – 1:30 PM
Luncheon & Presentation *(206/207)*
Smarter Safer Cities using AI and Machine Learning
Speaker: Eric B. Smith

1:30 – 3:00 PM
Session 3 *(206/207)*
Modeling Sociotechnical Systems 1
Session Chair: Fred Highland
Session 4 *(205)*
Cyberphysical Systems
Session Chair: Zeyi Sun

3:00 – 3:15 PM
Afternoon Break *(Art Gallery)*

3:15 – 4:45 PM
Panel *(206/207)*
Perspectives from Industry
Panel Members: Boris Vishnevsky, Aaron Proietti, Eric B. Smith, and Bob Biglin

Thursday, November 14

8:00 – 9:00 AM
Breakfast & Conference Registration *(Art Gallery)*

9:00 – 10:00 AM
Opening Session *(206/207)*
Keynote Presentation: Changing the Way We Operate Through Technology and Innovation
Speaker: John J. "JJ" DeGiovanni

10:00 – 11:00 AM
Session 5 *(205)*
Safety, Reliability and Resilience
Session Chair: Chandru Mirchandani

11:00 – 11:15 AM
Morning Break *(Art Gallery)*

11:15 AM – 12:15 PM
Session 6 *(205)*
Cyber-Security
Session Chair: Raghu Sangwan

12:15 – 1:30 PM
Luncheon & Presentation *(206/207)*
AI and Machine Learning in Drug-to-Drug Interaction
Speaker: Soundar Kumara, Ph.D.

1:30 – 3:00 PM
Session 7 *(206/207)*
Modeling Sociotechnical Systems 2
Session Chair: Mustafa Demir
Session 8 *(205)*
Data Analytics 2
Session Chair: Mika Sato-Ilic

3:00 – 3:15 PM
Afternoon Break *(Art Gallery)*

3:15 – 4:45 PM
Session 9 *(205)*
AI & ML Applications 2
Session Chair: Youakim Badr

6:00 – 6:30 PM
Cocktail Reception *(CCB Lobby)*

6:30 – 8:30 PM
Banquet & Presentation *(CCB Lobby)*
Quantum Blockchain & Society 5.0-Cyber Resilience of the Future
Speaker: Nii Attoh-Okine, Ph.D.

Friday, November 15

8:00 – 9:00 AM
Breakfast & Conference Registration *(Art Gallery)*

9:00 – 10:30 AM
Session 10 *(205)*
Data Analytics 3
Session Chair: Adrian Barb

10:30 – 10:45 AM
Morning Break *(Art Gallery)*

10:45 AM – 12:15 PM
Session 11 *(205)*
AI & ML Applications 3
Session Chair: Partha Mukherjee

12:25 PM
Closing Remarks
Conference Adjourns *(205)*

CONFERENCE MORNING KEYNOTE SPEAKER

Wednesday, November 13, 2019 | 9:00 – 10:00 AM | 206 / 207

Natural Language Processing: Interpretability, Trust, and Robustness

Prasenjit Mitra, Ph.D.

Associate Dean for Research and Professor of Information Sciences and Technology

The Pennsylvania State University, USA

ABSTRACT:

Natural language processing has advanced leaps and bounds in the last few years. This talk will focus on the advances in the field with respect to pre-training, multi-task training, and use of reinforcement learning with applications to machine translation, information extraction, question answering, and dialog systems. The creation of multi-task benchmarks and the use of huge amounts of data and computing power has enabled automated methods to achieve, or in some cases exceed, human-level performance. The talk will also highlight our work on automatic authoring of documents based on state-of-the-art abstractive summarization methods. Different architectures, their characteristics and effectiveness will be discussed. The presentation will also cover issues in interpretability, trust, and robustness of the algorithms.

BIOGRAPHY:

Prasenjit Mitra is the Associate Dean for Research and Professor in the College of Information Sciences and Technology. His current research interests are in the areas of artificial intelligence, health informatics, big data analytics, applied machine learning, and visual analytics. In the past, he has contributed to the areas of data interoperation, data cleaning, and digital libraries, especially in tabular data extraction, and citation recommendation.

Mitra received his Ph.D. from Stanford University in 2004, his M.S. from the University of Texas at Austin in 1994, and a B.Tech.(Tons.) from the Indian Institute of Technology, Kharagpur in 1993. At Penn State, he has pursued research on a broad range of topics, including data mining on the web and social media, scalable data cleaning, political text mining, chemical formula and name extraction from documents, and the extraction of data and metadata from figures and tables in digital documents.

He was the principal investigator of the DOES project funded by the NSF CAREER Award. He has also been the co-principal investigator of the CiteSeerX, ChemXSeer, and ArchSeer digital library projects, the Regional Visualization and Analytics Center (NEVAC), and the GeoCAM visual analytics projects. Mitra serves as the director of the Cancer Informatics Initiative at Penn State. His research has been supported by the NSF, Microsoft Corporation, DoD, DHS, DoE, NGA, and DTRA. Mitra has co-authored approximately 180 articles at top conferences and journals. He has supervised over 15 Ph.D. students and several M.S. students.

CONFERENCE LUNCHEON KEYNOTE SPEAKER

Wednesday, November 13, 2019 | 12:15 – 1:30 PM | 206 / 207

Smarter Safer Cities Using AI and Machine Learning

Eric B. Smith
Co-founder and CFO
Kognition, USA

ABSTRACT:

Eric Smith will be speaking about the use of AI and machine learning to be a "force multiplier" for police, security personnel, and municipalities in the smart city concept. The presentation will focus on a smarter, safer world, while addressing privacy and policies to ensure that technology is used for the greater good of all communities.

BIOGRAPHY:

Eric B. Smith – Co-founder and CFO of Kognition, LLC, a Philadelphia-based software development firm specializing in security, surveillance, and smart property systems.

Smith is a high technology serial entrepreneur. His last exit was to Boston based PTC (NYSE: PTC), through the acquisition of ColdLight Solutions (AI, machine learning, and analytics) where he was the CSO/CFO. Gartner lists PTC as one of the top global companies in Industrial IoT. At PTC, he served as Sector Vice President for the ThingWorx Global Analytics product line team.

Prior to that, he was one of the founders and the President of ESnet, which was funded and acquired by DuPont (NYSE: DD). He acted as the EVP of Global Operations for that business unit.

Smith holds a Computer Engineering degree from the University of Florida as well as a Global Executive MBA from Duke University.

CONFERENCE PANEL

Wednesday, November 13, 2019 | 3:15 – 4:45 PM | 206 / 207

Perspectives from Industry

MODERATOR

Colin Neill, Ph.D.,
Associate Professor of Software and Systems Engineering;
Director of Engineering Programs

Penn State Great Valley, USA

PANEL MEMBERS

Boris Vishnevsky,
Principal Slalom Consulting,
Adjunct Professor at
Thomas Jefferson University

Aaron Proietti,
Author of *Today's Innovator*
and Former Chief Innovation
Officer at Transamerica

Eric B. Smith,
Co-founder and
CFO, Kognition

Bob Biglin, CEO, Senior Partner,
& Executive Coach, The Center for
Advanced Emotional Intelligence

CONFERENCE MORNING KEYNOTE SPEAKER

Thursday, November 14, 2019 | 9:00 – 10:00 AM | 206 / 207

Changing the Way We Operate Through Technology and Innovation

John J. "JJ" DeGiovanni

Managing Director of Quality Assurance

Regulatory Compliance & Safety

United Airlines

ABSTRACT:

The talk will focus on how United is applying technology to transform all aspects of its business. United's focus is targeted to improve performance and efficiency while at the same time improving reliability and customer service. The talk will target the operational processing of the more than 820 aircraft in the fleet moving more than 161 million passengers annually.

BIOGRAPHY:

DeGiovanni leads United's Quality, Regulatory, Safety & Emergency Response programs that ensure the safe operations for moving more than 161 million passengers annually. In this position, his responsibilities include developing and implementing a corporate-wide safety strategy for the 95,000 employees overseeing critical systems and technical operations. This is done in accordance with the FAA/CAA, IATA, IOSA, OSHA and the Department of Defense requirements. DeGiovanni's team was recently recognized for their "Data Visualization Program" on identifying correlations across divisions for improvements in multiple operations of the airline. DeGiovanni chairs the IATA Airside Safety Group, which is comprised of airlines and suppliers focused on improving airline safety and industry efficiency. Prior to United, DeGiovanni worked for Pratt & Whitney Rocketdyne in various senior management positions in Mission Safety & Quality Assurance that included design, fabrication, assembly, procurement, engine testing and flight operations. As the Safety & Mission Assurance Director for Rocketyne, his team was an essential part of program management teams focused on success for the SSME, Delta IV, ISS, and X-33 programs.

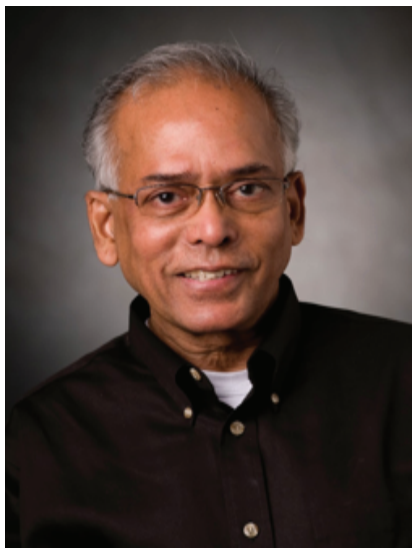
DeGiovanni is a certified Quality Engineer and has been recognized by NASA with the NASA Distinguished Public Service Medal.

DeGiovanni attended Arizona State University, receiving a BS in Aeronautical Industrial Technology, and earned his MBA from Pepperdine University.

CONFERENCE LUNCHEON KEYNOTE SPEAKER

Thursday, November 14, 2019 | 12:15 – 1:30 PM | 206 / 207

AI and Machine Learning in Drug-to-Drug Interaction



Soundar Kumara, Ph.D.

Allen E. Pearce and Allen M. Pearce Professor of Industrial Engineering

Professor of IST (Affiliate)

The Pennsylvania State University, USA

ABSTRACT:

This application-based talk will focus on a few of the major healthcare studies conducted by the Laboratory of Intelligent Systems and Analytics (LISA) using AI and machine learning. Identifying drug-drug interactions (DDIs) is a critical enabler for reducing adverse drug reactions and improving patient safety. Generating proper DDI alerts during patient prescription workflow has the potential to prevent DDI-related problems, and such alerting systems have received international attention. However, improving the contents of DDI alerts without causing alert fatigue presents challenges. One strategy is to establish a list of high-priority DDIs for alerting purposes, though it is a resource-intensive task. This study proposes a machine learning framework to extract useful features from the FDA adverse event reports, and then identify potential high-priority DDIs using an autoencoder-based semi-supervised learning algorithm. The experimental results demonstrate the effectiveness of using adverse event feature representations in differentiating high- and low-priority DDIs. Additionally, the proposed algorithm utilizes stacked autoencoders and weighted support vector machine to boost classification performance, which outperforms other competing methods in terms of F-measure and AUC score. This framework integrates multiple information sources, leverages domain knowledge and clinical evidence, and provides a practical approach to pre-screen high-priority DDI candidates for use in DDI alerting systems.

BIOGRAPHY:

Soundar Kumara is the Allen, E., and Allen, M., Pearce Professor of Industrial Engineering at Penn State. He has an affiliate appointment with the school of Information Sciences and Technology. His research interests are in sensor-based manufacturing process monitoring, data science in manufacturing and healthcare, graph analytics and large-scale complex networks.

He is a fellow of Institute of Industrial Engineers (IIE), International Academy of Production Engineering (CIRP), American Association for Advancement of Science (AAAS), and American Association of Mechanical Engineers (ASME).

Under his guidance, 58 Ph.D. and 63 M.S. students have graduated. He has pioneered nonlinear real-time sensor data analysis techniques for manufacturing process monitoring and diagnosis and large-scale sensor networks. He teaches courses in AI and Data Analytics in Manufacturing.

He has about 10,000 Google citations (h-index: 42) and his Erdos number is three. He has worked with the Aadhar team in India in the initial stages of its development. One of his papers in *Physical Reviews-E* is designated as the milestone paper for 2007.

CONFERENCE BANQUET SPEAKER

Thursday, November 14, 2019 | 6:00 – 8:30 PM | CCB Lobby

Quantum Blockchain & Society 5.0-Cyber Resilience of the Future

Nii Attoh-Okine, Ph.D.

Professor of Civil and Environmental Engineering, Electrical and Computer Engineering, Interim Academic Director (University of Delaware Cybersecurity Initiative)

University of Delaware, USA

ABSTRACT:

Quantum computing – a theory of computation based on principles of quantum mechanics - is becoming a new information processing model. In recent years, blockchain has moved from more traditional Bitcoin applications to other facets of society. The advantages range from higher transparency to process efficiency to increased resilience against various attacks. The current blockchains rely on digital signatures that can be vulnerable to quantum computing. As technology advances, quantum computing may make blockchain technology more vulnerable. The talk will present the basis of blockchain technology and its possible vulnerabilities, focusing on how the quantum blockchain is a key cyber resilience tool in the implementation of smart cities and Society 5.0. The talk will also connect the basic principles of quantum computing, qubit, non-separability (entanglement) of quantum systems, including Bell States and GHZ (Greenberger-Horne-Zeilinger) states that are discussed in quantum blockchain framework.

BIOGRAPHY:

Nii O. Attoh-Okine, Ph.D., P.E., F. ASCE, Snr Member IEEE, is a Professor of Civil and Environmental Engineering, and Electrical and Computer Engineering. He is also the Interim Academic Director of the University of Delaware Cybersecurity Initiative.

Recently, he has wrote two books that are defining the direction of research across disciplines: *Resilience Engineering: Models and Analysis* [Cambridge Press 2016] and *Big Data and Differential Privacy in Railway Track Engineering* [John Wiley 2017]. He is a founding associate editor for *ASCE/ASME Journal of Risk and Uncertainty Analysis*. He has served as an associate editor on the following ASCE Journals: *ASCE Journal of Infrastructure Systems*, *ASCE Journal of Computing*, *ASCE Journal of Bridge Engineering*, and *ASCE Journal of Pipeline Systems Engineering and Practice*. Attoh-Okine is currently a member of a group of researchers from the United States and Japan working on smart cities and various cyber issues related to the Tokyo 2020 Olympic Games.

CONFERENCE SCHEDULE

Wednesday, November 13, 2019

8:00 – 9:00 AM

Breakfast & Conference Registration | Art Gallery

9:00 – 10:00 AM

Welcoming Remarks & Keynote Presentation | 206 / 207

Natural Language Processing: Interpretability, Trust, and Robustness

Keynote Speaker:
Prasenjit Mitra, Ph.D., The Pennsylvania State University, USA

10:00 – 11:00 AM

Session 1:

AI & ML Applications 1 | 205

Session Chair: **Michael Richman,** University of Oklahoma, USA

Machine Learning for Attribution of Heat and Drought in Southwestern Australia
Michael B. Richman, University of Oklahoma, USA
Lance M. Leslie, University of Technology Sydney, Australia

Predictability of Common Atmospheric Teleconnection Indices Using Machine Learning
Andrew Mercer, Mississippi State University, USA

Multi-UAS Formation Recognition in Dynamic Environments
Surya Vamsi Varma Sagi and Leonard Petnga, The University of Alabama in Huntsville, USA

11:00 – 11:15 AM

Morning Break | Art Gallery

11:15 AM – 12:15 PM

Session 2:

Data Analytics 1 | 205

Session Chair: **Satish Srinivasan,** Penn State Great Valley, USA

Leveraging People Analytics for an Adaptive Complex Talent Management System
Kristin C. Saling, Michael D. Do, Army Talent Management Task Force, USA

Constructing a Heterogeneous Training Dataset for Emotion Classification
Anchal Gupta and Satish Mahadevan Srinivasan, Penn State Great Valley, USA

Probabilistic Metric Based Multidimensional Scaling
Mika Sato-Ilic, University of Tsukuba, Japan

CONFERENCE SCHEDULE

Wednesday, November 13, 2019

12:15 – 1:30 PM

Lunch & Keynote Presentation | 206 / 207

Smarter Safer Cities using AI and Machine Learning

Keynote Speaker:
Eric B. Smith, Co-founder and CFO, Kognition, USA

1:30 – 3:00 PM

Session 3:

Modeling Sociotechnical Systems 1 | 206/207

Session Chair: **Fred Highland,** University of Maryland Baltimore County, USA

A System-of-Systems Model to Simulate the Complex Emergent Behavior of Vehicle Traffic on an Urban Transportation Infrastructure Network
Rayan Assaada, Cihan Dagli, and Islam H. El-adaway, Missouri University of Science and Technology, USA

Agent Based Modeling for Flood Inundation Mapping and Rerouting
Vinayaka Gude, Steven Corns, Cihan Dagli, Suzanna Long, Missouri University of Science and Technology, USA

An Agent-based Model to study Competitive Construction Bidding and the Winner's Curse
Amr Elsayegh , Cihan H. Dagli, Islam H. El-adaway, Missouri University of Science and Technology, USA

An Agent-Based Approach to Artificial Stock Market Modeling
Samuel Vanfossana, Cihan H. Dagli, Benjamin Kwasa, Missouri University of Science and Technology, USA

Session 4:

Cyberphysical Systems | 205

Session Chair: **Zeyi Sun,** Missouri University of Science & Technology, USA

(Position paper) Characterizing the Behavior of Small Producers in Smart Grids: A data sanity analysis
Maria Stefan, Jose Gutierrez, Pere Barlet, Eduardo Prieto, Oriol Gomis, and Rasmus L. Olsen
Aalborg University Denmark, Universitat Politecnica de Catalunya Spain

Event-Driven Approach for an Efficient Coulomb Counting Based Li-Ion Battery State of Charge Estimation
Saeed Mian Qaisar, Effat University, KSA

Event-Driven System For Proficient Load Recognition by Interpreting the Smart Meter Data
Saeed Mian Qaisar, Effat University, KSA

Event-Driven Time-Domain Elucidation of the Power Quality Disturbances
Saeed Mian Qaisar, Effat University, KSA

3:00 – 3:15 PM

Afternoon Break | Art Gallery

CONFERENCE SCHEDULE

Wednesday, November 13, 2019

3:15 – 4:45 PM

Panel | 206 / 207

Perspectives from Industry

Moderator:
Colin Neill, Penn State Great Valley, USA

Panel Members:
Boris Vishnevsky, Thomas Jefferson University
Aaron Proietti, Transamerica
Eric Smith, Kognition
Bob Biglin, The Center for Advanced Emotional Intelligence

CONFERENCE SCHEDULE

Thursday, November 14, 2019

8:00 – 9:00 AM

Breakfast & Conference Registration | Art Gallery

9:00 – 10:00 AM

Morning Keynote Presentation | 206 / 207

Changing the Way We Operate Through Technology and Innovation

Keynote Speaker:
John J. "JJ" DeGiovanni, United Airlines

10:00 – 11:00 AM

Session 5:
Safety, Reliability and Resilience | 205

Session Chair: **Chandru Mirchandani,** George Washington University, USA

Degrader Analysis for Diagnostic and Predictive Capabilities: A Demonstration of Progress in DoD CBM+ Initiatives
William Baker, Steven Nixon, Jeffrey Banks, Karl Reichard, and Kaitlynn Castelle
NAVSEA USA, Applied Research Laboratory USA, Old Dominion University USA

Resilience Modeling in Complex Systems
Chandru Mirchandani, George Washington University, USA

A System Dynamics Model for Construction Safety Behavior
Mohamad Abdul Nabi, Islam H. El-adaway, and Cihan Dagli, Missouri University of Science and Technology, USA

CONFERENCE SCHEDULE

Thursday, November 14, 2019

11:00 – 11:15 AM

Morning Break | Art Gallery

11:15 AM – 12:15 PM

Session 6:

Cyber-Security | 205

Session Chair: **Raghu Sangwan,** Penn State Great Valley, USA

Detecting Ransomware Using Process Behavior Analysis
Abdullahi Arabo, Remi Dijoux, Timothee Poulain, and Gregoire Chevalier
The University of the West of England UK, Institue Universitaire de Technologie De La Reunion France

Comparison of Adaboost with MultiBoosting for Phishing Website Detection
Abdulhamit Subasi and Emir Kremic, Effat University SA, Federal Institute of Statistics, Bosnia and Herzegovina

Architectural Considerations for Blockchain Based Systems for Financial Transactions
Raghvinder S. Sangwan, Mohamad Kassab, and Christopher Capitolo, The Pennsylvania State University, USA

12:15 – 1:30 PM

Lunch & Keynote Presentation | 206 / 207

AI and Machine Learning in Drug-to-Drug Interaction

Keynote Speaker:
Soundar Kumara, Ph.D., The Pennsylvania State University, USA

1:30 – 3:00 PM

Session 7:

Modeling Sociotechnical Systems 2 | 206/207

Session Chair: **Mustafa Demir,** Arizona State University, USA

Examining Human-Autonomy Team Interaction and Explicable Behavior in a Dynamic LEGO Construction Task
Mustafa Demir , Polemnia G. Amazeen, and Nancy J. Cooke, Arizona State University, USA

Modeling and Simulation of a Robotic Bridge Inspection System
Muhammad Monjurul Karim, Cihan H. Dagli, and Ruwen Qin, Missouri University of Science and Technology, USA

A Model to Estimate the Lifetime of BESS for the Prosumer Community of Manufacturers with OGS
Md. Monirul Islam, Cihan H. Dagli, and Zeyi Sun, Missouri University of Science and Technology, USA

A System Dynamics Approach for Study of Population Growth and the Residential Housing Market in the US
Mohamad Abdul Nabi, Islam H. El-adaway, and Cihan Dagli, Missouri University of Science and Technology, USA

CONFERENCE SCHEDULE

Thursday, November 14, 2019

1:30 – 3:00 PM

Session 8:

Data Analytics 2 | 205

Session Chair: **Mika Sato-Ilic,** University of Tsukuba, Japan

Cancer Survival Analysis Using RNA Sequencing and Clinical Data
Carly L. Clayman, Satish M. Srinivasan, and Raghvinder S. Sangwan, The Pennsylvania State University, USA

Patients' Disease Risk Predictive Modeling using MIMIC Data
Dhanjeet Singh, Vishal Kumar, and Robin G. Qiu, The Pennsylvania State University, USA

Toward Autonomous and Collaborative Information-Credibility-Assessment Systems
Izzat Alsmad and Michael J. O'Brien, Texas A&M–San Antonio, USA

K-means clustering and principal components analysis of microarray data of L1000 landmark genes
Carly L. Clayman, Satish M. Srinivasan, and Raghvinder S. Sangwan, The Pennsylvania State University, USA

3:00 – 3:15 PM

Afternoon Break | Art Gallery

3:15 – 4:45 PM

Session 9:

AI & ML Applications 2 | 206 / 207

Session Chair: **Youakim Badr,** Penn State Great Valley, USA

Explainable AI: A hybrid approach to generate human-interpretable explanation for deep learning prediction
Tanusree De, Prasenjit Giri, Ahmeduvesh Mevawala, Ramyasri Nemani, and Arati Deo, Accenture Technology, India

Efficient Architecture Search for Deep Neural Networks
Ram Deepak Gottapu and Cihan H Dagli, Missouri University of Science and Technology, USA

Towards an Artificial Intelligence Aided Design Approach: Application to Anime Faces with Generative Adversarial Networks
Devendra Prakash Jaiswal, Srishti Kumar, and Youakim Badr, The Pennsylvania State University, USA

Solving Large Scale Classification Problems with Stochastic Based Optimization
Natacha Gueorguieva, Iren Valova, and Dominic Klusek
City University of New York USA, University of Massachusetts Dartmouth USA

6:00 – 6:30 PM

Cocktail Reception | CCB Lobby

6:30 – 8:30 PM

Banquet & Presentation | CCB Lobby

Quantum Blockchain & Society 5.0-Cyber Resilience of the Future

Keynote Speaker:
Nii Attoh-Okine, Ph.D., University of Delaware, USA

CONFERENCE SCHEDULE

Friday, November 15, 2019

8:00 – 9:00 AM

Breakfast & Conference Registration | Art Gallery

9:00 – 10:30 AM

Session 10:

Data Analytics 3 | 205

Session Chair: **Adrian Barb,** Penn State Great Valley, USA

Natural Language Processing in Analyzing Social Problem Tree
Juan Pablo Pájaro and Rafael Andres Gonzalez, Pontificia Universidad Javeriana, Colombia

Applications of Natural Language Techniques to Enhance Curricular Coherence
Adrian S. Barb and Nil Kilicay-Ergin, Penn State Great Valley, USA

Prediction of Likes and Retweets Using Text Information Retrieval
Ishita Daga, Anchal Gupta , Raj Vardhan, and Partha Mukherjee, The Pennsylvania State University, USA

Influence of Social Media Attitude in Cross Screen Conversation
Partha Mukherjeea and Bernard J. Jansen, The Pennsylvania State University, USA

10:30 – 10:45 AM

Morning Break | Art Gallery

10:45 – 12:15 AM

Session 11:

AI & ML Applications 3 | 205

Session Chair: **Partha Mukherjee,** Penn State Great Valley, USA

Classification of the Cardiotocogram Data for Anticipation of Fetal Risks using Bagging Ensemble Classifier
Abdulhamit Subasi , Bayader Kadasa, and Emir Kremic,
Effat University SA, Federal Institute of Statistics, Bosnia and Herzegovina

Approaching the Nurse Scheduling Problem in Consideration of Load Variance
Makihiko Sato,Takuya Onozato, and Kenichi Ida , Maebashi Institute of Technorogy, Japan

A Neural Network-based Approach for Detection of Time Delay Switch Attack on Networked Control Systems
Alireza Abbasspour, Arman Sargolzaei, Mauro Victorio, and Navid Khoshavi,
Florida International University USA, Florida Polytechnic University USA

Customer Transaction Prediction System
Devendra Prakash Jaiswal, Srishti Kumar, and Partha Mukherjee, The Pennsylvania State University, USA

12:25 PM

Closing Remarks & Conference Adjourns | 205

PROCEEDINGS

Papers presented at the 2019 Complex Adaptive Systems Conference are published in the ***Procedia Computer Sciences***, which is an online publication hosted by SciVerse Direct. Content is freely available worldwide perpetuity.

In addition, papers are submitted for indexing to Scorpus at **www.scorpus.com** and engineering Village (Ei) at **www.engineeringvillage.com**

Conference participants will be informed when the 2019 paper proceedings are posted online.

THANK YOU

On behalf of the Complex Adaptive Systems Conference Organizing Committee, we would like to express our appreciation to this year's esteemed sponsor.

PennState
Institute for CyberScience

NOTES

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Adaptive Systems
Founded by Missouri University
of Science and Technology