Sunil Gandhi

✉ sunilga1@umbc.edu 🔗 http://sunilgandhi.info
🔗 https://in.linkedin.com/in/gandhisunilr
🔗 https://github.com/gandhisunilr

Summary

I am a PhD Candidate at the University Of Maryland, Baltimore County (UMBC). My broad areas of interest are Artificial Intelligence & Machine Learning. My research uses deep neural networks for solving problems in several application areas including mining medical time-series, deep reinforcement learning and computer vision. I work with Prof. Tim Oates from the Cognition, Robotics, AI & Learning (CORAL) lab @ UMBC.

Education

MAY 2015 - CURRENT	Ph.D. in COMPUTER SCIENCE **University of Maryland Baltimore County** Thesis: "Artifact detection and removal from EEG data" Advisor: Dr. Tim Oates
AUG 2012 - MAY 2015	Masters of Science in COMPUTER SCIENCE **University of Maryland Baltimore County** Thesis: "A Generative Model for Time Series based on Multiple Normal Distributions" Advisor: Dr. Tim Oates | GPA: 4/4
AUG 2003 - MAY 2012	Bachelor of Engineering in COMPUTER ENGINEERING **Pune Institute of Computer Technology** BE Project: "On demand loading of code in MMUless embedded system" GPA: 3.3/4

Work Experience

JAN 2013 - CURRENT	Research Assistant at UNIVERSITY OF MARYLAND BALTIMORE COUNTY *Cognition, Robotics, and Learning (CORAL) lab*
JUN-AUG 2018	Research Intern at US ARMY RESEARCH LABORATORY, MD Developed a system for training reinforcement learning agents using video demonstrations and human feedback.
JUN-OCT 2014	Research Intern at XEROX RESEARCH CENTER EUROPE, France Worked on inferring templates in documents using grammar induction algorithms. We used document classification as evaluation metric for usefulness of grammar learnt from documents.

Publications

Conference & workshops

- **Sunil Gandhi**, Tim Oates, Tinoosh Mohsenin, Nicholas Waytowich. "Learning Behaviors from a Single Video Demonstration Using Human Feedback." *Extended Abstract at International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2019.*

- **Sunil Gandhi**, Tim Oates, Tinoosh Mohsenin, David Hairston. "Denoising Time Series Data Using Asymmetric Generative Adversarial Networks." *In Pacific-Asia Conference on Knowledge Discovery and Data Mining, 2018.*

- Pavel Senin, Jessica Lin, Xing Wang, Tim Oates, **Sunil Gandhi**, Arnold P. Boedihardjo, Crystal Chen, and Susan Frankenstein. "Grammarviz 3.0: Interactive discovery of variable-length time series patterns." *In ACM Transactions on Knowledge Discovery from Data (TKDD), 2018.*

- Tilak Neha, **Sunil Gandhi**, Tim Oates. "Visual entity linking." *In International Joint Conference on Neural Networks (IJCNN), 2017*

- Ali Jafari, **Sunil Gandhi**, Harsha Konuru, David Hairston, Tim Oates, Tinoosh Mohsenin. "An EEG Artifact Identification Embedded System Using ICA and Multi-Instance Learning" *In Ultra-efficient Approaches Enabling Long-term, Mobile EEG for Brain Monitoring Session at ISCAS 2017.*

- Xing Wang, Jessica Lin, Pavel Senin, Tim Oates, **Sunil Gandhi**, Arnold Boedihardjo Crystal Chen, Susan Frankenstein. "RPM: Representative Pattern Mining for Efficient Time Series Classification." *In 19th International Conference on Extending Database Technology (EDBT) 2016.*

- Abhay Kashyap, Lushan Han, Roberto Yus, Jennifer Sleeman, Taneeya Satyapanich, **Sunil Gandhi** and Tim Finin. "Robust Semantic Text Similarity Using LSA, Machine Learning, and Linguistic Resources." *In Language Resources and Evaluation, March 2016.*

- **Sunil Gandhi**, Tim Oates, Arnold Boedihardjo, Crystal Chen, Jessica Lin, Pavel Senin, Susan Frankenstein, and Xing Wang. "A Generative Model For Time Series Discretization Based On Multiple Normal Distributions." *In Proceedings of the 8th Workshop on Ph.D. Workshop in Information and Knowledge Management (PIKM '15). ACM, New York, NY, USA, 19-25.*

- Pavel Senin, Jessica Lin, Xing Wang, Tim Oates, **Sunil Gandhi**, Arnold Boedihardjo, Crystal Chen, and Susan Frankenstein. "Time series anomaly discovery with grammar-based compression." *In Proceedings of 18th International Conference on Extending Database Technology (EDBT). Brussels, Belgium. Mar 26, 2015.*

- Abhay Kashyap, Lushan Han, Roberto Yus, Jennifer Sleeman, Taneeya Satyapanich, **Sunil Gandhi**, and Tim Finin. "Meerkat mafia: Multilingual and cross-level semantic textual similarity systems." *In Proceedings of the 8th International Workshop on Semantic Evaluation, pp. 416-423. Association for Computational Linguistics, 2014.*

- Pavel Senin, Jessica Lin, Xing Wang, Tim Oates, **Sunil Gandhi**, Arnold Boedihardjo, Crystal Chen, Susan Frankenstein, and Manfred Lerner. "GrammarViz 2.0: a tool for grammar-based pattern discovery in time series." *In Machine Learning and Knowledge Discovery in Databases, pp. 468-472. Springer Berlin Heidelberg, 2014.*

- Tim Oates, Arnold Boedihardjo, Jessica Lin, Crystal Chen, Susan Frankenstein, and **Sunil Gandhi**. "Motif discovery in spatial trajectories using grammar inference." *In Proceedings of ACM International Conference on Information and Knowledge Management (CIKM). San Francisco, CA. Oct 27, 2013.*

Masters Thesis

- **Sunil Gandhi**. "A generative model for time series based on multiple normal distributions." *Masters Thesis at University of Maryland Baltimore County. May 2015.*

Technical Reports

- **Sunil Gandhi**, Tim Oates, Tinoosh Mohsenin, Nicholas Waytowich. Learning from Observations Using a Single Video Demonstration and Human Feedback. *arXiv preprint arXiv:1909.13392. 2019 Sep 29.*

- **Sunil Gandhi**, Swapnil Khorate, Chetan Pachange, Mandar Vaidya. "On-demand loading of code in MMUless embedded systems". *Undergraduate Thesis at Pune Institute of Computer Technology May 2012.*

Academic Projects

- **Deep Network for Artifact Removal using ICA and Multi instance learning**
  We propose a weakly supervised, online end-to-end deep neural network for removing artifacts from EEG data. This network improves upon previous work by explicitly separating EEG data into artifactual and EEG components. Then, artifactual components can be detected and removed using multi-instance learning.

- **Amodal semantic segmentation:**
  In this project we jointly reason about shape prior, relative depth and semantic segmentation of the objects. We utilize the intuition that occluding object should be closer to the camera compared to the occluded objects for improving semantic segmentation and depth estimation of objects.

- **Visual cocktail party problem:**
  The goal of the project is to develop an algorithm that focuses on specific person's voice that is selected from the video of the conversation. In this work we propose a novel deep neural network that solves visual cocktail party by learning features from two modalities, audio and video.

- **Image Classification with Hierarchical Datasets:**
  In this research, we used the hierarchy of object categories to improve accuracy of convolutional neural network (CNN) on image classification. We modified training of AlexNet by proposing a hierarchy aware loss function. This enabled us to categorize objects into generalized categories while improving accuracy on more specific categories.

- **Gossip based aggregation on a distributed system using Erlang:**
  Created distributed system and calculated max, min, average and median of data at each node using gossip protocol. This system can be used for faster ($O(logn)$) dissemination of information in a distributed system.

- **Using Semantic Technologies to Construct Knowledge base using topic modeling:**
  Conference publications, and in turn their authors, can be represented as clusters or well-connected graphs based on their topic commonalities. We created triples representing these associations and performed inference using standard semantic web technologies and ontologies.

- **Automating detection of change in distribution in data streams:**
  Used A-distance measure to detect changes in data stream generated by neural networks and showed the effect of change of its parameters. The same can be used to monitor performance of machine learning algorithms.

Skills

Platforms:	Linux, Windows
Languages:	Python, Java
Tools:	Pytorch, Tensorflow, scikit-learn, Django, MuJoCo physics simulator.

Professional Academic Activities

Reviewer	IET Computer Vision (Journal) (2018)
	Mid Altantic Student Colloquium (MASC) (2015)
Treasurer	UMBC ACM student chapter (2013 – 2014)