Sathyanarayanan N. Aakur

MSCS 210 Computer Vision and Understanding Lab
Department of Computer Science
Oklahoma State University, Stillwater, Oklahoma 74078

Mail: saakurn@okstate.edu
Website:http://saakur.github.io

RESEARCH INTERESTS

Application of Cognitive Models in Computer Vision
Predictive Learning for Active Event Segmentation in Videos; Explainable models for video interpretations; Contextual Models of Memory for video summarization

TEACHING INTERESTS

Image/Video processing, Computer Vision, Introduction to Programming, Data Structures, Pattern Recognition

EDUCATION

University of South Florida, Tampa, FL — Summer 2019
Ph.D., Computer Science and Engineering
Advisor: Dr. Sudeep Sarkar

University of South Florida, Tampa, FL — Fall 2015
Master of Science, Management Information Systems

Anna University, Chennai, India — Spring 2013
Bachelor of Engineering, Electronics & Communications Engineering
Advisor: Prof. Leena Jasmine
Thesis: Real-time Data Acquisition for Production Report Generation

PROFESSIONAL EXPERIENCE

Assistant Professor — Oklahoma State University
Aug 2019 - Present — Stillwater, OK

Applied Scientist Intern — Amazon Go
May 2018 - Aug 2018 — Boston, MA

- Responsible for developing and testing new algorithms and technology for real time activity detection and segmentation using convolutional neural networks.
- Worked with Tensorflow, Python, C++, and associated tools and frameworks.

Programmer Analyst — CTSI-Global
Oct 2012 - November 2015 — Chennai, India

- Designed and implemented data capturing and processing freight bills (CTSI-DOC). Led a team of 4 programmers.
- Increased data entry productivity by 75% and reduced cost of manual processing by a factor of 150% by capturing and processing bills in-house.
- Improved client-facing web interface for freight bill auditing (Exception Handling) to improve user experience and include additional features; Improved user experience by 85% according to feedback survey from clients.

Programmer Analyst Intern — CTSI-Global
Apr 2012 - Oct 2012 — Chennai, India

- Implemented automated reporting for clients
- Implemented client validation and report generation for business process validation in Supply Chain Management.

ACADEMIC HONORS AND AWARDS

Senior Fellow, USF NSF I-Corps	**2019**
Oral Presentation, Conference on Computer Vision and Robotic Vision	**2017**
Outstanding Contribution to the Company, CTSI-Global	**2015**
Best Student Project Award, Velammal Engineering College	**2010**
Best Student in Foreign Language - French, Leo Matriculation School	**2009**

PEER REVIEWED PUBLICATIONS

1. Vishalini R. Laguduva, Shakil Mahmud, **Sathyanarayanan Aakur**, Robert Karam, Srinivas Katkoori. Dissecting Convolutional Neural Networks for Efficient Implementation on Constrained Platforms. IEEE International Conference on VLSI Design (VLSID), 2020.
2. Vishalini R. Laguduva, **Sathyanarayanan Aakur**, Srinivas Katkoori. Latent Space Modeling for Cloning Encrypted PUF-based Authentication. IFIP International Internet of Things (IoT) Conference, 2019.
3. Vishalini R. Laguduva, Sheikh Ariful Islam, **Sathyanarayanan Aakur**, Srinivas Katkoori and Robert Karam. Machine Learning based IoT Edge Node Security Attack and Countermeasures *IEEE Computer Society Annual Symposium on VLSI (ISVLSI), 2019.* ***(oral)***.
4. **Sathyanarayanan Aakur**, Sudeep Sarkar. A Perceptual Prediction Framework for Self Supervised Event Segmentation. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2019.* [pdf].
5. **Sathyanarayanan Aakur***, Daniel Sawyer*, Sudeep Sarkar. Fine-grained Action Detection in Untrimmed Surveillance Videos *Winter Conference on Applications of Computer Vision Workshops, 2019.*
6. **Sathyanarayanan Aakur**, Fillipe DM de Souza, Sudeep Sarkar. Going Deeper with Semantics: Exploiting Semantic Contextualization for Interpretation of Human Activity in Videos. *Winter Conference on Applications of Computer Vision, 2019.* [pdf].
7. **Sathyanarayanan Aakur**, Fillipe DM de Souza, Sudeep Sarkar. Generating Open World Descriptions of Video using Commonsense Knowledge in a Pattern Theory Framework. *Quarterly of Applied Mathematics.* [pdf].
8. Gilbert Rotich*, **Sathyanarayanan Aakur***, Rodrigo Minetto, Mauricio Segundo, Sudeep Sarkar. Using semantic relationships among objects for geospatial land use classification. *IEEE Applied Imagery Pattern Recognition Workshop, 2018.*
9. **Sathyanarayanan Aakur**, Fillipe DM de Souza, Sudeep Sarkar. On the Inherent Explainability of Pattern Theory-based Video Event Interpretations. Book Chapter, *Explainable and Interpretable Models in Computer Vision and Machine Learning in the Springer Series on Challenges in Machine Learning.* [pdf].
10. **Sathyanarayanan Aakur**, Fillipe DM de Souza, Sudeep Sarkar. Inherently Explainable Model for Video Activity Recognition *AAAI Workshop On Reasoning and Learning for Human-Machine Dialogues, 2018* ***(oral)***. [pdf]
11. **Sathyanarayanan Aakur**, Fillipe DM de Souza, Sudeep Sarkar. Towards a Knowledge-based Approach to Video Comprehension. In *Conference on Computer and Robot Vision (CRV), 2017* ***(oral)***. [pdf]
12. **Sathyanarayanan Aakur**, Mithun Singh. Real Time Data Acquisition System for Production Report Generation. In *International Conference on Computational Intelligence and Advanced Manufacturing Research (ICCIAMR), 2013.*

PUBLICATIONS UNDER REVIEW

1. Kenneth Malmberg*, **Sathyanarayanan Aakur***, Sudeep Sarkar. A Bayesian Network Model of the Reinstatement of Autobiographical Context. Under Review.
2. **Sathyanarayanan Aakur**, Sudeep Sarkar. Abductive Reasoning as Self Supervision for Common Sense Question Answering. Under Review.
3. **Sathyanarayanan N. Aakur**, Arunkumar Bagavathi. Unsupervised Gaze Prediction by Energy-based Surprise Modeling. Under Review.
4. **Sathyanarayanan N. Aakur**, Sudeep Sarkar. Action Localization through Continual Predictive Learning. Under Review.

TECHNICAL REPORTS

1. **Sathyanarayanan Aakur**, Daniel Sawyer, Michal Balazia, Sudeep Sarkar. An Examination of Proposal-based Approaches to Fine-grained Activity Detection in Untrimmed Surveillance Videos *Proceedings of TRECVID 2018, NIST, USA, 2018.*
2. **Sathyanarayanan Aakur**, Michael Goltz, Alanould Alsalam. An Automated Jigsaw Puzzle Solver using Local and Global Discriminant Features. *University of South Florida (USF), 2016.*
3. **Sathyanarayanan Aakur**. An Evaluation of Methodologies for Predicting the Forest Cover Type via Visual Features. *University of South Florida (USF), 2014.*

MENTORING

1. Sanjoy Kundu (Ph.D. Spring 2020 - Present)
2. Nikhil Gunti (M.S. Fall 2019 - Present)
3. Daniel Sawyer (Undergraduate, 2016 - 2018)
   Mentored on deep learning for action and object recognition in videos. [*Now at: Ph.D. Program at University of South Florida*]
4. Subramanian Viswanathan (Master's, Fall 2016 - Spring 2017)
   Mentored on parallelization and high performance computing for computing inherent privacy of very large social graphs ($> 10^6 nodes$).[*Now at: Goldman Sachs*]

TEACHING EXPERIENCE

Instructor — Oklahoma State University
Spring 2020 - Present — Stillwater, OK
Spring 2020: CS 5323 Design and Implementation of Operating Systems II
Fall 2020: CS 4783/5783 Machine Learning

Instructor — University of South Florida
Summer 2017, Summer 2019 — Tampa, FL
Undergraduate Course: IT Programming Fundamentals
Student Evaluation: 4.0/5.0

Graduate Teaching Assistant — University of South Florida
Spring 2016 - Spring 2019 — Tampa, FL
Spring 2019: Computer Vision (Graduate)
Spring 2017 - Summer 2019: USF I-Corps Sessions (NSF Lean Business Canvas Course)
Spring 2017: Biometrics (Graduate), IT Data Structures/Algorithms (Undergraduate)
Fall 2016: IT Data Structures (Undergraduate), Computational Geometry (Undergraduate)
Spring 2016: Automata Theory/Formal Languages (Undergraduate)

PROFESSIONAL SERVICE

Program Committee: AAAI 2020
Reviewer: IET Computer Vision, WACV 2020, ICCV 2019, CVPR 2019, CVPR 2020, CRV 2020, ECCV 2020, WACV 2021, NeurIPS 2020, IEEE Access
External Reviewer: PLOS ONE, IROS 2017, CAIP 2017
Organizer: Computer Vision / AI Seminar series, University of South Florida. Fall 2016 - Spring 2019
Co-Organizer: Robotics Competition, INNOWIZ Symposium 2012-2013, Velammal Engineering College
Web Chair: INNOWIZ Symposium 2012-2013, Velammal Engineering College

TALKS

Invited Talk *The Role of Commonsense Knowledge in Visual Understanding.* Oklahoma State University. Fall 2018
Invited Talk with *Dr. Sudeep Sarkar. Going Deeper with Semantics: Exploiting Semantic Contextualization for Interpretation of Human Activity in Videos.* Technical Seminar Series, Statistical Shape Analysis & Modeling Group, Florida State University. Fall 2018
Invited Talk with *Dr. Sudeep Sarkar. Video Event Understanding with Pattern*

Theory. Robotics Technical Seminar Series, Department of Mechanical Engineering, University of South Florida. Spring 2018

Invited Talk *Leveraging ConceptNet to Reduce Training Requirements for Video Descriptions*, Seminar in AI, University of South Florida, Spring 2017.

PROFESSIONAL REFERENCES Available upon request.