Sathyanarayanan N. Aakur

MSCS 210 Computer Vision and Understanding Lab
Department of Computer Science
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RESEARCH INTERESTS

Application of Cognitive Models in Computer Vision
Predictive Learning for Active Event Perception in Videos; Commonsense Reasoning for Visual Understanding; Contextual Models of Memory for Event Perception

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

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

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

ACADEMIC HONORS AND AWARDS

Outstanding Reviewer at CVPR 2020 (Top 3.9% of reviewers)	**2020**
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. **Sathyanarayanan N. Aakur**, Arunkumar Bagavathi. Unsupervised Gaze Prediction by Energy-based Surprise Modeling. International Conference on Computer Vision Theory and Applications (VISAPP), 2021. **(Oral)**.
2. Sai Narayanan, Akhilesh Ramachandran, **Sathyanarayanan N. Aakur**, Arunkumar Bagavathi. Genome Sequence Classification for Animal Diagnostics with Graph Representations and Deep Neural Networks. IEEE International Conference on Machine Learning Applications (ICMLA), 2020.
3. Sanjoy Kundu, Nikhil Gunti, Bailey Hendrickson, Sunil More, **Sathyanarayanan N. Aakur**. Benchmark and Evaluation of Low Resource Object Detection in Biomedical Images. IEEE Workshop on Applied Imagery and Pattern Recognition (AIPR), 2020.
4. **Sathyanarayanan N. Aakur**, Sudeep Sarkar. Action Localization through Continual Predictive Learning. European Conference on Computer Vision (ECCV) 2020.

5. Vishalini R. Laguduva, Shakil Mahmud, **Sathyanarayanan N. Aakur**, Robert Karam, Srinivas Katkoori. Dissecting Convolutional Neural Networks for Efficient Implementation on Constrained Platforms. IEEE International Conference on VLSI Design (VLSID), 2020. ***(Oral)***
6. Vishalini R. Laguduva, **Sathyanarayanan N. Aakur**, Srinivas Katkoori. Latent Space Modeling for Cloning Encrypted PUF-based Authentication. IFIP International Internet of Things (IoT) Conference, 2019. ***(Oral)***
7. Vishalini R. Laguduva, Sheikh Ariful Islam, **Sathyanarayanan N. 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)***.
8. **Sathyanarayanan N. Aakur**, Sudeep Sarkar. A Perceptual Prediction Framework for Self Supervised Event Segmentation. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2019.* [pdf].
9. **Sathyanarayanan N. Aakur***, Daniel Sawyer*, Sudeep Sarkar. Fine-grained Action Detection in Untrimmed Surveillance Videos *Winter Conference on Applications of Computer Vision Workshops, 2019.*
10. **Sathyanarayanan N. 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].
11. **Sathyanarayanan N. 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].
12. Gilbert Rotich*, **Sathyanarayanan N. Aakur***, Rodrigo Minetto, Mauricio Segundo, Sudeep Sarkar. Using semantic relationships among objects for geospatial land use classification. *IEEE Applied Imagery Pattern Recognition Workshop, 2018.*
13. **Sathyanarayanan N. Aakur**, Fillipe DM de Souza, Sudeep Sarkar. On the Inherent Explainability of Pattern Theory-based Video Event Interpretations. *Explainable and Interpretable Models in Computer Vision and Machine Learning in the Springer Series on Challenges in Machine Learning.* [pdf].
14. **Sathyanarayanan N. 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]
15. **Sathyanarayanan N. 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]
16. **Sathyanarayanan N. 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. Ramy Mounir, **Sathyanarayanan N. Aakur**, Sudeep Sarkar. Self-Supervised Temporal Event Segmentation Inspired by Cognitive Theories. Under Review.
2. **Sathyanarayanan N. Aakur**, Sudeep Sarkar. Abductive Reasoning as Self Supervision for Common Sense Question Answering. Under Review.
3. **Sathyanarayanan N. Aakur**, Sudeep Sarkar. Self-supervised Object-centric Representations for Action Localization. Under Review.
4. **Sathyanarayanan N. Aakur**, Sanjoy Kundu, Nikhil Gunti. Knowledge Guided Learning: Open World Egocentric Action Recognition with Zero Supervision. Under Review at *Pattern Recognition Letters.*

5. Vineela Indla, Vennela Indla, Sai Sankara Narayanan, Akhilesh Ramachandran, Arunkumar Bagavathi, Vishalini Laguduva Ramnath, **Sathyanarayanan N. Aakur**. Sim2Real for Metagenomes: Accelerating Animal Diagnostics with Adversarial Co-Training. Under Review.

TECHNICAL REPORTS

1. **Sathyanarayanan N. 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 N. Aakur**, Michael Goltz, Alanould Alsalam. An Automated Jigsaw Puzzle Solver using Local and Global Discriminant Features. *University of South Florida (USF), 2016.*
3. **Sathyanarayanan N. Aakur**. An Evaluation of Methodologies for Predicting the Forest Cover Type via Visual Features. *University of South Florida (USF), 2014.*

MENTORING

1. Nikhil Gunti (M.S. Student (OSU) Fall 2019 - Present)
2. Sanjoy Kundu (Ph.D. Student (OSU) Spring 2020 - Present)
3. Shubham Trehan (Ph.D. Student (OSU) Fall 2020 - Present)
4. Priyadharsini Ramamurthy (Phl.D. Student (OSU) Fall 2020 - Present)
5. Vineela Indla (M.S. Student (OSU), Fall 2020 - Present)
6. Gilbert Rotich (Ph.D. Student (USF), 2017-2019)
7. Daniel Sawyer (Undergraduate (USF), 2016 - 2018) [*Now at: Ph.D. Program at University of South Florida*]
8. Subramanian Viswanathan (Master's (USF), Fall 2016 - Spring 2017)[*First Job: 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

NSF Panels: IIS CHS (2020)
Track Chair: Machine Learning for Graphs (ICMLA 2020), DEEP-DIAL (AAAI 2021)
Session Chair: ICMLA 2020 (Computer Vision)
Program Committee: AAAI 2020, AAAI 2021
Reviewer: ICML 2021, CRV 2021, CVPR 2021, ICLR 2021, IET Computer Vision, WACV 2020, ICCV 2019, CVPR 2019, CVPR 2020, CRV 2020, ECCV 2020, WACV 2021, NeurIPS 2020, ACCV 2020, IEEE Access

External Reviewer: PLOS ONE, IROS 2017, CAIP 2017
Organizer: Special Session on Machine Learning for Graphs (ICMLA 2020), DEEP-DIAL (AAAI 2021), AI Seminar (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.

FUNDING

Current

1. *Collaborative Research: RI: Medium: Understanding Events from Streaming Video - Joint Deep and Graph Representations, Commonsense Priors, and Predictive Learning*, NSF CISE Core Program, $285,126, (Total: $1,005,543) **PI**.
2. *Deep Learning Computational Algorithms for Disease Diagnosis by Genome Sequence*, USDA National Animal Health Laboratory Network, $158,136, **Co-PI**.

Submitted, Pending

1. *Enabling Lifelong Learning for grounded Visual Understanding with Attention, Compositional Understanding and Abductive Learning*, NSF Science of Learning Program, $425,150, **PI**.

Completed, Past

1. *Next Generation User Interfaces for Gateway Autonomous Operations*, NASA X-Hab Project, $30,000, **Co-PI**
2. *Accelerating Research Discoveries with GPU-enabled Computing*, Oklahoma State University Core Facility Support Program, $150,000, **Co-PI**.

PROFESSIONAL REFERENCES

Available upon request.