Sathyanarayanan N. Aakur

MSCS 210 Computer Vision and Understanding Lab   Mail: saakurn@okstate.edu
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Oklahoma State University, Stillwater, Oklahoma 74078

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

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

Sigma Xi Full Member	**2021**
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**, Sanjoy Kundu, Nikhil Gunti. Knowledge Guided Learning: Towards Open Domain Egocentric Action Recognition with Zero Supervision. *Pattern Recognition Letters*, 2022. *To appear.*

2. Ramy Mounir, **Sathyanarayanan N. Aakur**, Sudeep Sarkar. Self-supervised Event Segmentation. Book Chapter in *Advanced Methods and Deep Learning in Computer Vision*. Elsevier Series on Computer Vision and Pattern Recognition.

3. Shubham Trehan, **Sathyanarayanan N. Aakur**. Towards Active Vision for Action Localization with Reactive Control and Predictive Learning. *IEEE/CVF Winter Conference on Applications of Computer Vision, 2022.*

4. **Sathyanarayanan N. Aakur**, Sai Narayanan, Vineela Indla, Vennela Indla, Arunkumar Bagavathi, Akhilesh Ramachandran, and Vishalini Laguduva Ramnath. Metagenome2Vec: Building Contextualized Representations for Scalable Metagenome Analysis *International Conference on Data Mining Workshops, 2021.*

5. **Sathyanarayanan N. Aakur**, Arunkumar Bagavathi, Sai Narayanan, Vineela Indla, Akhilesh Ramachandran, Vishalini Laguduva Ramnath. MG-NET: Leveraging Pseudo-Imaging for Multi-Modal Metagenome Analysis. *International Conference on Medical Image Computing and Computer Assisted Intervention, 2021.*

6. Thanh Thieu, Ha Do, Thanh Duong, Shi Pu, **Sathyanarayanan N. Aakur**, Saad Khan. LexDivPara: A measure of paraphrase quality with integrated sentential lexical complexity. *Intelligent Systems Conference (IntelliSys) 2021.*

7. Vineela Indla, Vennela Indla, Sai Narayanan, Akhilesh Ramachandran, Arunkumar Bagavathi, Vishalini Laguduva Ramnath, **Sathyanarayanan N. Aakur**. Sim2Real for Metagenomes: Accelerating Animal Diagnostics with Adversarial Co-Training. *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD-2021).*

8. **Sathyanarayanan N. Aakur**, Arunkumar Bagavathi. Unsupervised Gaze Prediction in Egocentric Videos by Energy-based Surprise Modeling. *International Conference on Computer Vision Theory and Applications (VISAPP), 2021*

9. Sai Narayanan, Akhilesh Ramachandran, **Sathyanarayanan N. Aakur**, Arunkumar Bagavathi. GRaDL: A Framework for Animal Genome Sequence Classification with Graph Representations and Deep Learning. *International Conference on Machine Learning Applications (ICMLA'20), 2020.*

10. 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, 2020*

11. **Sathyanarayanan N. Aakur**, Sudeep Sarkar. Action Localization through Continual Predictive Learning. *European Conference on Computer Vision 2020.*

12. 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.* **(Oral)**

13. Vishalini R. Laguduva, **Sathyanarayanan Aakur**, Srinivas Katkoori. Latent Space Modeling for Cloning Encrypted PUF-based Authentication. *IFIP International Internet of Things (IoT) Conference, 2019.* **(Oral)**

14. 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)**.

15. **Sathyanarayanan Aakur**, Sudeep Sarkar. A Perceptual Prediction Framework for Self Supervised Event Segmentation. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2019.* [pdf].

16. **Sathyanarayanan Aakur***, Daniel Sawyer*, Sudeep Sarkar. Fine-grained Action Detection in Untrimmed Surveillance Videos *Winter Conference on Applications of Computer Vision Workshops, 2019.*

17. **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].

18. **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].

19. 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.*

20. **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].

21. **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]

22. **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]

23. **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. **Sathyanarayanan Aakur**, Sudeep Sarkar. Abductive Reasoning as Self Supervision for Common Sense Question Answering. Under Review at TPAMI.

2. **Sathyanarayanan Aakur**, Sudeep Sarkar. Learning Actor-centered Representations for Action Localization in Streaming Videos using Predictive Learning. Under Review.

3. Aditi Bal Basu, Ramy Mounir, **Sathyanarayanan Aakur**, Sudeep Sarkar, Anuj Srivastava. Time-Series Analysis of Video Graphs Using Joint Kalman Smoothing and Registration. 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

Current

1. Sanjoy Kundu (Ph.D., Spring 2020 - Present)
2. Shubham Trehan (Ph.D., Fall 2020 - Present)
3. Priyadarshini Ramamurthy (Ph.D., Fall 2020 - Present)
4. Vineela Indla (M.S. Fall 2020 - Present)
5. Yashwanth Peddaboina (M.S. Summer 2021 - Present)
6. Shengfang Ma (M.S. Summer 2021 - Present)
7. Devyn Hubbard (B.S. Spring 2022 - Present)
8. Uddhav Ramachandran (High School Scholar Fall 2020 - Present)

Past

1. Trae Primm (B.S. REU Summer 2021)
2. Madison Rushing (B.S. REU Summer 2021)
3. Nikhil Gunti (M.S., 2019 - 2021; [*First Job: Data Scientst, Concat Systems*])
4. Makenzie Terrell (B.S., Fall 2020 - Fall 2021)
5. Gilbert Rotich (Ph.D. (USF), 2017-2019)
6. Daniel Sawyer (B.S. (USF), 2016 - 2018) [*Next: Ph.D. at USF, Tampa*]

7. Subramanian Viswanathan (M.S. (USF), 2016 - 2017)[*First Job: Goldman Sachs*]

TEACHING EXPERIENCE	**Instructor**	Oklahoma State University
	Spring 2020 - Present	Stillwater, OK

Spring 2020, Spring 2021: CS 5323 Design and Implementation of Operating Systems II

Fall 2020, Fall 2021: 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

Associate Editor: IEEE Robotics and Automation Letters (RA-L, 2021-Present)
Area Chair: ACM Multimedia 2021, IEEE/CVF CVPR 2022
NSF Panels: IIS CHS (2020)
Track Chair: DEEP-DIAL (AAAI-2021), Machine Learning for Graphs (ICMLA 2020), ICMLA 2020 (Computer Vision), Vision for Robotics (VISAPP 2021)
Program Committee: AAAI 2020, AAAI 2021
Reviewer: IET Computer Vision, IEEE Access, WACV 2020, ICCV 2019, CVPR 2019, CVPR 2020, CRV 2020, ECCV 2020, WACV 2021, NeurIPS 2020, ACCV 2020, ICLR2021, CVPR2021, ICML 2021, Springer KAIS, ICCV 2021, WACV 2022, AAAI 2022, ICLR 2022, NeurIPS 2021
External Reviewer: PLOS ONE, IROS 2017, CAIP 2017
Organizer: DEEP-DIAL Workshop (AAAI-2021), Special Session on Machine Learning for Graphs (ICMLA 2020, ICMLA 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 *Towards Intelligent Agents with Open World Visual Understanding* . Collaborative Assistants for the Society (CASY 2020). Fall 2020
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

Total Funding: $\$1,163,679$ **(External)**, $\$187,000$ **(Internal)**. **Aakur share:** $\$344,126$**, As PI:** $\$322,126$

Current

1. *Deep Learning Computational Algorithms for Disease Diagnosis by Genome Sequence*, USDA National Animal Health Laboratory Network, $158,136, **Co-PI**.

2. *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, **PI**.

3. *REU Supplement: Collaborative Research: RI: Medium: Understanding Events from Streaming Video - Joint Deep and Graph Representations, Commonsense Priors, and Predictive Learning*, NSF CISE Core Program, $7,920, **PI**

Past

1. *GPU Server for Improving AI and Data Science Education*, OSU College of Arts and Sciences (CAS) Student Technology Fee Request, $25,000, **PI**

2. OSU College of Arts and Sciences Research (ASR) Program, $12,000, **PI**

3. *Accelerating Research Discoveries with GPU-enabled Computing*, Oklahoma State University Core Facility Support Program, $150,000, **Co-PI**.

PROFESSIONAL REFERENCES Available upon request.