SURAJ KOTHAWADE

Email: suraj.kothawade@utdallas.edu
Website: surajk.me
Phone: +1 213 285 2986

EDUCATION

University of Texas at Dallas *(Aug'19 - Aug'23)*
PhD, Computer Engineering GPA: 3.86/4.0
University of Southern California *(Jan'19 - Jul'21)*
MS, Computer Science, GPA: 3.7/4.0
SGGS Institute of Engineering & Technology *(July'14 - June'18)*
B.Tech, Computer Science & Engineering, GPA: 8.93/10.0

FIELDS OF INTEREST

Computer Vision, Machine Learning, Artificial Intelligence, Deep Learning, Natural Language Processing

INTERNSHIPS/WORK EXPERIENCE

1. **NVIDIA, Santa Clara, CA** *(May'20 - Present)*
   AI Research Intern
   - Devised and implemented an algorithm for semantic object based retrieval called Deep Template Matching (DTM) algorithm that efficiently mines for semantically similar images based on a region of interest in a query image. (US Patent filed and Paper under review at **CVPR 2021**)
   - Demonstrated the efficacy of DTM for retrieving small and underrepresented objects.
   - Applied DTM for fixing false negative failure cases of an objected detector deployed in NVIDIA autonomous vehicles — by mining semantically similar objects from large unlabeled dataset and adding such images to training data.
2. **University of Texas at Dallas** *(Aug'19 - May'20)*
   Teaching Assistant (Fall 2019, Spring 2020: CS 4348 - Operating Systems)
3. **University of Southern California, Los Angeles, CA** *(Jan'19 - Aug'19)*
   Research Student (Advisor: Prof. Stefanos Nikolaidis)
   - Robotic Lime Picking using Cost-Based APF-RRTs by Modelling Leaves as Penetrable Obstacles
   - Learning Collaborative Action Plans from YouTube Videos — ISRR 2019
4. **Indian Institute of Technology, Bombay** *(Dec'17 - Dec'18)*
   Research Intern (Advisor: Prof.Ganesh Ramakrishnan)
   - Worked with on developing machine learning models to solve computer vision problems in CCTV videos.
   - Lead a team to deliver a Compliance and Quality Monitoring System for the **Ministry of Rural Development:** for the following compliamces: 1) Predict if a Class has Started or Not (Implemented Handcrafted features for higher accuracy). 2) Classroom Attendance and 3)Uniform Detection. (Used multi-class customized YOLOv2 on edge devices). video
   - Developed an open source toolkit for Visual Data Subset Selection and Summarizartion: arXiv-preprint GitHub
5. **Aitoe Labs** *(Apr'18 - Dec'18)*
   Machine Learning Engineer
   - Implemented machine learning pipeline and system architecture for analyzing big data from 500+ CCTV cameras in Bhopal(IN) to deliver person search, face search, face recognition and text search for the state police department in Madhya Pradesh.
   - Solved problems like scheduling tasks efficiently to GPUs, storage and retrieval of huge metadata for quick search.
6. **Indian Institute of Technology, Bombay** *(May'17 - July'17)*
   Research Intern
   - Worked with *Prof. Deepak B. Phatak (Fundamental Research Group)* on the project: *Event Logging and Content Version System*
   - Developed a module that would facilitate imperative Events to be stored in a Local DB and synchronize back up to cloud servers, maintained versions of DB, Analyze DB to using Machine Learning to make indispensable business decisions and construct visualizations. *Project Link:* drupal-logger *Project Report:* Event Logging and CVS

RESEARCH PAPERS

PREPRINTS

[1] Suraj Kothawade, Donna Roy, Michele Fenzi, Elmar Haussman, Jose M. Alvarez, Christoph Angerer. **Object-Level Image Retrieval in the Wild with Deep Template Matching**, (Under review at CVPR 2021).

[2] Suraj Kothawade, Jiten Girdhar, Chandrashekhar Lavania and Rishabh Iyer. **Deep Submodular Networks for Extractive Data Summarization**. *In arXiv preprint arXiv:2010.08593*, 2020, (Under review at SDM 2021).

[3] Vishal Kaushal*, Suraj Kothawade*, Ganesh Ramakrishnan, Jeff Bilmes, Himanshu Asnani and Rishabh Iyer. **A Unified Framework for Generic, Query-Focused, Privacy Preserving and Update Summarization using Submodular Information Measures** . *In arXiv preprint arXiv:2010.05631*, 2020, (Under review at CVPR 2021).

[4] Rishabh Iyer, Pratik Dubal, Kunal Dargan, Suraj Kothawade, Rohan Mahadev and Vishal Kaushal. **Vis-DSS: An Open-Source toolkit for Visual Data Selection and Summarization** . *In arXiv preprint arXiv:1809.08846*, 2018.

[5] Pratik Dubal, Rohan Mahadev, Suraj Kothawade, Kunal Dargan and Rishabh Iyer **Deployment of customized deep learning based video analytics on surveillance cameras**. *In arXiv preprint arXiv:1805.10604*, 2018.

[6] Suraj Kothawade, Kunjan Mhaske, Sahil Sharma and Furkhan Shaikh. **Content Based Image Retrieval from AWiFS Images Repository of IRS Resourcesat-2 Satellite Based on Water Bodies and Burnt Areas** . *In arXiv preprint arXiv:1809.10190*, 2018.

WORKSHOP PAPERS

[1] Vishal Kaushal, Suraj Kothawade, Rishabh Iyer and Ganesh Ramakrishnan. **Realistic Video Summarization through VISIOCITY: A New Benchmark and Evaluation Framework**. *In Proceedings of the 2nd International Workshop on AI for Smart TV Content Production, Access and Delivery*, pp. 37-44, 2020.

CONFERENCE PAPERS

[1] Vishal Kaushal, Rishabh Iyer, Suraj Kothawade, Rohan Mahadev, Khoshrav Doctor and Ganesh Ramakrishnan **Learning from less data: A unified data subset selection and active learning framework for computer vision**, *In 2019 IEEE Winter Conference on Applications of Computer Vision (WACV)*, pp. 1289-1299, 2019.

[2] Vishal Kaushal, Sandeep Subramanian, Suraj Kothawade, Rishabh Iyer and Ganesh Ramakrishnan. **A framework towards domain specific video summarization**. *In 2019 IEEE Winter Conference on Applications of Computer Vision (WACV)*, pp.666-675, 2019.

[3] Vishal Kaushal, Rishabh Iyer, Khoshrav Doctor, Anurag Sahoo, Pratik Dubal, Suraj Kothawade, Rohan Mahadev, Kunal Dargan and Ganesh Ramakrishnan. **Demystifying multi-faceted video summarization: Tradeoff between diversity, representation, coverage and importance**. *In 2019 IEEE Winter Conference on Applications of Computer Vision (WACV)*, pp. 452-461, 2019.

[4] Hejia Zhang, Po-Jen Lai, Sayan Paul, Suraj Kothawade and Stefanos Nikolaidis. **Learning collaborative action plans from youtube videos**. *In Proceedings of the International Symposium on Robotics Research (ISRR 2019), Hanoi, Vietnam*, 2019.

[5] Sumit Tamgale , Suraj Kothawade **Application of deep convolutional neural network to prevent ATM fraud by facial disguise identification**. *In 2017 IEEE International Conference on Computational Intelligence and Computing Research (ICCIC)*, pp. 1-5, 2017.

[6] Suraj Kothawade, Shaikh Mohammed Furkhan, Abdul Raoof and Kunjan Suresh Mhaske. **Efficient water management for greenland using soil moisture sensor**. *In 2016 IEEE 1st International Conference on Power Electronics, Intelligent Control and Energy Systems (ICPEICES)*, pp. 1-4, 2016.

[7] Contributed to Coping with Accessibility Challenges for Security — A User Study with Blind Smartphone Users, Human-Computer Interaction —- **INTERACT 2017**, pp 3-22

PATENTS

1. US Patent Application 63111559, "Scalable Semantic Image Retrieval In The Wild With Deep Template Matching," Nov 9, 2020. Inventors: Donna Roy, Suraj Kothawade, Michele Fenzi, Elmar Haussman, Jose M. Alvarez, and Christoph Angerer.

ACHIEVEMENTS & AWARDS

- **Best Student Award** 2018 by Tata Sons. (Awarded to 1 out of 630 students across all engineering departments)
- **Best Project Award** 2018 by Tata Sons. (Awarded to 1 out of 30 projects across all engineering departments)
- Only student to receive both, the Best Student Award and Best Project Award awards since 1981 by Tata Sons
- **Best Paper Award** at 2017 IEEE International Conference on Computational Intelligence and Computing Research (ICCIC).
- **ACM ICPC 2017** Honorable mention.
- Ranked $\mathbf{1}^{st}$**/160** in Computer science & Engineering department in Junior year also cumulatively ranked $\mathbf{2}^{nd}$**/160**.

PROFESSIONAL ACTIVITIES/SERVICE

Program Committee Member for AAAI 2021

TOOLS & LIBRARIES

- **Languages:** Python, C++, C
- **Frameworks:** PyTorch, Tensorflow, Caffe, Keras, OpenCV