

Abhijit Suprem

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Specialization

I develop end-to-end systems for unsupervised, automated, adaptive learning and meta-learning to ensure robustness in real-world data with unpredictable, changing distributions. My research develops strategies for adaptive learning in two application areas:

- (i) real-time disaster and pandemic event detection under drifting and adversarial text streams
- (ii) end-to-end adaptive traffic monitoring, surveillance, and event detection under dynamic and adversarial environmental conditions

Interests

Event detection; Real-time systems; Adaptive systems for continuous learning; Multi-modal learning

Education

- Doctorate** (2017-): Georgia Institute of Technology, GA
End-to-End Adaptive ML, Real-time Event Detection, Video-based Surveillance
- MS** (Spring 2017): Columbia University, NY
Machine Learning
- BS** (Spring 2016): Smittcamp Honors College (Full ride), California State University, Fresno, CA
Major: Electrical Eng.; *Minors:* (i) Computer Eng., (ii) Math, (iii) Premed

Internships

- Traffic Surveillance System, University of Sao Paulo, Brazil** Summer 2019
Advisor: Joao Eduardo Ferreira
- Landslide Detection, CERCS, Georgia Tech** Summer 2018
Advisor: Calton Pu
- Surveying System for GPS-Blind Areas, California State University Fresno** Spring 2016
Advisor: Tarek Elarabi
- Microelectronics Course Development, California State University System** Spring 2016
Advisor: Reza Raeisi

Fellowships/Awards/Recognition

- Best Paper Award, IEEE CIC** 2019
- Best Paper Award, Services Congress** 2019
- Georgia Tech Chair's Fellowship** 2017
- National Institute of Health Fellowship** 2015
- Smittcamp Honors Scholarship (Full Ride, 50 out of ~5000 students)** 2011

Projects

- ASSED – Adaptive, Real-Time Event Detection from Streaming Sources** 01/18 – present
Supervisor: Dr. Calton Pu, Georgia Institute of Technology
Focus: Concept Drift Adaptive Event Detection; Disaster Detection; Pandemic Detection; Explainability
- Development of a scalable and extensible platform for physical event detection (github.com/asuprem/ASSED)
 - Analysis of concept drift and its impact on long term machine learning performance & stability
 - Development of heterogenous data integration strategies for multi-source multi-modal info.
 - Knowledge acquisition from reputable sources for unsupervised continuous learning

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Electronic Monitoring System for Traffic Surveillance

06/19 – present

Supervisor: Dr. Calton Pu, Georgia Institute of Technology; University of Sao Paulo

Focus: Vehicle detection, tracking, and identification

- Development of surveillance framework for fine-grained vehicle recognition, tracking, & ID
- Real-time event detection on video stream for accident, activity, and anomaly detection
- Automated meta-learning for finetuning detection performance under dynamic conditions (traffic density, occlusion, resolution)

Adaptive Model Specialization for Dynamic Video

05/19 – present

Supervisor: Dr. Joy Arulraj, Georgia Institute of Technology

Focus: Anomaly and drift detection for machine learning model specialization

- Development of unsupervised drift detection algorithm for high-dimensional video data
- Development of dual-adversarial GAN architecture for video drift detection
- Dense model specialization for hierarchical, domain-adaptive classification

Graph-based Fast Approximate Image Search

08/17 – 07/18

Supervisor: Dr. Polo Chau, Georgia Institute of Technology

Focus: Image analytics; Graph analytics; Approximation for fast graph search

- Developed IMAG-S: Image Matching with Approximate Graph Search (github.com/asuprem/imag-s)
- Fast, approximate relational content-based image search and retrieval on Visual Genome
- Built approximate algorithm for retrieval on ~108K images with ~3M objects in <2s on consumer hardware

Papers

Paying More Attention: Context-Invariant Re-ID in Adversarial Conditions (25% better SoTA; CVPR, in sub)
Automated Dataset Change Detection and Model Distillation for Dynamic Drifting Datasets (SIGMOD, in. sub)
Event Detection in Noisy Streaming Data with Corroborative & Probabilistic Sources *IEEE CIC*
Robust, Extensible, & Fast: Teamed Classifiers for Vehicle Tracking in Multi-Camera Networks. *IEEE CogMi*
Concept Drift Adaptive Physical Event Detection for Social Media Streams. *Services Congress 2019*
ASSED – A Platform for Social Sensor Event Processing to Detect Physical Events. *DEBS '19*
Approximate Query Matching for Graph-Based Holistic Image Retrieval. *Int'l Conf on Big Data, '18*
Orientation and Displacement Detection for Smartphone Device Based IMUs. *IEEE Open Access*.