

Sourish Gunesh Dhekane

• DOCTOR OF PHILOSOPHY STUDENT • GEORGIA INSTITUTE OF TECHNOLOGY

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Education

Georgia Institute of Technology

August 2023—present

DOCTOR OF PHILOSOPHY IN MACHINE LEARNING

Georgia Institute of Technology

August 2021—May 2023

MASTER OF SCIENCE IN COMPUTER SCIENCE (MACHINE LEARNING SPECIALIZATION)

OVERALL GPA : 3.93/4.0

Indian Institute of Information Technology Guwahati

July 2016—May 2020

BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING (PRESIDENT'S GOLD MEDAL)

OVERALL GPA : 9.32/10 • UNIVERSITY RANK: 1

Relevant Publications

How Much Unlabeled Data is Really Needed for Effective Self-Supervised HAR?

PUBLISHED AT **UBICOMP ISWC 2023** (25TH INTERNATIONAL JOINT CONFERENCE ON PERSVASIVE AND UBIQUITOUS COMPUTING)

Sourish Gunesh Dhekane, Harish Haresamudram, Megha Thukral, Thomas Plötz | [[PAPER](#)]

Enhanced Annotation Framework for Activity Recognition Through Change Point Detection

PUBLISHED AT **COMSNETS 2022** (14TH INTERNATIONAL CONFERENCE ON COMMUNICATION SYSTEMS AND NETWORKS)

Sourish Gunesh Dhekane, Shivam Tiwari, Manan Sharma, Dip Sankar Banerjee | [[PAPER](#)]

Semi-supervised Subject Recognition in Low-Model Sensor Data

PUBLISHED AT **AD HOC NETWORKS, ELSEVIER**

Shivam Tiwari, Sourish Gunesh Dhekane, Krishnam Vajra, Dip Sankar Banerjee | [[PAPER](#)]

Appropriateness of Performance Indices for Imbalanced Data Classification: An Analysis

PUBLISHED AT **PATTERN RECOGNITION, ELSEVIER**

Sankha S. Mullick, Shounak Datta, Sourish Dhekane, Swagatam Das | [[PAPER](#)]

Semi-supervised Subject Recognition through Pseudo Label Generation in Ubiquitous Sensor Data

PUBLISHED AT **COMSNETS 2020** (12TH INTERNATIONAL CONFERENCE ON COMMUNICATION SYSTEMS AND NETWORKS)

Sourish Dhekane, Krishnam Vajra, Dip Sankar Banerjee | [[PAPER](#)]

Funding & Academic Honors

PROJECT TITLED “**DOMAIN ADAPTATION IN SMART HOME ENVIRONMENTS BY LEARNED PRETEXT TASKS**”

UNDER THE SUPERVISION OF **PROF. THOMAS PLÖTZ** RECEIVED FUNDING FROM **CISCO**

2022

SERVED AS THE **HEAD TA** FOR THE **GRADUATE ARTIFICIAL INTELLIGENCE COURSE** UNDER THE INSTRUCTIONS OF

PROF. THOMAS PLÖTZ AND **PROF. THAD STARNER** [[LINK](#)]

2022

RECEIVED **9 THANK-A-TEACHER CERTIFICATES** FROM STUDENTS ENROLLED IN THE **GRADUATE ARTIFICIAL**

INTELLIGENCE COURSE DURING THE SPRING 22 AND SUMMER 22 SEMESTERS [[LINK](#)]

2022

AWARDED **PRESIDENT'S GOLD MEDAL** FOR SECURING **UNIVERSITY RANK 1** AT IIT GUWAHATI [[CERTIFICATE](#)]

2020

PROJECT TITLED “**ARPS SYSTEM FOR DETECTING POSSIBLE COVID-19 CASES**” SHORTLISTED IN THE **SAMADHAN**

CONTEST ORGANIZED BY **MHRD INNOVATION CELL** [[CERTIFICATE](#)] [[VIDEO](#)]

2020

Work Experience & Internships

Graduate Research Assistant at Georgia Institute of Technology

01/2023—present

UNDER THE SUPERVISION OF PROF. THOMAS PLÖTZ

Georgia Tech

- Proposed a systematic study that includes literature review, algorithmic development, and deployment of self-supervised domain adaptation frameworks to perform human activity recognition in smart-home environments.
- Proposed a domain adaptation framework that assumes the representations learned by individual pretext tasks as augmentations of the underlying data, and minimizes contrastive loss over them to *learn* the pretext tasks rather than designing them manually.

Graduate Teaching Assistant at Georgia Institute of Technology

01/2022—12/2022

UNDER THE SUPERVISION OF PROF. THAD STARNER AND PROF. THOMAS PLÖTZ

Georgia Tech

- Performed tasks like setting up course logistics, assignment creation, Gradescope setup, exam grading, holding office hours, monitoring discussions on Edstem, managing the team of TAs, and conducting lectures for the graduate Artificial Intelligence course.
- Served as the Head TA for two consecutive semesters and received multiple Thank-A-Teacher certificates from students.

Research Intern at TLC & RS Lab, University of Pavia

05/2019—07/2019

UNDER THE SUPERVISION OF PROF. PAOLO GAMBA

University of Pavia

- Implemented RASTFM, a spatio-temporal image-fusion algorithm to generate high-resolution high-frequency hybrid satellite images in order to monitor and track PM-2.5 pollution concentration.
- Built a regression model for estimation of PM-2.5 Concentration Maps by establishing a relation with ground temperature.
- Generated pollution concentration maps for the ongoing smart city projects in Paris, Barcelona, Rome, and Milan

Research Intern at Indian Statistical Institute, Kolkata

05/2018—07/2018

UNDER THE SUPERVISION OF DR. SWAGATAM DAS

ISI Kolkata

- Critically analyzed the existing performance indices in machine learning in the presence of high class-imbalance.
- Proposed new performance indices that are well-suited in presence of high class-imbalance and proved their theoretical properties.
- This work has been published at Pattern Recognition, Elsevier

Other Research Projects

Self-Supervised Domain Adaptation for Human Activity Recognition (Master's Project)

08/2021—12/2022

UNDER THE SUPERVISION OF PROF. THOMAS PLÖTZ

Georgia Tech

- Tested the ability of multiple pretext tasks to construct domain-invariant features that can be transferred after fine-tuning.
- Proposed a domain adaptation framework that performs sequential as well as joint training of these individual pretext tasks to obtain improved downstream performance on three real-world smart-home datasets.
- This project is a part of my CS6999: Master's Project, which is currently in its final stages.

Assessing Self-Supervised Frameworks from the Perspective of their Ease of Learning Layer-Wise Representations

05/2022—12/2022

UNDER THE SUPERVISION OF PROF. THOMAS PLÖTZ AND HARISH HARESAMUDRAM

Georgia Tech

- Performed experiments to measure the layer-wise downstream performance of the ConvLSTM-based CPC architecture in the presence of less unlabeled data, which is augmented using an extensive augmentation framework.
- Empirically observed a disparity in the ability of CPC to learn individual representation layers in the presence of less unlabeled data.
- Current experiments aimed at finding the "Critical Mass", which is the unlabeled data requirement to perform self-supervised pre-training to achieve near-supervised downstream performance.

Visualizing Climate Change by Analyzing and Extrapolating Trends Temperature Maps

01/2022—04/2022

IN COLLABORATION WITH CHEN CHEN AND SHEN EN CHEN

Georgia Tech

- Pre-processed satellite images with high spatial and temporal resolution to generate a dataset of temperature maps in order to perform sequence-to-sequence prediction.
- Implemented and tested LSTM and Transformer-based deep neural networks to accurately perform prediction of future temperature maps, which are then used to analyze the trends in temperature shifts.
- This project was part of the course CS 7643: Deep Learning under the supervision of Prof. Zsolt Kira.

Identifying Lung Infections and Predicting their Severity using Machine Learning

01/2022—04/2022

IN COLLABORATION WITH ADWAIT BAUSKAR, DONGWOOK GWEON, SANKALP SANGLE, AND SWASTHI SHETTY

Georgia Tech

- Developed machine learning techniques to classify the chest X-ray images into infection types and predict their severity.
- Performed benchmark experiments to highlight the difficulty of the problem and demonstrated the performance of both supervised (CNN-based architecture) and self-supervised (pretext task of "Rotation") approaches to successfully address the challenges.
- This project was part of the course CS 7641: Machine Learning under the supervision of Prof. Mahdi Roozbahani.

Learning Generalized Representations via Combining Pretext Tasks

08/2021–12/2021

IN COLLABORATION WITH JOHN YI, YOONWOO KIM, AND VITALY MARIN

Georgia Tech

- Proposed and tested three frameworks to combine the representations learned using individual pretext tasks on image datasets.
- Empirically observed that a combination of pretext tasks with different semantics (like Context Prediction + Colorization) yields better downstream performance than the same with similar semantics (like Context Prediction + Jigsaw Puzzle).
- This project was part of the course CS 8803: Machine Learning with Limited Supervision under the supervision of Prof. Judy Hoffman.

Cognitive Analysis of the Relationship between User and their Smartphones

05/2022–08/2022

WITH AFRA NAWAR, ERIC MARTIN, NIVEDHITHA KUMAR, AND XI LI

Georgia Tech

- Conducted user survey and collected data related to smartphone usage habits from the point of view of addiction.
- Designed a mental model to describe the effects of this addiction and proposed/built a prototype mobile application that would “intrinsically” motivate users to reduce their smartphone usage.
- This project was part of the course CS 6795: Introduction to Cognitive Science under the supervision of Prof. Michael Helms.

Relevant Coursework

Machine Learning

CS 7750: Maths Foundations for Machine Learning
CS 6601: Artificial Intelligence
CS 7641: Machine Learning
CS 7643: Deep Learning
CS 7476: Computer Vision
CS 7650: Natural Language Processing
CS 8803: Machine Learning with Limited Supervision
Data Analytics
Evolutionary Computation

Basic Mathematical Proficiency

CSE 6643: Numerical Linear Algebra
Mathematics I (Linear Algebra & Single Variable Calculus)
Mathematics II (Multivariable Calculus and Differential Equations)
Mathematics III (Probability & Stochastic Processes)
Discrete Mathematics
Optimization Techniques
Numerical Analysis
Introduction to Graph Theory

Computer Science and Engineering

Computer Programming • IT Workshop I
Data Structures • Algorithms • IT Workshop II
Operating Systems
Computer Organization
Theory of Computation
Formal Languages and Automata • Compilers
Database Management Systems
Computer Networks
Data Communications
Distributed Systems
Cloud Computing

Miscellaneous

CS 6795: Introduction to Cognitive Science
CS 6457: Video Game Design
CS 6460: Educational Technology

Technical Skills

Programming Proficiency

Python • C++/C • Java
SQL • CSS/HTML
MIPS Assembly Language

Operating Systems

Linux • Windows • OSX

Parallel Programming

MPI • OpenMP

Remote Sensing

Google Earth Engine • QGIS • ENVI

Networks and Cloud Computing

NS3 • Wiresharks • AWS

Machine Learning

PyTorch • TensorFlow/Keras
scikit-learn • OpenCV

Softwares/Environments

MATLAB • SPICE Simulator
Git • 𐤀𐤃𐤅𐤆 • Unity • Axure
Gradescope • Canvas • LitMaps

Extracurricular Activities

Environmental Conservation

10/2017

PARTICIPATED IN THE CONFERENCE “CONFLICT & ENVIRONMENT IN NORTH-EAST INDIA”

IIIT Guwahati

- One of the members in the Organizing & Management Committee of “Conflict & Environment In North-East India” conference.

Science, Technology and Society

08/2019

A PROJECT ON MAPPING THE INDIGENOUS TECHNOLOGY OF KARBI AND KACHARI TRIBES IN NORTH-EAST INDIA

IIIT Guwahati

- Participated in the Field Visit for the study of indigenous technology used by the tribal communities.