Sharat Agarwal

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Research Interest

My research interests are Computer Vision and Deep Learning. Research topics include Active Learning (data subset selection), Human-in-the-loop, Data Fairness, Domain Adaptation, Semantic Segmentation, and Object Detection.

Education

- **Indraprastha Institute of Information Technology Delhi** — Delhi, India
  PhD Candidate, Computer Science and Engineering — *August 2017 - Present*
  Thesis: Exploiting Contextual Uncertainty of Deep Models for Efficient Training
  Advisors: Dr. Saket Anand and Dr. Chetan Arora
  Courses: Machine Learning, Deep Learning, Advanced Computer Vision, Computer Vision, Image Processing, Probability and Random Process, Natural Language Processing

- **Graphic Era University** — Dehradun, India
  Bachelor of Technology - Computer Science and Engineering; GPA: 8.8 — *July 2012 - June 2016*
  BTP: Human Activity Recognition
  Advisor: Dr. Vikas Tripathi
  Courses: Operating Systems, Data Structures, Analysis Of Algorithms, Networking, Databases, Automata

Ongoing Projects

- **Automated Rural Road Inspection**:
  1. `Leading a team of 5 members` in developing an AI-driven system for Ministry of Rural Development.
  2. Focused on building a `reliable and explainable system`, ensuring that raised alarms lead to successful score updates.
  3. `Reduced human involvement by 80%`, utilizing human expertise primarily as fact-checkers for small set of flagged cases.
- **Data Management System for Wildlife Camera Trap Images**:
  1. Developing a `Text-Based Image Retrieval (TBIR)`, enabling efficient and scalable wildlife research analysis.
  2. Leading the development of a tool aimed at `automating annotation and augmentation` of images using zero-shot models and human's expertise.
  3. Investigating `shortcomings in visual representation of Multimodal-LLM's` to improve TBIR.
- **Effective Annotation System for Object Detection with Human-in-the-loop**:
  1. Conducting research on `different object detectors and their error patterns`, developing a model-agnostic acquisition function to train object detectors with limited data and reducing errors.
- **Active Learning (AL) for Multi-Object Tracking**:
  1. Estimating `uncertainty in multi-object trackers` to optimize acquisition functions for active learning algorithms identifying redundant frames in videos.

Publications

- **S. Agarwal**, S. Anand and C. Arora, *"Reducing Annotation Effort by Identifying and Labeling Contextually Diverse Classes for Semantic Segmentation Under Domain Shift"* IEEE Winter Conference on Applications of Computer Vision **(WACV 2023), Core-A** [PDF][Code].
- **S. Agarwal**, S. Muku, S. Anand and C. Arora, *"Does Data Repair Lead to Fair Models? Curating Contextually Fair Data To Reduce Model Bias"* IEEE Winter Conference on Applications of Computer Vision **(WACV 2022), Core-A** [PDF][Code].
- **S. Agarwal**, H. Arora, S. Anand and C. Arora, *"Contextual Diversity for Active Learning"*, European Conference on Computer Vision **(ECCV 2020), Core-A***.[PDF][Code].
- V. Tripathi, **S. Agarwal**, A. Mittal, D. Gangodkar, *"Improved Dynamic Time Warping Based Approach for Activity Recognition"*, Frontiers of Intelligent Computing: Theory and Applications **(FICTA 2017)**.
- V. Tripathi, Piyush Bhatt, **S. Agarwal**, M. Semwal, *"Modified Dense Trajectory for Real-Time Action Recognition"*, International Journal of Control Theory and Applications,**(IJCTA 2016)**.

Activities

- Presented our work in "Advanced Vision Technologies for Road Safety" IMPRINT-II 2023, IIT-Delhi.
- Selected for Google Research Week 2023, Bengaluru.

Technical Exposure

- **Languages**: Python, C, C++
- **Frameworks**: Scikit, NLTK, SpaCy, PyTorch, OpenCV, Matlab

Mentorship

- **Ojus Singhal**, "Domain Adaptation for Indian Roads"B.Tech Project(Jan 23 - Dec 23)
- **Utsav Garg**, "Semantic Segmentation on Indian Road" IP Project(August 23 - Dec 23)
- **Tanish Gupta, Aman Kumar, Danish Khan, Faizan**, "Automating Indian Road Data Annotation" B.Tech Project (Jan 24 - Dec 24)
- **Himanshi Sethi**, "Indian Road Inspection" B.Tech Project (Jan 24 - May 24)
- **Atharv Goel**, "Active Learning for Object Detection" B.Tech Project (Jan 24 - Dec 24)
- **Mehar Khurana**, "Active Learning for Multi Object Tracking" B.Tech Project(Jan 24 - Dec 24)

Professional Service

- **Reviewed Journal**: TPAMI-23
- **Reviewed Conference**: ICCV-23, ECCV-22,24, CVPR-22,23, WACV-22,23,24
- **Program Committee**, COMSNETS 23,24, Workshop on Connected Vehicles & Autonomous Driving.
- **Committee Member**, ICVGIP Data Challenge 2021
- **Deep Learning Tutorial** , AI Assisted Data Analytic (AIDA) 2020, IIITD
- **Machine Learning Tutorial**, Economics Workshop 2019, IIITD

Teaching

- **CSE-544 Computer Vision**, Winter 2021
- **CSE-343 Machine Learning**, Monsoon 2020
- **CSE-661 Affective Computing**, Winter 2020
- **CSE-343 Machine Learning**, Monsoon 2019
- **CSE-641 Deep Learning**, Winter 2019
- **CSE-540 Digital Image Processing**, Monsoon 2018
- **CSE-600A Object Oriented Programming**, Monsoon 2017

Academic Projects

- **Domain Adaptation for Semantic Segmentation**: Course: Deep Learning
- **Detecting people with Down Syndrome**: Course: Image Processing
- **Pairwise Confusion Loss for Semantic Segmentation**: Course: Advanced Computer Vision
- **Depression Detection Using Tweets**: Course: Natural Language Processing
- **Quora Question Duplicate Detection**: Course: Machine Learning
- **Driver Drowsiness Detection on Long Videos**: Course: Computer Vision
- **Improved Study of Heart Disease Detection using Data Mining**: Course: Data Mining for Health Care