Akhil Meethal

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Research Interests

Computer Vision & Image Understanding, Semi-supervised Learning, Vision Language Models, Natural Language Processing, Self-supervised Learning, Aerial Image Analysis for Climate Studies.

Education

École de Technologie Supérieure (ETS) — Montreal, Canada
Doctorate in Computer Vision & Machine Learning — *Mar 2018 – Oct 2023*

Indian Institute of Space Science & Technology — Trivandrum, India
Master's in Machine Learning & Computing; ***GPA: 8.6/10*** — *Aug 2014 – Jun 2016*

College of Engineering, Trivandrum — Trivandrum, India
Bachelors's in Computer Science & Engineering; ***GPA: 7.7/10*** — *Aug 2009 – Jun 2013*

Experience

Tenvos — Silicon Valley, USA (Remote, contract)
ML Research Scientist — *Sept 2023 – Present*

- Impairment detection from voice signals. Developing novel algorithms to identify impaired individuals in a workplace due to drug, alcohol, and fatigue, by studying the resulting neuromotor effects on their voice.
- Fine tuning large foundation models for impaired speech detection.

Ericsson — Montreal, Canada
Computer Vision Research Intern — *Jun 2020 – Aug 2022*

- Computer Vision solutions for Automated Site Inspection and Fault Detection with less annotated data. Also, worked on training object detectors with classification data.
- To facilitate Automation and Quality Control of some routine tasks on Ericsson's Antenna Systems with drone imagery.

MobME Wireless Solutions Limited — Cochin, India
Machine Learning Engineer — *Aug 2016 – Feb 2018*

- Analyzed the feedback from portals of Telecom and Retail industries and integrated the results into the dashboard. Providing abstract and fine-grained analytics.
- Implemented Deep Learning algorithms (for NLP) to do Sentiment Analysis, Text Categorization, Question Answering, and Aspect Specific Sentiment Analysis.
- Used RNN-based time-series algorithms for forecasting the usage pattern for the future year.
- Established collaboration with Indian Institute of Technology (IIT) Palakkad on large-scale text data mining.

Indian Institute of Space Science & Technology — Trivandrum, India
Teaching Assistant — *Jul 2015 – Apr 2016*

- Teaching Assistant for foundation-level courses in Machine Learning including Data Mining, and Pattern Recognition. Duties include assignment correction, project guidance, etc.
- Lab Tutor for Python Programming.

Selected Publications

- A. Belal, **A. Meethal**, F. P. Romero, M. Pedersoli and E. Granger, Multi-Source Domain Adaptation for Object Detection with Prototype-based Mean-teacher, in *WACV* 2024.
- **A. Meethal**, E. Granger, and M. Pedersoli, Cascaded Zoom-in Detector for High-resolution Aerial Images, in *CVPRw* 2023.
- **A. Meethal**, E. Granger, and M. Pedersoli, Density Crop-guided Semi-supervised Object Detection in Aerial Images, under review in *TGRS* 2023.
- **A. Meethal**, M. Pedersoli, Z. Zhu, F. P. Romero, and E. Granger, Semi-Weakly Supervised Object Detection by Sampling Pseudo Ground-Truth Boxes, in *IJCNN* 2022.

- **A. Meethal**, M. Pedersoli, S. Belharbi, and E. Granger, Convolutional STN for Weakly Supervised Object Localization, in *ICPR* 2020.
- V. Shaj, **A. Meethal**, andAsharaf,, Edge-PSO: A Recombination Operator Based PSO Algorithm for Solving TSP, in *ICACCI* 2016.
- **A. Meethal**, S. Asharaf, and S. Sumitra, Unsupervised MKL in Multi-layer Kernel Machines.

Selected Projects

Aerial image object detection: Developed semi-supervised object detectors for small object detection from high-resolution drone and satellite images.

Bias detection in foundation models: Studied the bias in gender classification models with and without fine-tuning. The Embeddings from foundation models are used for identifying underrepresented sub-groups.

Bandit sampler for weakly supervised object detection: Designed a sampling algorithm to train object detectors using weak supervision using multi-armed bandits.

Novel view synthesis: Worked on a differentiable 3DMM model for synthetic face generation & domain adaptation to real-world conditions using cycle GAN.

Learning to localize objects with limited supervision: Developed object detectors that can be trained with limited labels using semi-supervised and weakly supervised learning techniques.

Deep Multi-layer Kernel Methods (Master's Thesis): Developed kernel machine equivalent to DNNs for supervised and unsupervised learning | *Code*

Machine Parsable RESTful web API: Developed techniques for annotating REST API documentation to make them machine parsable. This is used to link RESTful services in the same domain enabling automatic discovery and composition.

Graphical Interface to manage BOINC projects: Implemented a GUI to control the BOINC server, allowing easy deployment of BOINC apps and work units.

Achievements & Activities

- **Reviewer:** ICCV, BMVC
- Presented our research on Semi-supervised Object Detection at Ericsson's Technology Expo.
- Participated in a 12 week training program on Scientific Entrepreneurship (QCSE) provided by the Quebec Govt.
- Gave talk at various engineering schools in Kerala, India on recent advances in Object Detection and training object detectors with limited labels.
- Conducted sessions on the career path from Engineering to Research for students supported by the Pratiksha Trust.
- Won accolades for our work on aspect-based sentiment mining at the industrial track session of the Conference on Data Science (CODS) India's top conference in Data Science.
- Won **Best Paper award** for our paper *Edge-PSO: A Recombination Operator Based PSO Algorithm for Solving TSP*, in 5th International Conf. on Advances in Computing, Communications, and Informatics (ICACCI 2016).
- Event co-ordinator of Linux kernel API Programming on Drishti-2012, annual tech fest of College of Engineering, Trivandrum.
- Won **CETAA award** (College of Engineering, Trivandrum Alumni Association) for a meritorious student.

Programming Skills

Programming: Python, C, C++, MATLAB, SQL

Packages: Pytorch, NumPy, SciPy, Pandas, TensorFlow, Scikit-Learn, NLTK, LaTeX, GCC, OpenCV

ML Stack: Huggingface, Transformers, Langchain, LLMs, AWS, Comet, W&B
Scripting: Bash Scripts (basics)

Relevant Courseworks

Pattern Recognition and Machine Learning, Artificial Intelligence, Applied Statistics, Data Mining, Matrix Computation, Optimization Techniques, Evolutionary and Natural Computing, Discrete Mathematics, Reinforcement Learning, Data Structures and Algorithms, Object Oriented Design, Principles of Programming Languages, Design and Analysis of Algorithms, Graph Theory, Distributed Systems, Cryptography and Network Security.

Personal Details

Date of Birth: 11 April 1991
Languages: English, Malayalam, Hindi
Nationality: Indian