Sannara EK

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Research Summary

I am an interdisciplinary researcher at the intersection of AI and Pervasive/Ubiquitous Computing My current research as a Postdoctoral Research Associate at the University of Cambridge focuses on developing efficient Multi-modal Large Language Models (MLLMs) with Retrieval-Augmented Generation (RAG) for the domain of Earth Observation (EO) using satellite images. My work is driven by two core questions: **How can we design user-centric AI models that are efficient and robust?** and **How can we collectively run or train advanced AI models while preserving user privacy at the edge?**

My previous research has focused on developing novel neural network components to address domain shift challenges in federated learning environments. In addition, I have also explored a range of self-supervised learning techniques to overcome labeled data scarcity and designed benchmarks to evaluate AI domain generalization. My open-source research contributions have led to influential publications, publicly available pre-trained models, and the introduction of new AI layers.

Work Experience

- **Postdoctoral Research Associate** *2025 July – Present*
  University of Cambridge Cambridge, United Kingdom
  - Investigations on the integration of LLM with RAG deployed to edge satellite use cases for enhanced analysis onto the domain of earth observation.
- **Research Intern - M2** *June 2020 – November 2020*
  Grenoble Computer Science Laboratory Grenoble, France
  - Developed and published personalized federated learning algorithms for human activity recognition
  - Deployed AI models to wearable devices for on-device training/inference
  - Experienced on distributed and multi-GPU development and training (Jean Zay supercomputers)
- **Research Intern - M1** *June 2019 – September 2019*
  Grenoble Computer Science Laboratory Grenoble, France
  - Developed metrics to analyze the visual stimulus of physically impaired users utilizing eye-trackers
- **Software Engineer** *August 2017 – September 2018*
  Udaya Technology Co., Ltd Phnom Penh, Cambodia
  - Developed mobile applications using Java and Swift for Android and iOS platforms
  - Collaborated with cross-functional teams to deliver software solutions in healthcare and education sectors
- **Telecommunications Intern** *May 2017 – July 2017*
  Huawei Technology Co., Ltd Phnom Penh, Cambodia
  - Configured and installed new Huawei core routers and switches at Smart Axiata

Educations

- **PhD in Computer Science** *2021 – 2024*
  Université Grenoble Alpes Grenoble, France
  - Metrics: 11+ Papers (8 first-authored), h-index: 7, citations: 350+
  - Thesis: Personalized Federated Learning for Pervasive Heterogeneous Environments
  - Sponsor: Naval Group France
  - Supervisors: Philippe Lalanda and François Portet
  - Committee: Jiannong Cao, Cecilia Mascolo, Giovanni Neglia, Keiichi Yasumoto and Vania Marangozova
- **Master of Science in Informatics** *2018 – 2020*
  Université Grenoble Alpes - Grenoble INP Grenoble, France
  - Specialization: Artificial Intelligence for Graphics, Vision, and Robotics
- **Bachelor of Science in Software Engineering with Multimedia** *2013 – 2017*
  Limkokwing University of Creative Technology Phnom Penh, Cambodia
  - Specialization: Mobile Computing and Systems

Selected Publications

- **FedAli: Personalized Federated Learning Alignment with Prototype Layers for Generalized Mobile Services** *2025*
  Sannara Ek, Kaile Wang, François Portet, Philippe Lalanda, and Jiannong Cao
  Submitted and under-revision (pre-print on arXiv)
- **Comparing Self-Supervised Learning Techniques for Wearable Human Activity Recognition** *2024*
  Sannara Ek, Riccardo Presotto, Gabriele Civitarese, François Portet, Philippe Lalanda, and Claudio Bettini
  CCF Transactions on Pervasive Computing and Interaction
- **Transformer-based models to deal with heterogeneous environments in Human Activity Recognition** *2022*
  Sannara Ek, François Portet, and Philippe Lalanda
  Springer Nature Journal on Personal and Ubiquitous Computing
- **A federated learning aggregation algorithm for pervasive computing: Evaluation and comparison** *2021*
  Sannara Ek, François Portet, Philippe Lalanda, and German Vega
  IEEE International Conference on Pervasive Computing and Communications (PerCom)

Research Exchanges

- **Visiting Research Assistant** *August 2024 - September 2024*
  The Hong Kong Polytechnic University - IMCL Lab Hong Kong, China
  ◦ Participated in a research exchange to extend federated learning findings into the vision domain
- **Visiting Student Researcher** *October 2022 - November 2022*
  University of Milan - EveryWare Lab Milan, Italy
  ◦ Engaged in research on pre-trained and self-supervised learning models for human activity recognition
- **Visiting Student Researcher** *November 2021*
  Université de Lorraine - Institut Jean Lamour Nancy, France
  ◦ Investigated deep learning solutions for arc fault detection

Extracurriculars

- **Advanced Language Processing (NLP & LLM) Winter School** *January 2022*
  Laboratoire d'informatique de Grenoble Grenoble, France
- **Cisco Certified Network Associate Training Course** *May 2015 – June 2016*
  Sunrise Institute of Technology Phnom Penh, Cambodia

Academic Services and Awards

- **Reviewer:** IEEE: Percom, ACM: IMWUT, Journals: Pervasive and Mobile Computing, Knowledge-Based Systems
- **Awards:** IEEE PerCom '23 Student Travel Grant, Limkokwing Award for Creativity and Innovation, Limkokwing Valedictorian of the graduation years '15-17
- **Internship Supervisions:** Domain Adaptation by Gradient Reversal (M2), Model Confidence Prediction (M2), and Benchmarking Self-Supervised Learning (M1)

Skills

- **Expertise Domain:** Machine Learning, Mobile and Pervasive Computing, Federated Learning, Wearable Sensing, Computer Vision
- **Technical Proficiencies:** Python [Tensorflow, PyTorch], Java [Android], Swift [iOS], JavaScript [NodeJS, React], SQL
- **Languages:** Khmer [Native], English [Fluent], French [Basic]

References

- **Prof. Philippe Lalanda** *philippe.lalanda@univ-grenoble-alpes.fr*
  PhD Supervisor Université Grenoble Alpes
- **Prof. François Portet** *francois.portet@imag.fr*
  PhD Supervisor Université Grenoble Alpes
- **Prof. Claudio Bettini** *claudio.bettini@unimi.it*
  Research Exchange Host University of Milan
- **Prof. Jiannong Cao** *jiannong.cao@polyu.edu.hk*
  Research Exchange Host The Hong Kong Polytechnic University