

GAUTHAM KRISHNA GUDUR

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RESEARCH & INDUSTRY EXPERIENCE

Data Scientist

ERICSSON R&D - GLOBAL AI ACCELERATOR (GAIA)

📅 Feb 2019 – Ongoing 📍 Chennai, India

- Incorporating Machine Learning for Network Intelligence broadly in the spaces of telecom and IoT.
- Working on **mobility prediction** of user equipment (UE) to base stations (eNodeBs) in 5G NetWork Data Analytics Function (NWDAF) using **Deep Bayesian Contextual Bandits** robust to concept drift in an online learning setting. Also worked on speeding up network simulation of optimal eNodeB placement in heterogeneous user load environments.
- Successfully delivered **iSite (Intelligent Site Acceptance)** – a set of tasks for **on-mobile multi-object detection** of physical infrastructure failures at cell-sites, thereby replacing field technicians. Used YOLO, SSD, FasterRCNN networks; handled detection of blurred images.
- Improved **search recommendations** of customer issues from long-descriptions, slogans/symptoms using **transformer models** like BERT, RoBERTa; used **Active Learning** to handle sentence labeling. Worked on language translation from English to Brazilian Portuguese.
- Our team created **E-ADF** – an **end-to-end framework for anomaly detection on time-series**, with a focus on existing/novel unsupervised machine learning algorithms, metrics, explainability, visualization, etc.

Independent Researcher

📅 Dec 2018 – Ongoing 📍 Chennai, India

- Worked on handling unlabeled data using **Deep Bayesian Active Learning** for on-device audio sensing, Human Activity Recognition (HAR), fall and stress/affect detection, and video frame labeling.
- Developed a framework for on-device **Federated Active Learning** with **heterogeneous new classes and models** for vision, audio and HAR tasks.
- Currently working on **Incremental/Continual Learning** on the edge to handle **catastrophic forgetting** for audio sensing and HAR tasks.

Machine Learning Engineer

SMARTCARDIA (EPFL)

📅 May 2018 – Nov 2018 📍 Chennai, India (Remote)

- Developed machine learning, deep learning models for analyzing **biomarkers** like sleep apnea, troponin, haemoglobin, blood pressure, glucose, to provide unique insights into patients' health.
- Engineered features for imbalanced time-series clinical data; modeled classification, regression architectures using **gradient-boosted ensemble models** and **Recurrent Neural Networks (LSTMs)**.

Research & Teaching Assistant

SOLARILLION FOUNDATION

📅 Feb 2016 – Jun 2018 📍 Chennai, India

- Led a team of four to develop **HARNet** – a set of deep learning ensemble models for HAR with heterogeneities on resource-constrained devices capable of incremental model updation.
- Led a team of five to design a user-independent **Dynamic Gesture Recognition** system with machine learning approaches by extracting domain-specific features on a low-cost **Raspberry Pi Zero (\$5)**.

RESEARCH INTERESTS

Deep Learning Resource-Efficient AI
On-Device ML Ubiquitous Computing
Computer Vision IoT NLP
Continual Learning Bayesian ML
Active Learning Activity Recognition
Mobile Health Reinforcement Learning
Telecom ML4Development

EDUCATION

B.Tech in Information Technology

Anna University [SSN College of Engineering]

📅 Grad. Apr 2017 📍 Chennai, India

Cum. GPA: 7.41/10 - First Class

Thesis: Intelligent Bus Stop Recognition System. Advised by Prof. Srinivasan R.

Coursework

Programming & Data Structures: I & II
Design & Analysis of Algorithms
Artificial Intelligence Signal Processing
Data Analytics Data Mining

HSC (Class XII)

DAV Higher Secondary School, Gill Nagar

📅 Grad. May 2013 📍 Chennai, India

Scored an overall of 94.25%.

SUMMER SCHOOLS

Oxford Machine Learning Summer School (OxML 2020)

📅 Aug 2020 📍 Oxford, UK (Virtual)

Organized by AI for Global Goals, CIFAR, Saïd Business School, Deep Medicine.
Provided full fee waiver.
Focus Areas: Deep Learning and Healthcare.

Eastern European Machine Learning Summer School (EEML 2020)

📅 Jul 2020 📍 Warsaw, Poland (Virtual)

Organized by DeepMind.
Focus Areas: Deep Learning and Reinforcement Learning.

- Developed a **Movie Occupancy Prediction** engine by engineering adaptive behavioral features of the crowd using tree-based ensemble models and branched LSTMs (with ± 6 MAPE). Deployed the beta application for a *top 3 Indian movie multiplex chain*.
- *Mentored students* to help them develop problem-solving approaches in embedded programming for their assignments and research project.

Undergraduate Student Researcher

SSN COLLEGE OF ENGINEERING

📅 Feb 2015 – Mar 2017

📍 Chennai, India

- Developed a vision-based **Intelligent Bus Stop Recognition System** using CNNs. Used data augmentation and active learning strategies to handle scalability and adaptability to dynamic Indian environments.
- Worked on a funded HCI research project – *Neurocinematics*, to classify real-time cognitive responses of film viewers from EEG.
- Worked on choosing the best-suited mote for two IoT scenarios, by analyzing their *RPL performance* metrics on a *Contiki testbed*.

PUBLICATIONS

👥 Conferences/Workshops

- Gautham Krishna Gudur, Satheesh Kumar Perepu, "Federated Learning with Heterogeneous New Classes and Models for Audio Classification", *IEEE ICASSP 2021* [Under Review].
- Resource-Constrained Federated Learning with Heterogeneous Labels and Models for Human Activity Recognition, *IJCAI 2020* - 2nd International Workshop on Deep Learning for Human Activity Recognition (*DL-HAR '20*), Springer.
Abridged version: Gautham Krishna Gudur, Satheesh Kumar Perepu, "Federated Learning with Heterogeneous Labels and Models for Mobile Activity Monitoring", *NeurIPS 2020* - Machine Learning for Mobile Health Workshop (*MLMH '20*);
- Abhijith Ragav*, Gautham Krishna Gudur*, "Bayesian Active Learning for Wearable Stress and Affect Detection", *NeurIPS 2020* - Machine Learning for Mobile Health Workshop (*MLMH '20*).
- Gautham Krishna Gudur, Bala Shyamala Balaji, Perepu Satheesh Kumar, "Resource-Constrained Federated Learning with Heterogeneous Labels and Models", *ACM KDD 2020* - 3rd International Workshop on Artificial Intelligence of Things (*AIoT '20*).
- Sundararaman Venkataramani, Ateendra Ramesh, Sharan Sundar S, Aashish Kumar Jain, Gautham Krishna Gudur, Vineeth Vijayaraghavan, "A Dynamically Adaptive Movie Occupancy Forecasting System with Feature Optimization", *IEEE ICDM 2019* - Workshop on Learning and Mining with Industrial Data (*LMID '19*).
- Raghavan A K, Venkatesh Umaashankar, Gautham Krishna Gudur, "Label Frequency Transformation for Multi-Label Multi-Class Text Classification", *KONVENS 2019* (GermEval '19).
- Gautham Krishna Gudur, Ateendra Ramesh, Srinivasan R, "A Vision-based Deep On-Device Intelligent Bus Stop Recognition System", *ACM UbiComp 2019* - 8th International Workshop on Pervasive Urban Applications (*PURBA '19*).
- Gautham Krishna Gudur, Prahalathan Sundaramoorthy, Venkatesh Umaashankar, "ActiveHARNet: Towards On-Device Deep Bayesian Active Learning for Human Activity Recognition", *ACM MobiSys 2019* - 3rd International Workshop on Embedded and Mobile Deep Learning (*EMDL '19*).

SKILLS

Programming

Expert Python C/C++
Intermediate Java SQL HTML/CSS
JavaScript Bash
Basic Android R

Hardware & Software

LaTeX Git Arduino Raspberry Pi

Tools & Frameworks

NumPy Scikit-learn TensorFlow
PyTorch Keras OpenCV Docker
MATLAB PySpark

SERVICES

- Program Committee Member/Reviewer
 - Machine Learning for Health Workshop **ML4H 2020 - NeurIPS 2020**, **ML4H 2019 - NeurIPS 2019**
 - GermEval 2019, KONVENS 2019
- Technical Reviewer of the book titled "Hands-On Meta Learning With Python"
- Event Organizer of "Data Nuggets" - a Data Science event, Invente 2016

HONORS AND AWARDS

- **99th percentile** in *HackerRank* (Algorithms Domain/Problem Solving - Advanced)
- Undergraduate *financial research grant* of **INR 24,000** from SSN College of Engineering
- **Winner** of **GermEval** Shared Task 1 Challenge (Subtask (a)), KONVENS 2019 in Post-Evaluation Phase
- **Full fee waiver** to attend Oxford Machine Learning Summer School (**OxML 2020**)
- Certification of Merit for Grade A1 in all subjects in AISSE (CBSE 10th boards)
- Completed all 10 levels of UCMAS Mental Arithmetic (Abacus)
- Division Level Badminton Player (U-19)
- **29th Rank** overall in Grade 3 Keyboard

TALKS

- Resource-Constrained Machine Learning for Ubiquitous Computing Applications [Flipped by GAIUS].

*Equal Contribution

- Prahalathan Sundaramoorthy, **Gautham Krishna Gudur**, Manav Rajiv Moorthy, R Nidhi Bhandari, Vineeth Vijayaraghavan, "**HARNet: Towards On-Device Incremental Learning using Deep Ensembles on Constrained Devices**", *ACM MobiSys 2018* - 2nd International Workshop on Embedded and Mobile Deep Learning (*EMDL '18*).
- **Gautham Krishna G**, Karthik Subramanian Nathan, Yogesh Kumar B, Ankith A Prabhu, Ajay Kannan, Vineeth Vijayaraghavan, "**A Generic Multi-modal Dynamic Gesture Recognition System Using Machine Learning**", IEEE Future for Information and Communication Conference (*FICC 2018*).
- **Gautham Krishna G**, Krishna G, Bhalaji N, "**Electroencephalography Based Analysis of Emotions Among Indian Film Viewers**", Springer, International Conference on Advanced Informatics for Computing Research (*ICAICR 2017*).
- **G Gautham Krishna**, G Krishna, N Bhalaji, "**Analysis of Routing Protocol for Low-power and Lossy Networks in IoT Real Time Applications**", Procedia Computer Science, Elsevier, *ICRTCS 2016*.

Posters/Extended Abstracts

- **Gautham Krishna Gudur**, Prahalathan Sundaramoorthy, Abhijith Ragav, Venkatesh Umaashankar "**Deep Bayesian Active Learning for Wearable and Mobile Health**", NeurIPS Europe meetup on Bayesian Deep Learning (*BDL 2020*) [*Submitted*].
- **Gautham Krishna Gudur**, Prahalathan Sundaramoorthy, Venkatesh Umaashankar "**ActiveHARNet: Towards On-Device Deep Bayesian Active Learning for Human Activity Recognition**", Eastern European Machine Learning Summer School (*EEML 2020*).
- **Gautham Krishna Gudur**, Prahalathan Sundaramoorthy, Venkatesh Umaashankar "**Handling Real-time Unlabeled Data in Activity Recognition using Deep Bayesian Active Learning and Data Programming**", *MobiUK 2019*, University of Oxford.
- N Bhalaji, G Krishna, **G Gautham Krishna**, "**Neurocinematics: The Intelligent Review System.**", 3rd International Conference on Cognition, Brain and Computation (*CBC 2015*), Indian Institute of Technology (IIT), Gandhinagar.

PATENTS

- Federated Learning using Heterogeneous Labels {P81198 WO1 - PCT/IN2020/050618} [*Filed*].
- System and Method to Explore New Classes with Heterogeneous Label Distribution in Federated Learning [*Under Filing*].

NOTABLE PROJECTS

Weakly-Supervised Data Programming for Sensor Data

Working on *ground truth generation* by leveraging heuristic data labeling functions which are fed into a generative model and fine-tuned using a discriminative model - a *weakly supervised data programming paradigm*, for mobile, wearable sensing tasks.

MOOCS

- **University of Washington | Coursera**
Machine Learning Specialization (4 courses)
A Case Study Approach Regression
Classification Clustering & Retrieval
- **NRU HSE | Coursera**
Bayesian Methods for Machine Learning
- **University of Alberta | Coursera**
Fundamentals of Reinforcement Learning
- **Stanford University | Coursera**
Machine Learning
- **UC San Diego | Coursera**
Algorithmic Toolbox Data Structures
- **John Hopkins University | Coursera**
R Programming
- **Google | Udacity** - Deep Learning
- **Stanford University** - CS231n