GAUTHAM KRISHNA GUDUR

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RESEARCH & WORK EXPERIENCE

Data Scientist
ERICSSON R&D - GLOBAL AI ACCELERATOR (GAIA)
Feb 2019 – Ongoing | Chennai, India

- Incorporating Machine Learning for Network Intelligence broadly in the space of telecom, computer vision, reinforcement learning, IoT, time-series. Developing multiple patents and publications.
- Working on ***mobility prediction*** of *user equipment (UE) to eNodeBs* using ***Deep Contextual Bandits*** robust to *concept drifts* for *5G NWDAF*.
- Successfully delivered ***iSite*** *(Intelligent Site Acceptance)* – a set of ***on-mobile multi-object detection/localization*** tasks like weatherproofing, mounting bracket for effective fault tolerance at cell sites. Utilized *YOLO*, *SSD*, *FasterRCNN* architectures; handled blurred images.
- Our team created ***quidditch*** – an *open-source framework for time-series and anomaly detection*, with a focus existing/novel unsupervised machine learning algorithms, metrics, explainability, visualization, etc.

Independent Researcher
Dec 2018 – Ongoing | Chennai, India

- Currently working on ***Federated Learning*** across devices by leveraging *Knowledge Distillation* to handle *heterogeneous architectures and labels*.
- Currently working on ***Bayesian Incremental/Continual Learning*** on the edge to handle *catastrophic forgetting* for audio sensing and HAR tasks.
- Developing an efficient and unified framework for ***Continual Learning for NLP*** tasks, particularly *NMT*, on resource-constrained devices.
- Worked on incremental updation of incoming unlabeled data on-device using ***Bayesian Active Learning*** for Human Activity Recognition (HAR) and fall detection tasks.

Machine Learning Engineer
SMARTCARDIA (EPFL)
May 2018 – Nov 2018 | Chennai, India

- 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, and modeled classification, regression architectures using *Gradient-boosted ensemble models* and *Recurrent Neural Networks (LSTMs)*.

Research & Teaching Assistant
SOLARILLION FOUNDATION
Feb 2016 – June 2018 | Chennai, India

- Co-led a team of four to develop novel deep learning ensemble models for heterogeneous ***Human Activity Recognition (HAR)*** tasks on resource-constrained devices capable of incremental model updation.
- Developed a ***Movie Occupancy Prediction*** engine for a top 3 Indian movie multiplex chain, using tree-based ensemble models and LSTMs. Deployed the beta application into production.
- Led a team of five and designed a user-independent *on-device* ***Dynamic Gesture Recognition*** system using accelerometers with machine learning approaches on a low-cost *Raspberry Pi Zero* ($5).
- *Mentored students* to help them develop problem-solving approaches in embedded programming for their assignments and research project.

RESEARCH INTERESTS

Machine Learning | Deep Learning | Ubiquitous Computing | On-Device ML | Bayesian ML | Continual Learning | Active Learning | Healthcare | IoT | Activity Recognition | Computer Vision | NLP | HCI | Reinforcement Learning

EDUCATION

B.Tech in Information Technology
Anna University
Grad. Apr 2017 | Chennai, India

Cum. GPA: 7.41/10 - First Class
Thesis: **Intelligent Bus Stop Recognition System**. Advised by *Prof. Srinivasan R.*

Courses

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

HSC (Class XII)
DAV Higher Secondary School, Gill Nagar
Grad. May 2013 | Chennai, India

Scored an overall of 94.25%.

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 | NLTK | Docker | PySpark | Flask

Undergraduate Student Researcher

SSN COLLEGE OF ENGINEERING

Feb 2015 – Mar 2017 Chennai, India

- Developed an on-device vision-based ***Intelligent Bus Stop Recognition System*** using light-weight CNNs. Utilized data augmentation, *Incremental Bayesian Active Learning* strategies for bus stop scalability and adaptability to dynamic Indian bus stop 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

- Sundararaman V, 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 Workshop 2019.
- 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***).
- 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, ***ICRTCSE 2016***.

Posters/Extended Abstracts

- 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.

HONORS & SERVICES

Honors and Awards

- 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
- **97th percentile** in *HackerRank (Algorithms Domain)*
- Top 10 percentile in 42nd National Mathematics Talent Competitions
- Certification of Merit for Grade A1 in all subjects in AISSE
- Completed all 10 levels of UCMAS Mental Arithmetic (Abacus)
- Division Badminton Player (U-19)

Services

- **Reviewer** - Machine Learning for Health Workshop (**ML4H 2019**), **NeurIPS 2019**
- **Reviewer, PC Member** - 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

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

NOTABLE PROJECTS

Modeling Scalable Social Media Comments
Working on modeling scalable and ambiguous (multilingual, short) topics of interest – *topic modeling from noisy comments* in movies/TV shows using *data programming*. An illustrated heat map of the closely-knit social media topics and their summary is showcased to the user.

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

Gest-Face
Developed a simple Gesture & Facial recognition application to identify real-time simple hand gestures, and faces of users (and total counts).

Speed Control of DC Motor using Arduino
Devised a feedback based Proportional controller algorithm to self-stabilize the error between reference and measured speed (± 4 RPM) of a 12V DC Motor with external load using AtMega328 MCU.