

# Prahalathan Sundaramoorthy

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## EDUCATION

University of Southern California - Viterbi School of Engineering

January 2019-December 2020

Master of Science in Electrical Engineering (Machine Learning)

**Coursework:** Probability, Linear Algebra, Pattern Recognition, Machine Learning, Deep Learning, Data Mining

Anna University

June 2013-April 2017

Bachelor of Engineering in Electrical and Electronics

## TECHNICAL SKILLS

- **Languages:** Python, Java, C/C++, MATLAB, Bash
- **Tools:** NumPy, SciPy, Pandas, Spark, Git, Docker
- **Data Visualization:** Matplotlib, Seaborn, Plotly
- **Deep Learning:** Keras, TensorFlow, PyTorch
- **Databases:** MySQL, MongoDB
- **NLP:** NLTK, SpaCy, Hugging Face
- **ML and Statistics:** Scikit-learn, Statsmodels
- **Cloud Services:** AWS, GCP

## WORK EXPERIENCE

Research Intern

May 2020-August 2020

HP Inc., Palo Alto

- Devised an end-to-end heart rate calculation model from Photoplethysmography (PPG) time-series sensor data in **Python**. Reduced mean error by **30%** through spectral filtering and statistical validation; collaborated with production team for porting model to **C** for release.
- Achieved **80%** accuracy in predicting cognitive load of individuals through PPG wave morphology. Trained **1D Convolutional Neural Network** to capture shape of data from **450** participants on **AWS EC2**.

NLP & Deep Learning Intern

June 2018-August 2018

Teknuance Info Solutions Pvt. Ltd, Chennai

- Examined **deep learning** techniques such as seq2seq LSTMs, Word2Vec, GloVe, etc. for performing **NLP** tasks -- text summarization, topic modeling on business data.

Research Assistant

April 2017-June 2018

Solarillion Foundation, Chennai

- Led a team of four to develop a human activity recognition system from smartphone sensor data with **43 million samples**. Used CNN ensembles to achieve **96%** accuracy, beating state-of-the-art by **3%**.
- Equipped the above model with support for **on-device** incremental learning resulting in an increase in accuracy of **~35%** of least performing end-user.
- Devised a **low-cost** system for non-intrusive load monitoring on Raspberry Pi employing ensemble machine Learning (extremely randomized trees) with inference time of **400ms** and **86%** accuracy.

## PROJECTS

Active Learning using Bayesian Convolutional Neural Network

- Developed **ActiveHARNet**, a Bayesian Convolutional Neural Network with uncertainty estimates to update model based on **real-time unlabelled data** for Human Activity Recognition.
- Trained model online using active learning and improved mean accuracy by **~25%** using **50%** new data.

Sentiment Classification on COVID-19 tweets using BERT

- Created a sentiment analysis NLP model leveraging pre-trained BERT weights from Hugging Face and fine-tuned to COVID-19 tweets dataset using PyTorch. Achieved 86% classification accuracy.

### Recommendation system on Yelp data

- Performed collaborative filtering with **MapReduce** technique to predict user ratings on products from Yelp data. Employed **Spark** framework for parallel processing and predicted ratings with RMSE of **1.176**.
- Created **NLP** pipeline to calculate **TF-IDF** scores on text data and built content-based recommender system to recommend similar products based on user history.

### BFR Algorithm for large scale K-Means

- Implemented Bradley-Fayyad-Reina algorithm for distributed **K-Means** clustering on Yelp data using Python and Spark; obtained **90%** agreement with ground-truth clusters.

### PUBLICATIONS

- Gautham Krishna Gudur, **Prahalathan Sundaramoorthy**, Venkatesh Umaashankar, "*ActiveHARNet: Towards On-Device Deep Bayesian Active Learning for Human Activity Recognition*", **ACM MobiSys 2019**, 3<sup>rd</sup> International Workshop on Embedded and Mobile Deep Learning, Seoul, South Korea.
- 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** [Extended Abstract].
- **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**, 2<sup>nd</sup> International Workshop on Embedded and Mobile Deep Learning, Munich, Germany.
- A. K. Jain, S. S. Ahmed, **P. Sundaramoorthy**, R. Thiruvengadam, V. Vijayaraghavan, "Current peak based Device Classification in NILM on a low-cost embedded platform using Extra-trees," *2017 IEEE MIT Undergraduate Research Technology Conference (URTC)*, **Massachusetts Institute of Technology, Cambridge, MA, 2017**.

### POSTERS

- Gautham Krishna Gudur, Abhijith Ragav, **Prahalathan Sundaramoorthy**, Venkatesh Umaashankar "*Bayesian Active Learning for Wearable and Mobile Health*", **NeurIPS Europe** meetup on Bayesian Deep Learning (BDL 2020).

### AWARDS

- **First prize** among 50 participants in project exhibition **PROXPO 2016** organized by Velammal Engineering College, Chennai.
- **Runner up** in **Badminton** at the intramural sports competition among 8 departments conducted by Velammal Engineering College in 2016.

### LANGUAGES:

- *Read, write, speak* - English, Tamil
- *Speak* - Hindi, Kannada