Adaickalavan Meiyappan

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SUMMARY

Expertise lies in developing machine learning algorithms. Worked on machine learning problems in the fields of object tracking, pattern classification, image recognition, and real-time-series data processing. Strong in mathematical modelling, stochastic processes, optimization theory, algorithm development, and bench-top experimental skills. Experienced in programming and simulation of machine learning algorithms in Python (e.g., NumPy, Theano, Keras, TensorFlow), C++, Matlab, and Linux. Knowledgeable in big data with Hadoop, MapReduce, and DataFrames. A fast learner who is self-motivated, resourceful, and able to work independently or in a team.

WORK

Panasonic Singapore May 2017 - present

Senior Machine Learning Engineer

- Project 1: Intelligent vehicle driver distraction state modelling and clssification via deep learning from face and eye tracking data.
  - Machine learning algorithms for classification using TensorFlow, includes: convolutional neural network, neural network, and support vector machine
  - Multithreading in Python and C++ for real-time data streaming and online machine learning
  - UDP and TCP socket programming in Python and C++ for real-time data communication

- Project 2: Predictive maintenance to optimise Panasonic factory's production line
  - Data analysis on time-series sensor data and machine operation parameters from factory production line
  - Predicted next component breakdown for enhanced machine maintenance schedule

NXP Semiconductors Singapore Nov 2014 - Apr 2017

Statistical Signal Processing & Machine Learning Engineer

- Project 2: Working on real-time classification of images for application in self-driving vehicles, using machine learning and deep learning techniques such as convolutional neural networks. Note: Some preliminary work performed for testing are listed below and are available at GitHub https://adaickalavan.github.io/portfolio/mnist/ .
  - Implemented a 2-layer feedforward neural network (30 hidden nodes with sigmoid activation, 10 output nodes with multiclass sigmoid activation, cross entropy cost function) in Python using NumPy for handwritten digit recognition from MNIST database. Test set accuracy is >95%.
  - Implemented a 3-layer feedforward neural network (50 nodes in each hidden layer with tanh activation, 10 output nodes with softmax activation, cross entropy cost function) in Python using Theano & Keras for handwritten digit recognition from MNIST database. Test set accuracy is >94%.
  - Implemented a convolutional neural network (2 convolution + max pooling layers consisting of 20 and 50 filters with 2-by-2 subsampling, fully-connected hidden layer using 500 nodes with tanh activation, 10 output nodes with softmax activation, and negative log-likelihood cost function) in Python using Theano for handwritten digit recognition from MNIST database. Test set accuracy is >98%.

- Project 1: Designed real-time-series data classification and prediction using linear/logistic regression techniques in digital baseband receiver for near-field communication (NFC) type-B amplitude-shift keying (ASK) and phase-shift keying (PSK) signals.
  - Modelled and simulated the entire wireless ASK/PSK transmission path, including: ASK/PSK transmitter, inductively coupled NFC-antenna channel, digital phase-locked loop, symbol synchronizer, amplitude gain control, adaptive equalizer to recover distorted signals, and symbol detector.
  - Derived supervised and non-supervised adaptive learning algorithms to rapidly learn the time-varying wireless channel and successfully decoded the distorted received data.
  - Tested algorithms include: perceptron, sigmoid activation, recursive least squares, affine projection, subband adaptive filtering, order-recursive adaptive lattice filter, blind deconvolution, support vector machine, k-nearest neighbours (k-NN), autoencoders
  - Translated final production code from floating-point to fixed-point.

COURSES

Machine Learning Jul 2016
Coursera, Stanford University Prof. Andrew Ang
- Linear/logistic regression, gradient descent, neural network, support vector machine, k-NN, principal component analysis, autoencoders

Learning From Data CS1156x Nov 2016
EdX, Caltech Prof. Yaser S. Abu-Mostafa
- Feasibility of learning, neural networks, support vector machines, conjugate gradient descent.

Introduction to Data Science in Python Nov 2016
Coursera, University of Michigan Prof. Christopher Brooks
- Data manipulation and cleaning techniques using Python pandas. Abstraction of DataFrames as central data structure for data analysis. Application of statistical measures to DataFrames.

Introduction to Hadoop and MapReduce Jan 2017
Udacity, Cloudera
- Built mappers and reducers for MapReduce in Hadoop distributed file system (HDFS), and processed the web server log data on a local pseudo-distributed cluster using Oracle VM VirtualBox.

Machine Learning CSMM.102x April 2017
EdX, Columbia University Prof. John Paisley
- Bayesian/maximum likelihood/maximum a-posteriori estimation, linear/logistic regression, perceptron/least squares, bias-variance, sparsity, Laplace approximation, kernel methods, support vector machines, decision trees, random forests, boosting, clustering/k-NN, expectation-maximization, mixtures of Gaussian, matrix factorization, latent factor models, principal component analysis, hidden Markov models, discrete/continuous state space models

Artificial Intelligence CSMM.101x July 2017
EdX, Columbia University Prof. Ansaf Salleb-Aouissi
- Uninformed/heuristic/adversarial search, constraint satisfaction, perceptron, k-NN, neural networks, support vector machine, decision trees, Markov decision processes, reinforcement learning, logical/propositional agent, application to natural language processsing and vision

EDUCATION

National University of Singapore Aug 2010 - Jul 2014
Ph.D. in Engineering (Statistical Signal Processing & Adaptive Filter Theory) Prof. Pooi-Yuen Kam, Prof. Hoon Kim
- GPA : 4.92/5.00
- Thesis : Digital and Optical Compensation of Signal Impairments for Optical Communication Receivers
- Proposed and implemented novel adaptive learning algorithms for real-time-series data prediction and classification using modified linear and logistic regression techniques.

National University of Singapore Aug 2006 - Jun 2010
Bachelor of Engineering (Electrical Engineering)
- GPA : 4.79/5.00 (First Class Honors)
- Programmed an uCsimm microcontroller (uC68EZ328) to build an autonomous terrain navigating vehicle, incorporating real-time communications, sensing, and signal processing.

TECHNICAL SKILLS

Programming	Python (e.g., NumPy, Theano, Keras, TensorFlow), C, C++, C#, Matlab, MuPad (symbolic algebra), Octave, MapReduce, Assembly, VHDL, Verilog, HTML, LaTeX, LabView
Tools	Hadoop, Git, Oracle VM VirtualBox, Spyder, Jupyter, Visual Studio .NET, Synopsys, AutoCAD, Xilinx ISE Design Suite, Cadence, PSpice, Altium Designer, OriginPro, Linux

HONORS AND AWARDS

Scholarships

President's Graduate Fellowship	Aug 2010 - Jul 2014
ASEAN Undergraduate Scholarship	Aug 2006 - Jun 2010
ASEAN Pre-U Scholarship	Jan 2004 - Dec 2005

Prizes

Best Poster Award | 3rd Graduate Student Symposium, NUS	Mar 2013
24th Faculty Innovation & Research Award (Merit) | for final year research project, NUS	Apr 2010
Student Achievement Award for Community Service | NUS	Oct 2009
Lucent Technologies Book Prize | for best student in Integrated Digital Design course, NUS	Jul 2009
Certificate of Outstanding Achievement | for research internship project, Data Storage Institute	Aug 2008
Student Achievement Award for Community Service | NUS	Oct 2007
Faculty of Engineering Dean's List | on 4 occasions, NUS	2006 - 2008

PROFESSIONAL AND LEADERSHIP ACTIVITIES

Member, IEEE — Apr 2013 - present

Journal reviewer — 2012 - present

- Optics Express, Optical Society of America (OSA)
- Photonics Technology Letters, IEEE
- Electronic Letters, IET

Graduate Assistant (Teaching), NUS — Jan 2011 - Dec 2013

- EE1002 Introduction to Circuits and Systems
- CG1108 Electrical Engineering

PATENTS AND PUBLICATIONS

Patent

[1] (Filed) **A. Meiyappan**, J. Li, M. Ciacci, G. Al-Kadi, "Detection method in amplitude shift keying receiver", Europe, EP15185335.5 / US15/267099 / CN201610806691.3, 15 Sept. 2015.

Journals

[1] **A. Meiyappan**, H. Kim, and P.-Y. Kam, "A low-complexity, low-cycle-slip-probability, format-independent carrier estimator with adaptive filter length," *J. Lightw. Technol.*, vol. 31, no. 23, pp. 3806–3812, Dec. 2013.

[2] **A. Meiyappan**, P.-Y. Kam, and H. Kim, "On decision aided carrier phase and frequency offset estimation in coherent optical receivers," *J. Lightw. Technol.*, vol. 31, no. 13, pp. 2055–2069, Jul. 2013.

[3] **A. Meiyappan**, P.-Y. Kam, and H. Kim, "A complex-weighted, decision-aided, maximum-likelihood carrier phase and frequency-offset estimation algorithm for coherent optical detection," *Opt. Exp.*, vol. 20, no. 18, pp. 20102–20114, Aug. 2012.

[4] **A. Meiyappan**, P.-Y. Kam, and H. Kim, "6-GHz radio-over-fiber upstream transmission using a directly modulated RSOA," *IEEE Photon. Technol. Lett.*, vol. 23, no. 22, pp. 1730–1732, Nov. 2011.

Conferences

[1] **A. Meiyappan**, P.-Y. Kam, and H. Kim, "A low-complexity carrier phase and frequency offset estimator with adaptive filter length for coherent receivers," in *Proc. ECOC*, London, United Kingdom, 2013, paper P.3.6.

[2] **A. Meiyappan**, P.-Y. Kam, and H. Kim, "Full-range and rapid-tracking carrier phase and frequency estimator for 16-QAM coherent systems," in *Proc. OFC/NFOEC*, Anaheim, CA, 2013, paper OTu3I.4.

[3] **A. Meiyappan**, P.-Y. Kam, and H. Kim, "Complex decision-aided maximum-likelihood phase noise and frequency offset compensation for coherent optical receivers," in *Proc. ECOC*, Amsterdam, The Netherlands, 2012, paper P3.02.

[4] **A. Meiyappan**, P.-Y. Kam, and H. Kim, "Performance of decision-aided maximum-likelihood carrier phase estimation with frequency offset," in *Proc. OFC/NFOEC*, Los Angeles, CA, 2012, paper OTu2G.6.