Long Wang

CONTACT INFORMATION

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University of Science and Technology Beijing,
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Beijing, China

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RESEARCH INTERESTS

I am interested in machine learning, computer vision and their applications in renewable energy. I have focused on developing deep learning based anomaly detection approaches for complex systems, such as wind turbines. Meanwhile, I have worked on developing computer vision algorithms for object detection based on UAV-taken images.

WORK EXPERIENCE

University of Science and Technology Beijing

Associate Professor 2017-now

Teach both undergraduate and graduate courses and supervise research students

City University of Hong Kong

Teaching Assistant 2015-2016

Duties at various times have included teaching tutorials, office hours, and leading weekly computer lab exercises.

Postgraduate Level:

- SEEM 6015 Supply Chain Management, Semester A 2015/16, Class Size: 85

Undergraduate Level:

- SEEM 4025 Quality Systems & Management, Semester B 2015/16, Class Size: 30
- SEEM 3040 Engineering Database & Systems, Semester A 2016/17, Class Size: 18

China Agricultural University

Research Assistant 2011-2013

Advisor: Prof. Peiling Yang

Developed a neural network based model to forecast soil moisture based on historical data and weather information.

Worked as the IT-supporter in the Soil-physics Lab

China Longyuan Power Group Corporation Ltd., Beijing, China

Summer Intern Summer 2015

Mentor: Jia Xu

Developed and implemented a data-driven framework for monitoring wind turbine power generation performance

Parensoc Ltd., London, UK

Summer Intern Summer 2014

Mentor: Mital Kinderkhedia

Developed both the front-end and the back-end of a social networking website. The project included user interface design, database design, and friend recommendation algorithm development.

EDUCATION

City University of Hong Kong 2014-2017

Ph.D. in Systems Engineering and Engineering Management — Supervisor: Dr. Zijun Zhang

University College London (UCL) — 2013-2014
M.Sc. in Computer Science, *Distinction* — Dissertation Supervisor: Dr. Kevin Bryson

China Agricultural University — 2011-2013
M.Eng. in Hydraulic Engineering — Supervisor: Professor Peiling Yang

China Agricultural University — 2007-2011
B.Eng. in Irrigation and Drainage Engineering, *GPA: 3.81/4.00*

Awards and Scholarships

Hong Kong PhD Fellowship	2014-2017
Research Tuition Scholarship	2015-2016
Chow Yei Ching School of Graduate Studies Entrance Scholarships	2014-2015
Outstanding Graduates of Beijing	2013
Outstanding Graduates of China Agricultural University	2013
Excellent All-round Student of Beijing	2011
First Class Scholarship for Academic Excellence	2010
Excellent All-round Student of China Agricultural University	2010
Samsung Scholarship for Agricultural Talents	2010
Second Class Scholarship for Academic Excellence	2009
Excellent All-round Student of China Agricultural University	2009
National Encouragement Scholarship	2009
First Class Scholarship for Academic Excellence	2008
Excellent All-round Student of China Agricultural University	2008
National Encouragement Scholarship	2008

Research Experience

Integration of Machine Learning and Computational Intelligence — 2016-2017
Advisors: Prof. Henry Chung, Prof. Alain Bensoussan, and Dr. Zijun Zhang
The goal of this project is to develop a regression model guided swarm intelligence algorithm. We are working on integrating the Gaussian process model into a swarm intelligence algorithm and thus the Gaussian process model is utilized for estimating the fitness function values. This algorithm has been applied to track the maximum power point of PV systems.

GPU-based Parallel Jaya Algorithm — 2016-2017
Advisor: Dr. Zijun Zhang
This project aims to develop a parallel Jaya algorithm implemented on GPU. Compared with the conventional Jaya algorithm, the parallel Jaya algorithm is also free of any algorithm-specific parameters and the three main procedures, solution update, fitness value computation, and the best/worst solution selection are all computed in parallel on GPU. We have applied this algorithm to estimate parameters of a li-ion battery model.

Object Detection Using UAVs — 2015-2017
Advisor: Dr. Zijun Zhang
Objection detection algorithms are highly desired in emerging applications of UAVs for remote inspection tasks. We are working on designing an improved cascading classifier for objection detection based on UAV-taken images. In order to reduce the number of features utilized, decision trees and

support vector machines are utilized as substitutions of boosting algorithms. This algorithm has been applied for detecting surface cracks on wind turbine blades.

Anomaly Detection of Complex Systems 2014-2017
Advisor: Dr. Zijun Zhang
This project aims at developing data-driven anomaly detection approaches for complex systems. We are working on developing deep learning based frameworks to detection anomalies of complex systems. In these frameworks, deep learning algorithms, such as deep autoencoders and dropout deep neural networks, are employed to model complex systems while statistical control charts are utilized to monitor the abnormal statuses. We have applied these frameworks for wind turbine condition monitoring and fault diagnosis.

Short-term Electricity Price Forecasting 2014-2015
Advisor: Dr. Zijun Zhang
Developed an extended stacked denoising autoencoders model, which incorporates both the stochastic neighbor embedding and the random sample consensus algorithms. This model has outperformed classical data-driven models and an industrial method in forecasting electricity prices of five hubs in the USA.

Research Project

"Wind Turbine Generation Performance Monitoring with Representation Learning"
Sponsored by Dong Energy Ltd.
Year: 2015-2017
PI: **Long Wang**

Publications

L. Wang and C. Huang, "A Novel Elite Opposition-Based Jaya Algorithm for Parameter Estimation of Photovoltaic Cell Models," *Optik*, in press, 2017.

C. Huang, **L. Wang**, "Gaussian Process Regression Based Modeling of Lithium-ion Battery Temperature-Dependent Open-Circuit-Voltage," *IET Electronics Letters*, vol. 53, no. 17, 2017.

L. Wang and Z. Zhang, "Automatic Detection of Wind Turbine Blade Surface Cracks Based on UAV-taken Images," *IEEE Transactions on Industrial Electronics*, vol. 64, no. 9, 2017.

L. Wang, Z. Zhang, H. Long, J. Xu, and R. Liu, Wind Turbine Gearbox Failure Identification with Deep Neural Networks, *IEEE Transactions on Industrial Informatics*, vol. 13, no. 3, pp. 1360-1368, June 2017.

C. Huang, **L. Wang**, R.S.C. Yeung, Z. Zhang, H.S.H. Chung, and A. Bensoussan, A Prediction Model Guided Jaya Algorithm for the PV System Maximum Power Point Tracking, *IEEE Transactions on Sustainable Energy,* in press, 2017.

S. Jang, K.S. Chin, **L. Wang**, G. Qu, and K.L. Tsui, Modified Genetic Algorithm-based Feature Selection Combined with Pre-trained Deep Neural Network for Demand Forecasting in Outpatient Department, *Expert Systems with Applications*, vol. 82, pp. 216-230, October 2017.

L. Wang, Z. Zhang, J. Xu, and R. Liu, Wind Turbine Blade Breakage Monitoring with Deep Autoencoders, *2017 IEEE Power and Energy Society General Meeting*, in press, 2017.

L. Wang, Z. Zhang, and J. Chen, Short-term Electricity Price Forecasting with Stacked Denoising Autoencoders, *IEEE Transactions on Power Systems*, vol. 32, no. 4, July 2017.

L. Wang, Z. Zhang, J. Xu, and R. Liu, "Wind Turbine Blade Breakage Monitoring with Deep Autoencoders," *IEEE Transactions on Smart Grid*, in press, 2016.

L. Wang, H. Long, Z. Zhang, J. Xu, and R. Liu, "Wind Turbine Gearbox Failure Monitoring Based

on SCADA Data Analysis," *2016 IEEE Power and Energy Society General Meeting*, Boston, MA, July 2016.

H. Long, **L. Wang**, Z. Zhang, Z. Song, and J. Xu, "Data-Driven Wind Turbine Power Generation Performance Monitoring," *IEEE Transactions on Industrial Electronics*, vol. 62, no. 10, pp. 6627-6635, June 2015.

Submitted Papers

L. Wang and C. Huang, "Parameter Estimation of the Soil Water Retention Curve Model with Jaya Algorithm," *Computers and Electronics in Agriculture*, under review.

L. Wang and Z. Zhang, "The Intelligent Wind Turbine Blade Crack Detection: A Computer Vision Approach," *IEEE Transactions on Industrial Electronics,* under 2nd review.

L. Wang, C. Huang, Z. Zhang, and K.L. Tsui, "Estimation of Li-ion Battery Model Parameters with a GPU-accelerated Parallel Jaya Algorithm," *Applied Soft Computing*, under revision.

L. Wang, L. Zhuang, Z. Zhang, R.K.K. Yuen, and K.L. Tsui, "Automatic Detection of Rail Surface Crack with a Superpixel Based Data-driven Approach," *IEEE Transactions on Industrial Electronics,* under review.

C. Huang, **L. Wang**, Z. Zhang, and A. Bensoussan, "The Point and Probabilistic Forecasting of Solar Radiations Based on Information of Neighboring Sites: A Data-Driven Study," *IEEE Transactions on Smart Grid*, under review.

Presentations

"Data-driven Wind Turbine Condition Monitoring," 2016 East Lake International Forum for Outstanding Overseas Young Scholars, December, 2016, Wuhan, China

"Data Mining and its Application to Wind Energy," China Longyuan Power Group Corporation Ltd., November, 2016, Beijing, China

"Wind Turbine Gearbox Failure Monitoring Based on SCADA Data Analysis," 2016 IEEE Power and Energy Society General Meeting, July 2016, Boston, USA

"Wind Turbine Gearbox Failure Monitoring Based on SCADA Data Analysis," Seminar Series, Department of Systems Engineering and Engineering Management, City University of Hong Kong, August, 2016, Hong Kong

"Data-driven Wind Turbine Generation Performance Monitoring," China Longyuan Power Group Corporation Ltd., August, 2015, Beijing, China

Software

Sarky Grammaticus
Developers: Long Wang, Haoqiang Liu, and Jun Shang
This is a mobile game application (sponsored by Google UK) for Icelandic language learning, which supports multiple platforms including iOS and Android. An introduction video can be found at: `https:\\youtu.be\VAVMbOHz_h8`.

Professional Activities

Member, IEEE & IEEE Power and Energy Society
Member, Chinese Society for Electrical Engineering (CSEE)
Reviewer, *IEEE Transactions on Industrial Electronics*
Reviewer, *IEEE Transactions on Sustainable Energy*
Reviewer, *IEEE Transactions on Network Science and Engineering*
Reviewer, *IEEE Transactions on Cybernetics*
Reviewer, *Renewable Energy*
Reviewer, *Journal of Intelligent Manufacturing*
Reviewer, *IET Electronics Letters*