Yiming **Peng**

Ph.D. Candidate · Research Assistant

10 Friend Street, Karori, Wellington, New Zealand

(+64) 220619380 | ✉ yiming.peng@ecs.vuw.ac.nz | ⌂ yimingpeng.github.io | ⊙ yimingpeng | ⬚ yiming-peng-ba415251

Overview

- 8-year research experience on designing and developing various machine learning algorithms for solving robotic control, intelligent game-play, image classification, anomaly detection and other machine learning problems.

- 14-year programming experience with ability in both producing clean and efficient code as well as debugging and understanding large code bases, such as TensorFlow and PyTorch.

- 6-year teaching and tutoring experience enables comfortable communication of complex data to lay and technical audience in written, verbal and visual formats.

- Extensive public speaking experience with ability to develop compelling and coherent presentations.

Education

Victoria University of Wellington *Wellington, New Zealand*

Ph.D. in Computer Science (Specialized in Machine Learning) *Sep. 2015 - Present*
- Thesis: Policy Direct Search for Effective Reinforcement Learning
- Advisors: Dr Aaron Chen and Prof. Mengjie Zhang
- Focus: Reinforcement Learning, Deep Learning, Policy Gradient Search, Robotic Control, Intelligent Game-play and Evolutionary Computation.
- Grade: Submitted for examination

Auckland University of Technology *Auckland, New Zealand*

Master of Computer and Information Sciences *Jun. 2009 - Jul. 2011*
- Thesis: Boosting performance of incremental IDR/QR LDA - from sequential to chunk
- Advisors: Prof. Alvis Fong and Dr Shaoning Pang
- Focus: Incremental Learning, Linear Discriminant Analysis, Singular Value Decomposition, QR Decomposition, Supervised Learning and Image Classification.
- Grade: A+ (ranked as the top one Master of Computer and Information Sciences in 2011)

Wuhan University of Technology *Hubei, China*

Bachelor of Computer Science and Technology *Sep. 2000 - Jul. 2004*
- Grade: A (average)

Skills

Programming	Python, Java, MATLAB, C, C++, C#, VB.net, SQL, HTML, JavaScript, CSS
Machine Learning Tools	Numpy, Scipy, Scikit-learn, Pandas, Matplotlib, Seaborn
Deep Learning Tools	TensorFlow, Keras, Theano, PyTorch, Deeplearning4J
Text Editing	Latex, Markdown
Visual Design	Adobe Photoshop, Adobe Illustrator
Other Tools	Git, Docker, Google Could Platform (GCP), High Performance Computing (HPC)
Languages	Chinese, English

Awards & Scholarships

2018	**ACM SigEVO Student Travel Award**, $700 USD	*GECCO*
2018	**Victoria Thesis Submission Scholarship**, $6000 NZD	*VUW*
2018	**Faculty Strategic Research Grant**, $3000 NZD	*VUW*
2017	**The 26th International Joint Conferences on AI (IJCAI 2017) Student Travel Grant**, $1000 USD	*IJCAI*
2017	**Faculty Strategic Research Grant**, $3000 NZD	*VUW*
2015	**Victoria Doctoral Scholarship**, Fully funded, $23,500 NZD p.a. for three years plus tuition fee	*VUW*
2014	**Nominee**, Highest Rated Lecturer	*Unitec*
2011	**Eagle Technology Scholarship**, $2,500 NZD for the top master graduate (First Class First Division)	*AUT*

Work and Research Experience

Victoria University of Wellington, Wellington
Wellington, New Zealand

PH.D. STUDENT AND PART-TIME RESEARCH ASSISTANT
Sep. 2015 - Present

- Developed 3 new policy gradient search algorithms for reinforcement learning that theoretically guarantee convergence (with mathematical proof) and empirically perform better than existing algorithms on continuous control benchmarks (implemented in TensorFlow and 1 journal manuscript is submitted for review).
- Developed a new evolutionary policy optimization algorithm that outperforms many state-of-the-art reinforcement learning algorithms on continuous control benchmarks (implemented in TensorFlow and 1 journal manuscript is submitted for review.)
- Developed 2 new automated feature learning based policy direct search algorithms that empirically show better performance on major continuous control benchmarks and intelligent game-play tasks (implemented in Theano and 2 conference publications).
- Developed 2 policy direct search algorithms with reliable and flexible value function learning that perform better than their base algorithms on control benchmarks (implemented in Java and 2 conference publications).
- Co-developed 7 new reinforcement learning algorithms (model-based and model-free) that empirically perform better than many existing algorithms on major benchmark problems including continuous control problems and intelligent game-play tasks (implemented in TensorFlow).
- Developed a deep Convolution Neural Networks based image classification system for accurately and automatically detecting false alarms from low-quality raw images collected from remote cameras deployed in many bushes of Wellington. The system, with a limited amount of training data, can improve the classification accuracy from ∼56% to ∼84% and save a huge amount of time for ecologists who used to manually check such false alarms. (implemented in Keras and a journal manuscript in preparation)
- Mentored and supervised 4 students in their summer projects or final-year Honors projects.
- Collaborated work with colleagues in the ECRG group for organizing two international conferences, i.e., the 31st Australasian Joint Conference on Artificial Intelligence (AI 2018) and 2019 IEEE Congress on Evolutionary Computation (CEC 2019).
- Developed and maintaining the two conference websites (AI 2018 and CEC 2019).
- Managing 4 social media channels of CEC 2019 (i.e., Facebook, Twitter, Linkedin, and Google+) for publicity of the CEC 2019 conference.
- Deliverables:
  - 10 conference publications
  - 2 new conference manuscripts in preparation
  - 2 journal manuscripts submitted for review
  - 1 new journal manuscript in preparation
  - 2 conference websites (HTML5, CSS 3.0, and Bootstrap 3)

Unitec Institute of Technology, Auckland
Auckland, New Zealand

RESEARCH AND TEACHING ASSISTANT
Sep. 2011 - Jun. 2015

- Led a technical team (2 Ph.D. students and 2 master students) to design and develop a decentralized network analysis system with real-time visualization that can automatically detect anomaly packets from online network traffic. Within a simulated network environment, the system achieves 90% recognition rate and performs approximately three times faster than the centralized baseline system.
- Worked collaboratively with colleagues to develop algorithms for financial data analysis (stock market and crude oil market), which have shown better performance than existing algorithms.
- Deployed and maintained three real-time Darknet traffic monitoring systems "NICTER", "NIRVANA" and "NIRVANA Rev. 2", in collaboration with three colleagues from National Institute of Communication and Technology (NICT), Japan, for three years.
- Mentored and supervised 2 undergraduates in their final-year projects.
- Deliverables:
  - 2 conference publications
  - 1 federated network traffic anomaly analysis system with real-time visualization (J2SE, Java Agent Development Framework (JADE), Unity3D and MySQL)

Auckland University of Technology
Auckland, New Zealand

MASTER STUDENT & PART-TIME RESEARCH ASSISTANT
Jun. 2009 - Jul. 2011

- Developed a new batch QR decomposition based Linear Discriminant Analysis (LDA) algorithm for feature extraction in face recognition tasks that performs significantly better than most existing LDA algorithms on six benchmark datasets.
- Deliverables:
  - 1 conference publication

Educational Science Publishing House (Ministry of Education, China)
Beijing, China

NETWORK ADMINISTRATOR & WEB DEVELOPER
Dec. 2005 - Dec. 2008

- Developed and maintained the core web-based Content Manage System (CMS) and the internal Office Automation (OA) system.
- Managed the content updates for the website and the OA system.
- Deliverables:
  - 1 web-based CMS, i.e., ESPH (HTML, CSS, ASP based CMS, Microsoft Access 2000)
  - 1 OA system (HTML, VB.net and SQL Server 2000)

DragonFlow Network Inc.
Beijing, China

WEB DEVELOPER & WEBMASTER
Sep. 2004 - Dec. 2005

- Developed and maintained the core web-based CMS and a technical forum for the company.
- Managed the content updates for the CMS and the forum.
- Deliverables:
  - 1 web-based CMS, i.e., SiteView.com(HTML, CSS, ASP based CMS, SQL Server 2000)
  - 1 forum, i.e., BigIT Forum (HTML, CSS, C#, SQL Server 2000)

Publications

Journals

2 JOURNALS PUBLICATIONS
- **Y. Peng**, G. Chen, and M. Zhang. "Proximal Evolutionary Strategies: Achieving State-of-the-art Deep Reinforcement Learning through Evolutionary Policy Optimization," 2018. (Submitted for review to the journal "IEEE Transaction on Evolutionary Computation"
- **Y. Peng**, G. Chen, and M. Zhang, "Primal-dual Sub-gradient Approximation based Policy Gradient Search," 2019. (Submitted for review to the journal "IEEE Transaction on Neural Networks and Learning Systems"

Conferences

13 CONFERENCE PUBLICATIONS
- **Y. Peng**, S. Pang, G. Chen, A. Sarrafzadeh, T. Ban and D. Inoue. "Chunk incremental IDR/QR LDA learning," in *2013 International Joint Conference on Neural Networks (IJCNN 2013)*, 2013.
- **Y. Peng**, G. Chen, M. Zhang, and S. Pang. "Generalized Compatible Function Approximation for Policy Gradient Search," in *The 23rd International Conference on Neural Information Processing (ICONIP 2016)*, 2016.
- **Y. Peng**, G. Chen, S. Holdaway, Y. Mei, and M. Zhang. "Automated State Feature Learning for Actor-Critic Reinforcement Learning through NEAT," in *The Genetic and Evolutionary Computation Conference (GECCO Companion 2017)*, 2017.
- **Y. Peng**, G. Chen, M. Zhang, and Y. Mei. "Effective Policy Gradient Search for Reinforcement Learning through NEAT based Feature Extraction," in *Simulated Evolution and Learning – 11th International Conference (SEAL 2017)*, 2017.
- **Y. Peng**, G. Chen, M. Zhang, and S. Pang. "A Sandpile Model for Reliable Actor-Critic Reinforcement Learning," *2017 International Joint Conference on Neural Networks (IJCNN 2017)*, 2017.
- **Y. Peng**, G. Chen, H. Singh, and M. Zhang. "NEAT for Large-Scale Reinforcement Learning through Evolutionary Feature Learning and Policy Gradient Search," in *The Genetic and Evolutionary Computation Conference (GECCO 2018)*, 2018.
- A. Lai, L. Song, **Y. Peng**, P. Zhang, Q. Wang and S. Pang. "Exploring Crude Oil Impacts to Oil Stocks through Graphical Computational Correlation Analysis," in *The 19th International Conference on Neural Information Processing (ICONIP 2012)*, 2012.
- S. Pang, **Y. Peng**, T. Ban, D. Inoue and A. Sarrafzadeh. "A Federated Online Network Traffic Analysis Engine for Cybersecurity.," in *2015 International Joint Conference on Neural Networks (IJCNN 2015)*, 2015.
- W. Hardwick-Smith, **Y. Peng**, G. Chen, Y. Mei and M. Zhang. "Evolving Transferable Artificial Neural Networks for Gameplay Tasks via NEAT with Phased Searching," in *Australasian Conference on Artificial Intelligence 2017 (AI 2017)*, 2017.
- G. Chen, **Y. Peng**, and M. Zhang. "Constrained Expectation-Maximization Methods for Effective Reinforcement Learning," in *2018 International Joint Conference on Neural Networks (IJCNN 2018)*, 2018.
- G. Chen, **Y. Peng**, and M. Zhang. "An Adaptive Clipping Approach for Proximal Policy Optimization," arXiv:1804.06461, 2018.
- G. Chen, **Y. Peng**, and M. Zhang. "Effective Exploration for Deep Reinforcement Learning via Bootstrapped Q-Ensembles with Tsallis Entropy Regularization," arXiv:1809.00403, 2018.
- G. Chen, **Y. Peng**, and M. Zhang. "Ensemble Actor-Critic Reinforcement Learning under Generalized Entropy Regularization," arXiv:1809.00403, 2019.

Manuscript in Preparation

3 MANUSCRIPTS IN PREPARATION
- **Y. Peng**, G. Chen, B. Xue, V. Anton, and M. Zhang. "A Case Study: Filtering False Alarms from Remote Camera Images via Deep Learning," 2019. (A Journal Manuscript)
- H. Lindsay, **Y. Peng**, G. Chen, and M. Zhang. "Effective Reinforcement Learning via Policy Gradient Search enhanced Deep NeuroEvolution," (A conference manuscript, to be submitted to *The 2019 IEEE Congress on Evolutionary Computation (CEC 2019)*)
- **Y. Peng**, G. Chen, B. Xue and M. Zhang. "Evolutionary Strategy for Effective Continuous Q-Learning," (A conference manuscript, to be submitted to *The Genetic and Evolutionary Computation Conference (GECCO 2019)*)

Teaching & Tutoring

School of Engineering and Computer Science, VUW
Wellington

TUTOR
Sep. 2015 - Present
- COMP309 – Machine Learning Tools and Techniques:
    - Designed the course contents, collected data (6000 images), developed program templates based Keras and 5 weeks of tutorial demos (Jupyter Notebooks)
    - Designed one practical assignment (i.e., Regression Analysis) and one final project (i.e., Image Classification)
    - Evaluated assignments and projects with course coordinators
- NWEN243 – Network Applications:
    - Designed and developed two assignments (An Android image retriever app and A J2EE WebService application)
    - Provided technical support in weekly lab sessions for $\sim$ 50 students
- NWEN301 – Operating Systems Design:
    - Evaluated assignments and projects with course coordinators
    - Led weekly lab sessions, graded practical projects and provided feedback for $\sim$ 40 students

Department of Computer Science, Unitec

Auckland

Part-time Lecturer & Research and Tutorial Assistant

Sep. 2011 - Jun. 2015

- ISCG 4505 – Introduction to Programming (Course Coordinator: 2011–2015)
  - Redesigned the entire course contents in Python by removing complicated contents, adding more in-class guided practice and more practical assignments.
  - Deliverables: The course successful rate was increased from 24% (in 2011) to 90% (in 2015).
- ISCG 5420 – Programming Fundamentals (Course Coordinator: 2013–2015)
  - Redesigned the entire course contents by changing the Java edition from 5.0 to 7.0, removing outdated knowledge, and adding more guided practical sessions meanwhile reducing lecturing sessions.
  - Deliverables: The course successful rate was increased from 57% (in 2013) to 82% (in 2015).
- ISCG 5421 – Programming Principle and Practices (Course Coordinator: 2013–2015)
  - Redesigned the entire course contents by adding more contents about Data Structures and Algorithms, adding the concepts about System Development Life Cycle (SDLC) and adding a more practical final project where student would have experienced a complete SDLC from the initial plan stage to the deployment stage and then to the final stage of presenting the product professionally.
  - Deliverables: The course successful rate was increased from 65% (in 2013) to 88% (in 2015), also the course enrollment was increased approximately 20% in 2015 in comparison to that of previous years.
- ISCG 8042 – Data Mining and Industrial Applications (Co-lecturing: 2011–2014)
  - Designed and Delivered 4 lectures on introducing basic concepts of Machine Learning and Data Mining for ∼15 postgraduate students (an average number from 2012 to 2014)
- ISCG 8029 – Computational Finance (Co-lecturing: 2011–2012)
  - Designed and Delivered 6 lectures out of 12 in total on introducing machine learning background and applications in financial domain for ∼7 postgraduate students (in 2012)
- "She#" – Outreach Teaching Project (Core Member: 2013–2015)
  - Developed 6 Android apps as well as video tutorials for educational purposes to encourage more girls joining technical industry and to connect women in technology.
  - Visited 5 colleges with other 6 team members to deliver practical tutorials about Android Development to 12-Grade girls
  - Deliverables: 6 Android apps with video tutorials. In addition, a competition associated with the project had also been reported by New Zealand TV3 on 27/07/2014.

School of Art and Design, AUT

Auckland

Tutor

Jun. 2009 - Jul. 2011

- Art & Math
  - Designed and Delivered 2 lectures on "The Mathematics behind Design"
  - Designed and Delivered 2 in-class tutorials on "The Mathematics behind Design"