XIAOYANG WANG, Ph.D.

Innovation Centre, Rennes Drive
Exeter, UK, EX4 4RN

x.wang7@exeter.ac.uk
(+44) 7759160832

EDUCATION

University of Electronic Science and Technology of China(UESTC), Chengdu, China

- Ph.D., Signal and Information Processing 2013 - 2018
  Thesis: "Infrared dim and small target detection theory and methodology based on sparse dynamic inversion"
  Supervisor: Prof. Zhenming Peng
- B.S., Electrical Engineering 2009 - 2013

University of Bristol, Bristol, UK

- Visiting Ph.D. student, Computer Science 2017 - 2018
  Supervisor: Prof. Dima Damen

PROFESSIONAL EXPERIENCE

Assistant Professor in Artificial Intelligence, University of Exeter Dec. 2022 - Present

- Initiate original research in machine learning and artificial intelligence.
- Develop and deliver a portfolio of teaching within computer science and artificial intelligence.
- Contribute to the community of computer science at the university by taking academic administration roles.

Postdoctoral Research Associate, University of Bristol Nov. 2018 - Nov. 2022

- Conducting *Machine Learning* research and delivering its value to industrial partners.
- Project management, liaison and administrative work.
- As the *Principal Investigator*, led a three-month research project on *Machine Learning*, funded by the *EPSRC Doctoral Training Partnership* (DTP).
- Proposing and co-supervising *undergraduate* and *MSc* research projects. Advising on *PhD* projects.
- Co-lecturing an undergraduate unit *"Introduction to Artificial Intelligence"* in Engineering Mathematics.

RESEARCH PROJECTS

"NG-CDI: Next Generation Converged Digital Infrastructure" Nov. 2018 - Present

To bring more intelligence to the next-generation communication networks by designing *Machine Learning* solutions. We specifically focus on *Reinforcement Learning*, presenting solutions to dynamic network status. I work as the leading researcher in the Bristol team, collaborating with the industrial partner *BT* and four universities.

- Conduct data quality assessment, pre-processing and preparation for downstream tasks.
- Design an unsupervised learning model for anomaly detection for Connected and Autonomous Vehicles.
- Design reinforcement learning strategies for resource and infrastructure management in the Open Radio Access Network (ORAN) for the next generation communication system, using a self-play strategy.
- Study the development life-cycle of reinforcement learning in next-generation networks like ORAN.
- Give formal/informal tutorials to industrial audiences without a machine learning background.

"Playing with Alchemy: A Benchmark and Evaluation for Meta-RL" Jul. 2021 - Oct. 2021

Funded by the EPSRC Doctoral Training Partnership (DTP) *Vacation Internships scheme*, this project focuses on the meta-reinforcement learning (Meta-RL), one of the key enablers of cross-domain and cross-task intelligence.

- Investigate the effectiveness, efficiency and stability of state-of-the-art Meta-RL methods, including the model-agnostic meta-learning approach, in the Alchemy environment.
- Explore the fast adaptation ability of reinforcement learning models from the training domain to unseen tasks, through customized environments.

"Social Force Model for Road User Trajectory Prediction" May. 2017 - May 2018

To use *Machine Learning* for studying the locomotion and interaction patterns of different types of road users in shared spaces, achieving accurate short-term trajectory prediction.

- Design and implement a social force-based mixed traffic model for trajectory prediction.
- Analyze the locomotion pattern of individuals in cross-class interactions.
- Propose a learning-based "observation-prediction" framework for real-time trajectory prediction. Validate the proposed model with a large scale dataset including approximately 10^6 targets in total.

TALKS & PRESENTATIONS

- "Advanced Topics in Deep Learning" — 8^{th} Feb, 2022
  NG-CDI Tech Talk (joint talk), Bristol, UK (online)
- "Deep Reinforcement Learning for Future Open RAN" — 15^{th} Sep, 2021
  BT/NG-CDI: Spotlight on the Future of Networks, Bristol, UK (online)
- "Future Open RAN – Intelligence and Challenges" — 1^{st} Apr, 2021
  SCEEM Research Conference, University of Bristol, Bristol, UK (online)

TEACHING & SUPERVISION

Unit Co-lecturer, "Introduction to Artificial Intelligence" — Fall 2020 & Spring 2021

- Design and supplement teaching materials on *Reinforcement Learning* theory.
- Design step-by-step tutorials on algorithm implementations in the *Python* environment.
- As a unit co-lecturer, deliver teaching materials to undergraduate students with Engineering Mathematics backgrounds in an asynchronous manner.

Supervisor, Undergraduate Projects & MSc Projects — 2019 & 2021

- Propose and co-supervise an undergraduate project titled "Self-supervised Reinforcement Learning Based Network Resource Management".
- Co-supervise *4* MSc projects within different programmes, including Image & Video Communications and Communication Networks & Signal Processing.

LEADERSHIP & SERVICES

Research Conference Organiser — 2022

- Organised the "Bristol University Reinforcement Learning Symposium" on June 2022, through the "SCEEM Post-pandemic Research Restart Events Scheme". Grant value: **£1.3k**.
- The in-person event brought together *Machine Learning*, especially *Reinforcement Learning* researchers in Bristol Uni, along with invited external speakers, to share research opportunities and challenges.

Principle Investigator — 2021

- Propose research topics and apply for the funding to support it. Grant value: **£5k**.
- Broadcast the research project, organise interviews and hire an undergraduate research assistant.
- Manage expense and the progress of the project; Deliver research outcome.

Reviewer Duties — 2017 - Present

- Conferences: Conference on Computer Vision and Pattern Recognition (*CVPR*), International Conference on Computer Vision (*ICCV*), British Machine Vision Conference (*BMVC*), etc.
- Journals: IEEE Transactions on Image Processing, IEEE Transactions on Geoscience and Remote Sensing, IEEE Signal Processing Letters, etc.

AWARDS & FELLOWSHIPS

- SCEEM Post-Pandemic Research Restart Events Award, University of Bristol — 2022
- Engineering Faculty Post-Doctoral Research Prize, University of Bristol — 2021
- Bristol Plus Award, University of Bristol — 2018
- Huawei Ph.D. Fellowship — 2017 - 2018
- China Scholarship Council Ph.D. Fellowship — 2017 - 2018

PUBLICATIONS LIST

[1] **Wang, X.**, Thomas, J.D., Piechocki, R.J., Kapoor, S., Santos-Rodríguez, R. and Parekh, A., 2022. Self-play learning strategies for resource assignment in Open-RAN networks. Computer Networks, 206, p.108682.

[2] Li, P., Thomas, J., **Wang, X.**, Khalil, A., Ahmad, A., Inacio, R., Kapoor, S., Parekh, A., Doufexi, A., Shojaeifard, A. and Piechocki, R., 2021. RLOps: Development Life-cycle of Reinforcement Learning Aided Open RAN. IEEE Access, 10, pp.113808-113826

[3] Li, P., **Wang, X.**, Piechocki, R.J., Kapoor, S., Doufexi, A. and Parekh, A., 2022. Variational Autoencoder Assisted Neural Network Likelihood RSRP Prediction Model. In 2022 IEEE 33rd Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC).

[4] Zhang, P., Zhang, L., **Wang, X.**, Shen, F., Pu, T. and Fei, C., 2020. Edge and corner awareness-based spatial–temporal tensor model for infrared small-target detection. IEEE Transactions on Geoscience and Remote Sensing, 59(12), pp.10708-10724.

[5] Zhang, P., Liu, J., **Wang, X.**, Pu, T., Fei, C. and Guo, Z., 2020. Stereoscopic video saliency detection based on spatiotemporal correlation and depth confidence optimization. Neurocomputing, 377, pp.256-268.

[6] **Wang, X.**, Mavromatis, I., Tassi, A., Santos-Rodriguez, R. and Piechocki, R.J., 2019, September. Location Anomalies Detection for Connected and Autonomous Vehicles. In 2019 IEEE 2nd Connected and Automated Vehicles Symposium (CAVS) (pp. 1-5). IEEE.

[7] Liu, Y., Peng, L., Huang, S., **Wang, X.**, Wang, Y. and Peng, Z., 2019. River detection in high-resolution SAR data using the Frangi filter and shearlet features. Remote Sensing Letters, 10(10), pp.949-958.

[8] Huang, S., Peng, Z., Wang, Z., **Wang, X.** and Li, M., 2019. Infrared small target detection by density peaks searching and maximum-gray region growing. IEEE Geoscience and Remote Sensing Letters, 16(12), pp.1919-1923.

[9] Zhang, P., Wang, X., **Wang, X.**, Fei, C. and Guo, Z., 2019. Infrared small target detection based on spatial-temporal enhancement using quaternion discrete cosine transform. IEEE Access, 7, pp.54712-54723.

[10] Li, M., Peng, Z., Chen, Y., **Wang, X.**, Peng, L., Wang, Z., Yuan, G. and He, Y., 2019. A novel reverse sparse model utilizing the spatio-temporal relationship of target templates for object tracking. Neurocomputing, 323, pp.319-334.

[11] Huang, S., Li, M., **Wang, X.**, Zhao, X., Yang, L. and Peng, Z., 2017, December. Infrared small target detection with directional difference of Gaussian filter. In 2017 3rd IEEE International Conference on Computer and Communications (ICCC) (pp. 1698-1701). IEEE.

[12] **Wang, X.**, Peng, Z., Zhang, P. and He, Y., 2017. Infrared small target detection via nonnegativity-constrained variational mode decomposition. IEEE Geoscience and Remote Sensing Letters, 14(10), pp.1700-1704.

[13] **Wang, X.**, Peng, Z., Kong, D. and He, Y., 2017. Infrared dim and small target detection based on stable multisubspace learning in heterogeneous scene. IEEE Transactions on Geoscience and Remote Sensing, 55(10), pp.5481-5493.

[14] **Wang, X.**, Peng, Z., Kong, D., Zhang, P. and He, Y., 2017. Infrared dim target detection based on total variation regularization and principal component pursuit. Image and Vision Computing, 63, pp.1-9. **Editor's Choice Paper**

[15] Wang, Y., Peng, Z., **Wang, X.** and He, Y., 2017. Matching pursuit-based sliced wigner higher order spectral analysis for seismic signals. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, 10(8), pp.3821-3828.

[16] **Wang, X.**, Peng, Z. and Zhang, P., 2016, October. Boolean map saliency combined with motion feature used for dim and small target detection in infrared video sequences. In Infrared Technology and Applications, and Robot Sensing and Advanced Control (Vol. 10157, pp. 250-256). SPIE.

[17] Han, Y., Zhang, P., Fei, C. and **Wang, X.**, 2015, December. Infrared small target detection based on spatio-temporal saliency in video sequence. In 2015 12th International Computer Conference on Wavelet Active Media Technology and Information Processing (ICCWAMTIP) (pp. 279-282). IEEE.

Preprints

[1] Li, P., Thomas, J., **Wang, X.**, Erdol, H., Ahmad, A., Inacio, R., Kapoor, S., Parekh, A., Doufexi, A., Shojaeifard, A. and Piechocki, R., 2022. Sim2real for Reinforcement Learning Driven Next Generation Networks. arXiv preprint arXiv:2206.03846.