CHEN JIN

Website: https://chenjin.netlify.app/ Github: https://github.com/lxasqjc Email: chen.jin@ucl.ac.uk

PERSONAL PROFILE

Jin has seven years' **multidisciplinary** research experience in **deep learning** and **computer vision** across **computer science**, **medical-image** and **geo-image** sectors. His recent research focuses on developing either **data-efficient** **or** **computation-efficient** **machine learning methods,** and applied on a set of **budgeted large-scale computer vision tasks,** e.g. **segmentation, classification, super-resolution and 3D-reconstruction**. He is also interested in designing **self-supervised** algorithms that allow disentangled **representation learning** from **multiple modalities**, **scales** and **tasks** at minimal supervision. He has an ultimate goal of building **Artificial General Intelligence**.

PROFESSIONAL HISTORY

Research Associate, University College London, London, UK **Mar.2019 –Present**

- Develop deep learning methods and published **7 top AI Conference and Journal articles** (includes under-review).
- Hosted **MedICSS 2021 Summer School** project and taught one-week **deep learning course for segmentation** (**theory and coding**), and lead a team of **7 researchers** achieved **top 3 among the 14** final project presentations.
- Supervise/co-supervised **1 PhD** and **4 MSc students** on **deep learning projects** (1 distinction and 3 under review).
- Oral talk at top conference (**MICCAI**), **IPMI 2021** guest Lecture and various seminars (e.g. **CMIC open day**).
- Chaired research group meetings (of size 20+ researchers) for a period of over 1.5 yrs.

Research Associate, Heriot-Watt University, Edinburgh, UK **Nov.2017 –Nov.2018**

- Built **3D** images statistical **modelling** protocol for simulation mineral, deployed in Python, Matlab, and Tcl.

Intern Student, Canadian Natural Resources International (UK) Limited **Aug.2013 –Dec.2014**

- Performed **numerical simulation** analysis and **presented** to development team helped on decisions worth millions.

RESEARCH PROJECTS

Ultra-high resolution image analysis

- Developed a **learnable downsampler** for **efficient segmentation** at a limited budget, improved accuracy of up to **10%** and **saved computation** of up to **90% over SoTA**, and **accepted by ICLR 2022** as the **leading author**.
- Developed a joint "**learnable data loader**" optimise the patch magnification-resolution trade-off at each location for segmenting large images, achieved **SoTA**, **published at MICCAI/extensive preprint** as the **leading author**.
- Co-authored an **attention-based semi-supervised** method and **submitted to MIDL** as the **third author**.

Disentangling human error from inter-reader variability

- **Co-authored MICCAI/NeurIPS 2020 publication** contributed on problem formulation and STAPLE baseline;

Medical histology image analysis

- Co-supervised one **PhD student** performing research on **deep multiple instance learning** for large histological image **classification** and **submitted** as the **second author**.
- Co-supervised **two MSc projects** (**3 months** each) performing **segmentation** and **detection** on histology images.
- Applied **3D reconstruction** method for tumour cells and image analysis in immunofluorescence images.

Image super-resolution

- Developed a deep **recurrent multiscale pyramid network** for image **super-resolution** task.
- **Proposed** and **independently supervised 2 MSc projects** (**3 months each**) on **super-resolution** with **CNN** and **GAN** based methods.

Weak supervised deep neural model for segmentation

- Developed a **weak supervised** iterative convolutional net (based on ad-hoc filter banks, AdaBoost and auto-context) that auto-improves segmented connectivity of thin linear pattern, **presented (2016)/ poster (2018) at conferences**.

Multiscale image analysis and reconstruction workflow (PhD Thesis, 2017)

- Developed a multi-scale/moda image analysis, fusion and reconstruction protocol for digital rock analysis.
- Calibrate CT and SEM images, integrate multiscale data and guide 3D pore-grain image reconstruction via multiple-point statistics method (conditional to neighbouring "patch").

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- Developed an automated patch-based rock pattern classification procedure based on random forest.

PROGRAMMING: **Python**, Matlab, C/C++, R, JavaScript, Batch.

TOOLS: **Pytorch**, Tensorflow, Keras, Jupyter, Linux, Cloud/Cluster, ImageJ (FIJI), ParaView, Cinema4D.

EDUCATION

Ph.D. Computational Geoscience, Heriot-Watt University, Edinburgh, UK March. 2013 – Nov. 2017
MSc Petroleum Engineering, Heriot-Watt University, Edinburgh, UK Aug. 2011 –Aug. 2012
B.E. Oil and Gas Engineering, China University of Petroleum September. 2007 –July. 2011

SELECTED PUBLICATIONS

1. **Jin, C.**, Tanno, R., Mertzanidou, T., Panagiotaki, E., and Alexander, D.C.,. Learning to Downsample for Segmentation of Ultra-High Resolution Images. **ICLR 2022 (Accepted).**
2. Xu, M., Zhou, Y., **Jin, C.**, Blumberg, S., Wilson, F., Oxtoby, N., Alexander, D., and Jacob, J., Learning Morphological Feature Perturbations for Semi-Supervised Segmentation. **MIDL 2022 (Under Review).**
3. **Jin, C.**, Tanno, R., Xu, M., Mertzanidou, T. and Alexander, D.C.,. Foveation for Segmentation of Ultra-High Resolution Images. **arXiv preprint 2020**.
4. Zhang, L., Tanno, R., Xu, M., **Jin, C.**, Jacob, J., Cicarrelli, O., Barkhof, F. and Alexander, D., Disentangling Human Error from Ground Truth in Segmentation of Medical Images. **NeurIPS 2020**.
5. **Jin, C.**, Tanno, R., Xu, M., Mertzanidou, T. and Alexander, D.C., October. Foveation for Segmentation of Mega-Pixel Histology Images. **MICCAI 2020**.
6. Zhang, L., Tanno, R., Bronik, K., **Jin, C.**, Nachev, P., Barkhof, F., Ciccarelli, O. and Alexander, D.C., October. Learning to Segment When Experts Disagree. **MICCAI 2020**.
7. Olga, F., **Jin, C.**, Mertzanidou, T., Alexander, D.C. and Bakal, C. Deep Neighbour-Based Multiple Instance Learning for Histopathology Image Classification. **Journal (Under Review).**
8. **Jin, C.** and J. Ma, "Connectivity-enhancing fracture segmentation from X-ray Tomography (XRT) images of reservoir core samples by machine learning-based method", **InterPore 2018**.
9. **Jin, C.**, "Developing a hierarchical digital core analysis workflow for petro-physical characterisation of cross-laminated reservoir rocks at pore scales", **Ph.D. thesis, 2017**, Heriot-Watt University, Edinburgh, UK.
10. **Jin, C.**, J. Ma, J. Buckman, P. Zhang, and G. Couples, "Registering Scanning Electron Microscopy (SEM) and X-Ray Tomography (XRT) images for pore-grain characterisation of cross-laminated siliciclastic rock samples", The **Geological Society Symposium 2017**.
11. **Jin, C.** and J. Ma, "Advanced fracture segmentation from X-ray tomography (XRT) images of reservoir core samples by machine learning-based centerline extraction", **EAGE-SCA** International Symposium **2016**.
12. **Jin, C.** and J. Ma, "An automated machine-learning procedure for robust classification of SEM images of cross-laminated sandstones for digital rock analysis", **Society of Core Analysis (SCA)** Symposium **2014**.

AWARDS

☆ Scholarship for Outstanding International Student from Xinjiang (Top 20 in UK) in 2016
☆ James-watt scholarship of Heriot-Watt University from 2014 to 2016
☆ SINOPEC funding to study the uncertainty of Digital Rock Analysis from 2014 to 2016
☆ Science & Technology Innovation Award by China University of Petroleum (East of China) in 2008 and 2009
☆ Scholarship for the scientific and technological innovation in 2008 and 2009