CHEN JIN

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PERSONAL PROFILE

Jin has six years' **interdisciplinary** research experience in integrating **computer vision**, **machine/ deep learning** and **statistical modelling** techniques in both **medical-image** and **geo-image** sector, developed mainly in **Python and Matlab**. He has extensive practical experience and academic training in **multiscale image segmentation, classification, mapping, 3D image reconstruction**, **registration**, **visualisation** and **parallel simulation** on multi-modality 2/ 3D images. He has a passion for building AI-based medical imaging methods for greater social impact.

PROGRAMMING: **Python**, Matlab, C/C++, R, JavaScript, Batch.
TOOLS: Pytorch, Tensorflow, Keras, Jupyter, Linux, Cloud/Cluster, ImageJ (FIJI), ParaView, Cinema4D.

EXPERIENCES

Research Associate, University College London, London, UK   **Mar.2019 –Present**
- Develop deep learning model for Histology-MRI mapping project for prostate cancer detection though image segmentation, classification and multiple scale-modality image mapping.

Research Associate, Heriot-Watt University, Edinburgh, UK   **Nov.2017 –Nov.2018**
- Built 3D images modelling protocol for the key mineral at nano-scale, combined polygon modeling and pattern statistics, deployed in Python, Matlab, and Tcl, documentation, wrote manual, manuscripts and research proposals.

Intern Student, Canadian Natural Resources International (UK) Limited   **Aug.2013 –Dec.2014**
- Performed and presented numerical simulation analysis to development team helped on decisions worth millions.

RELATED RESEARCH PROJECTS

Histology and Medical image analysis (Python/ Pytorch / R)   3 Conference and 1 Journal articles, 2019-2020
- Innovated a novel "learnable data loader" for optimal mega-pixel histology image segmentation (Pytorch).
- Developed a deformed segmentation method for efficient analysis of large but imbalanced 2D/3D medical images.
- Deployed R based label fusion method STAPLE to assist a deep learning-based inter-reader variability project.
- Developed a deep recurrent multiscale pyramid network for image super-resolution task (Pytorch).
- Assisted 3D reconstruction of tumor cells and image analysis from stacked immunofluorescence images.
- Co-supervised a PhD and a Msc student in developing deep learning methods for histopathology image analysis.

Multiscale image analysis and reconstruction workflow (Python/ C++)   PhD Thesis, 2017
- Owned a novel multi-scale/moda image fusion and reconstruction workflow for digital rock analysis.
- Developed codes for rock image analysis and pattern recognition of landmark (thin layer) by machine learning.
- Calibrate low-quality CT and high-quality SEM images, and conduct image registration to integrate multiscale data.
- Segmented particles (6E+5 per image) and visualise cross-scale structure-correlated statistics by sliding window.
- 3D pore-grain image reconstruction via multiple point statistics method (conditional to neighbouring "patch").
- Automated the workflow in parallel HPC scripts delivered on broken record size of rock image (1.5E+12 voxels).

Weak supervised deep neural model for segmentation (Matlab)   Presented (2016)/ Poster (2018) at conferences
- Innovated a weak supervised iterative convolutional net (embedded with filter banks, AdaBoost and auto-context) that auto-improves segmented connectivity of thin linear pattern with learning transferred from synthetic scratch.
- Researched the nature impact of the convolutional feature and training image on segmented connectivity from noisy images, measured qualitatively by activation map and quantitatively by confusion matrix over various filter banks.

Uncertainty study of digital rock analysis in the parallel project (C++/ imageJ)   Presented at conference, 2017
- Presented to industry the segmentation uncertainty improved by machine learning and visualise fluid simulation.
- Collaborated with visiting scholar on feature selection framework combine super-pixel and genetic algorithm.

Automated machine-learning for rock phase classification (JavaScript)   Published at conference, 2014
- Implement an auto-sampling and labeling script in ImageJ by local mean and variance.
- Developed an automated patch-based rock pattern classification procedure based on random forest.

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Deep learning and machine learning for generic rock image analysis (Python/ Tensorflow/ GPUs/ imageJ)

- Supported visiting student on design experiments of rock image segmentation with KNN, K-mean, SVM and PCA.
- Evaluated modern deep learning (CNN, ResNet, RNN, R-CNN etc.) for semantic segmentation of rock image.

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

PUBLICATIONS

1. **Jin, C.**, Tanno, R., Xu, M., Mertzanidou, T. and Alexander, D.C.,. Foveation for Segmentation of Ultra-High Resolution Images. **arXiv preprint** arXiv:2007.15124 **2020**.
2. 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**.
3. **Jin, C.**, Tanno, R., Xu, M., Mertzanidou, T. and Alexander, D.C., October. Foveation for Segmentation of Mega-Pixel Histology Images. **MICCAI 2020**.
4. 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**.
5. H. Kayhanian, W. Waddingham, P. Barmpoutis, **Jin, C.** and M. Jansen, "Studying tumours & their precursors in 3D using computational image reconstruction", **CI and CRUK-UCL 2019** Conference.
6. **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**.
7. **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.
8. **Jin, C.**, Lv, R. Wang, A. Zhu and J. Ma,   "Challenges in Ultra-tight Rock Characterisation for Fluid Flow Modelling in Digital Core Analysis", **InterPore 2017**.
9. **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**.
10. **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**.
11. **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**.

SCHOLARSHIP AND 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
☆ 3rd Place in the 3rd "Challenging Cup" Business Plan Competition of China University of Petroleum (East of China) in 2008