Xinghua (Patrick) Cheng

E-mail: bioxinghua.cheng@gmail.com, Phone: +1 (959)-529-1893 Website: https://geog0521.github.io/

Research Interests

Land-atmosphere Interaction, **Soil Moisture**, Land Surface Phenology, **Machine Learning for Ecosystem Science**, **High-performance Computing**, Remote Sensing Theory, **Multi-source Data Fusion**, Thermodynamics

Education & Professional Appointment

Southwest Jiaotong University Chengdu, China
Full-time Research Associate Sep 2022- Jul 2023

The Hong Kong Polytechnic University Hung Hom, Hong Kong
Full-time Research Associate Mar 2020- May 2022

The Hong Kong Polytechnic University Hung Hom, Hong Kong
M.S. in Geomatics (Distinction) Mar 2020

Nanjing Normal University Nanjing, China
B.S. in Geographical Information Science June 2018

Honors & Awards

2019	**LSGI Scholarship for Outstanding Academic Performance** - The Hong Kong Polytechnic University	Hong Kong
2018	**Outstanding Undergraduate Thesis** - Nanjing Normal University	China
2018	**Third-class Scholarship for Excellent Student** - Nanjing Normal University	China
2017	**Second-class Scholarship for Excellent Student** - Nanjing Normal University	China
2016	**Second Prize in the 5th National GIS Skills Competition**	China
2016	**Third-class Scholarship for Excellent Student** - Nanjing Normal University	China
2015	**Award of Pacemaker to Merit Student** - Nanjing Normal University	China
2015	**Third-class Scholarship for Excellent Student** - Nanjing Normal University	China

Peer-Reviewed Scientific Publications

Google Scholar: **https://scholar.google.com/citations?user=h-Sj2KkAAAAJ&hl=en**

2023

[7] **Cheng, X.H**, Li, Z.L. Modeling Information Flow from Multispectral Remote Sensing Images to Land Use and Land Cover Maps for Understanding Classification Mechanism. *Geospatial Information Science*. https://doi.org/10.1080/10095020.2023.2275625.

[6] **Cheng, X.H**, Li, Z.L. Predicting the Lossless Compression Ratio of Remote Sensing Images with Configurational Entropy. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*.14, pp. 11936-11953. https://doi.org/10.1109/JSTARS.2021.3123650.

[5] **Cheng, X.H**, Li, Z.L., 2021. Configurational Entropy for Optimizing the Encryption of Digital Elevation Model Based on Chaos System and Linear Prediction. *Applied Sciences*, 11(5), pp. 2402. https://doi.org/10.3390/app11052402.

[4] Li, S. J, Hu, G. H, **Cheng, X. H**, Xiong, L. Y, Tang G. N. Josef S., Integrating topographic knowledge into deep learning for the voids filling of digital elevation models. *Remote Sensing of Environment*. https://doi.org/10.1016/j.rse.2021.112818.

2020

[3] **Cheng, X. H**, Li Z. L. How Does Shannon's source coding theorem Fare in prediction of image compression ratio with current algorithms? In *ISPRS Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*. https://doi.org/10.5194/isprs-archives-XLIII-B3-2020-1313-2020.

[2] **Cheng, X. H**, Li, Z. L. Using Boltzmann Entropy to Measure Scrambling Degree of Grayscale Images. In Proc. the 2021 IEEE 5th International Conference on Cryptography, Security and Privacy (CSP 2021), Zhuhai, China, pp. 181-185. https://doi.org/10.1109/CSP51677.2021.9357492.

2017

[1]Zhou, R. C, Lu, K., Long, Y., Lu, J. Y, **Cheng, X. H**, Hu, D. and Gu, Y.H., 2017. A survey on social image understanding. In Proc. 2017 *IEEE International Conference on Behavioral, Economic, Socio-cultural Computing (BESC)*, Krakow, Poland, pp. 1-5. https://doi.org/10.1109/BESC.2017.8256394.

In Review

[1] Wang Y.P, Mao J.F, Brelsford C, Ricciuto M.D, Yuan F.M, Shi X.Y, Rastogi D, Mayes A.M, Kao S.C, Warren M.J, Griffiths A.N, **Cheng X.H**, Weston D, Zhou Y.Y, Gu L.H, Thornton E.P. Water, Thermal, and Land Cover Factors Led to Contrasting Urban and Rural Vegetation Resilience to Heat Waves. (**Revision was sent to *PNAS* on November 8, 2023; Track Number: PNAS MS# 2023-06883R**).

In Preparation

[2]**Cheng X.H**. 2023. Determining the Upper and Lower Limits of Spatial-temporal Remote Sensing Image Fusion with Boltzmann Entropy and the First Law of Thermodynamics (**Results available upon request**)

[1]**Cheng X. H**, Yan, W., 2023. Inferring the Radiometric Quality of Multispectral Airborne Laser Scanning Point Clouds via Boltzmann Entropy (**rejected** by *IEEE Transactions on Geoscience and Remote Sensing* on 10 Oct 2023)

Book Chapters

Hu, D, **Cheng, X. H**, Lü, G. N, Wen, Y. N, Chen, M., 2020. The Chinese Family Tree Geographical information system. In: Ye, X.Y, Lin, H. eds. Spatial Synthesis: Computational Social Science and Humanities. Switzerland: Springer Nature, pp. 13-17. https://link.springer.com/chapter/10.1007/978-3-030-52734-1_3

Journal Review Service

- IEEE Geoscience and Remote Sensing Letters (#1)
- Neural Processing Letters (#1)

Teaching Assistant Experience

The Hong Kong Polytechnic University Hung Hom, Hong Kong
- Course: LSGI3242A Digital Terrain Modelling Sept 2020-Dec 2020

The Hong Kong Polytechnic University Hung Hom, Hong Kong
- Course: LSGI3244A_535_20202_A Spatial Data Analysis and Mining Jan 2021- May 2021

Professional Activities

Professional Association
- Ecological Society of America (2023-)
- American Geophysical Union (2022-)
- North American Regional Association of the International Association for Landscape Ecology (IALE-NA) (2020-)
- American Association of Geographers (2020-)
- Institute of Electrical and Electronics Engineers (IEEE) Geoscience and Remote Society- (2020)

Conference Talks

2023 **Cheng, X. H**, Li, Z. L "Modelig Energy Flow from Landscape Gradients to Mosaics with the Law of Energy Conservation". In COS 264: Modeling, **Ecological Society Meeting 2023**, Portland, USA, Aug 6-11, 2023 (**My first-time ESA meeting oral presentation**).

2021 **Cheng, X. H**, Li, Z. L "Effects of Upscaling Functions on Calculating Thermodynamic Entropy of Numerical Raster Data: A Case Study on Aggregation". In T-08: Modeling, **North American Regional Association of the International Association for Landscape Ecology (IALE-NA) Annual Meeting**, Neveda, USA, April 8-16, 2021. (Online).

Cheng, X. H, Li, Z. L. "Using Boltzmann Entropy to Measure Scrambling Degree of Grayscale Images". In 2021 IEEE 5th International Conference on Cryptography, Security and Privacy (CSP 2021), Zhuhai, China, January 8-10, 2021.

2020   **Cheng, X. H**, Li, Z. L. "Boltzmann-entropy-based Optimization of Encryption and Decryption of DEM with Logistic Map". In Special Symposia-07: Entropy for landscape ecology: models, computation, and applications, North American Regional Association of the International Association for Landscape Ecology (IALE-NA) Annual Meeting, Toronto, Canada, May 10-14, 2020. (Online).

       Cheng, X. H, Li, Z. L. "Measung the Srambling Degree of Remote Sensing Imgaes: A Perspective from The Second Law of Thermodynamics". In 2020 International Graduate Workshop on Geoinformatics, Wuhan, China, December 16-18, 2020.

       Cheng, X. H, Li, Z. L. "How Does Shannon's source coding theorem Fare in prediction of image compression ratio with current algorithms?" XXIVI International Society for Photogrammetry and Remote Sensing (ISPRS) Congress 2020, Nice, France, June 14-20, 2020.

2017   **Cheng, X. H**, Hu, D, He, H. Y, Wang, Q. R. "Publicly-oriented Historical Geographical Information System of Three Kingdoms". Digital Humanities: Academic Frontiers and Explorations in the Big Data Era" Symposium, Nanjing, People's Republic of China, July 1-3, 2017.

Skills

Programming Languages	**Python, R**, C, C#, C++, Java, HTML5, JavaScript
Deep Learning Frameworks	Tensorflow, PyTorch
Operating System	Windows families, MacOS, Linux families
Databases	Oracle, Mysql, SQLite, PostgreSQL, SqlServer, ESRI Geodatabase
Software and Tools	**MATLAB, NetCDF, NCL, WRF,** DJ UAV (Unmanned Aerial Vehicle), Android Studio, Visual Studio, Eclipse, IntelliJ, ArcGIS, ENVI

References

Dr. Zhilin Li	Full Professor (2020-) Faculty of Geosciences and Environmental Engineering Southwest Jiaotong University, Chengdu, China. dean.ge@swjtu.edu.cn Professor in the Hong Kong Polytechnic University (1996-2020) Curriculum Vitae (polyu.edu.hk), Li Zhilin - Google Scholar
Dr. Jianbo Gao	Full Professor Faculty of Geographical Science Beijing Normal University, Beijing, China, jbgao.pmb@bnu.edu.cn https://geot.bnu.edu.cn/Public/htm/news/5/427.html, Jianbo Gao -Google Scholar
Dr. Christopher Higgins	Assistant Professor Department of Human Geography University of Toronto, Canada cd.higgins@utoronto.ca Tel: 416-208-4871 https://higgicd.github.io/