Shengjie Liu

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EDUCATION

2015 – 2019 **Sun Yat-Sen University**, Guangzhou, China
B.S. in Geographic Information Science (GPA: 3.9/4.0)
Thesis: Deep learning for land use and land cover classification

WORK EXPERIENCE

Oct 2019 – Present **The University of Hong Kong**, Pokfulam, Hong Kong
Research Assistant, Department of Physics
- Investigated artificial light at night and light pollution in Hong Kong using satellite and night sky brightness data
- Satellite data including VIIRS Annual/Monthly Composite, Black Marble VNP46A1/A2, Luojia-1, Jilin-1, and ISS

Jul – Aug 2019 **OneSpace Technology Co., Ltd.**, Chongqing, China
Remote Sensing Engineer, Department of Spatial Information
- Applied satellite data for crop mapping, and water and air quality assessment (e.g., chlorophyll a, PM2.5)
- Reduced the need for human annotation and was the key to a three million crop mapping project in Chongqing

Oct 2017 – Apr 2019 **Guangdong Key Lab. of Urbanization and Geo-simulation**, Guangzhou, China
Undergraduate Research Assistant (Part-time)
- Developed machine learning methods for remote sensing image classification with limited samples
- Methods: convolutional neural network, multitask learning, active learning, object-based image analysis
- Applications: land use and crop mapping, local climate zone, hyperspectral and PolSAR classification

Jul 2017 – Dec 2018 **School of Geography and Planning**, Sun Yat-Sen University, Guangzhou, China
Assistant Lab Manager (Part-time), GIS Lab
- Maintained 82 computers and 2 multimedia systems for classes

Jun – Aug 2016 **Center of Social Survey**, Sun Yat-Sen University, Zhuhai, China
Interviewer (Internship), China Labor-force Dynamic Survey
- Conducted face-to-face interviews about job and migration history with 70 families in two communities

JOURNAL PUBLICATIONS

Liu, S., Shi, Q., and Zhang, L., 2020. Few-shot Hyperspectral Image Classification with Unknown Classes Using Multitask Deep Learning. *IEEE Transactions on Geoscience and Remote Sensing*, Early Access, 2020. doi:10.1109/TGRS.2020.3018879

Liu, S., Luo, H., and Shi, Q., 2020. Active Ensemble Deep Learning for Polarimetric Synthetic Aperture Radar Image Classification. *IEEE Geoscience and Remote Sensing Letters*, Early Access, 2020. doi:10.1109/LGRS.2020.3005076

Liu, S., and Shi, Q., 2020. Local Climate Zone Mapping as Remote Sensing Scene Classification Using Deep Learning: A Case Study of Metropolitan China. *ISPRS Journal of Photogrammetry and Remote Sensing*, 164, 229-242, 2020. doi:10.1016/j.isprsjprs.2020.04.008

Liu, S., and Shi, Q., 2020. Multitask Deep Learning with Spectral Knowledge for Hyperspectral Image Classification. *IEEE Geoscience and Remote Sensing Letters*, Early Access, 2020. doi:10.1109/LGRS.2019.2962768

Liu, S., Qi, Z., Li, X., and Yeh, A.G.O., 2019. Integration of Convolutional Neural Networks and Object-Based Post-Classification Refinement for Land Use and Land Cover Mapping with Optical and SAR Data. *Remote Sensing*, 11(6), p.690. doi:10.3390/rs11060690

PEER-REVIEWED CONFERENCE PROCEEDINGS

Liu, S., Luo, H., Tu, Y., He, Z., and Li, J., 2018. Wide Contextual Residual Network with Active Learning for Remote Sensing Image Classification. In *IEEE International Geoscience and Remote Sensing Symposium*, July 2018, pp. 7145-7148. doi:10.1109/IGARSS.2018.8517855

CONFERENCE ABSTRACTS AND PRESENTATIONS

Shengjie Liu, 2020. Deep learning for remote sensing image classification: Scene classification of local climate zone and fine-grained classification with unknown classes. In *3rd Urban Remote Sensing Symposium*, November 2020, Shanghai, China.

Chun Shing Jason PUN, Chu Wing SO, Nok Yan Janet CHANG, **Shengjie LIU**, Lina CANAS, Constance E. WALKER, and Sze Leung CHEUNG, 2020. A Multinational Study of Night Sky Brightness patterns: preliminary results from the Globe at Night – Sky Brightness Monitoring Network (GaN-MN). In *6th International Conference on Artificial Light at Night (ALAN)*, June 2020, Lleida, Catalonia, Spain.

WORKING PAPERS

Shengjie Liu, Chu Wing So, Janet Chang, Chun Shing Jason Pun et al. Understanding remotely sensed nighttime lights with field measurements and land use data: A case study of Hong Kong. (manuscript available on request)

HONORS AND AWARDS

2020	Arctic Code Vault Contributor, GitHub
Nov 2019	Second Price (5 000 CNY), The 1st Orbita Hyperspectral Satellite Data Processing Paper Contest - Estimating PM2.5 and PM10 directly from TOA reflectance using hyperspectral data and multitask learning
Dec 2018	Scholarship of the EMBA Alumni Association for Real Estate of Sun Yat-Sen University
Dec 2018	The First Prize of Excellent Undergraduate Scholarship, Sun Yat-Sen University

PROFESSIONAL ACTIVITIES AND SERVICES

2020 –	Reviewer for *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, Pattern Recognition Letters, Urban Climate, Remote Sensing Letters.*
2018 –	Member, IEEE Geoscience and Remote Sensing Society

SKILLS

Coding languages: Python, C/C++, MATLAB, HTML5, LaTeX
Coding in Python: TensorFlow, Keras, PyTorch, NetworkX, Matplotlib
Academic software: GeoDa, ArcGIS, QGIS, ENVI, eCognition, Gephi, OriginLab
General software: VideoPad Video Editor, Adobe Illustrator

SELECTED PAST PROJECTS

2020	**U- and inverted U-shaped relationship between Flickr photo density and nightlight**

- Found that People prefer to take photos in bright urban centers and dark green parks
- Found a U- and inverted U-shaped relationship between nightlight (x-axis) and Flickr photo density (y-axis)
- Submitted to the Deep City Symposium Latsis EPFL 2020–21
- Flickr density map (change "Hong-Kong" to "Singapore" or "Toronto"): https://sjliu.me/Flickr/Hong-Kong/

2019 **Local climate zone mapping in metropolitan China**
- Developed an artificial network named LCZNet to classify satellite scene images to local climate zone
- Created local climate zone maps in fifteen major cities in China
- Responsible for conceptualization, methodology, analysis, investigation, manuscript writing and editing
- Project page: https://sjliu.me/lcz

2019 **Estimating PM2.5 and PM10 directly from TOA reflectance using Zhuhai-1 hyperspectral data**
- Developed a Python script to covert raw Zhuhai-1 hyperspectral data to Top-of-Atmosphere reflectance
- Developed a multitask artificial network to simultaneously predict PM2.5 and PM10 concentration
- Project page: http://sjliu.me/Estimation-of-PM2.5-PM10-from-Satellite-Imagery

2018 **Using DMSP/OLS nighttime light data to capture the collapse and rise of post-Soviet states**
- Funded by National Undergraduate Innovative Project (No. 201810558050, 10 000 CNY)
- Found that most light-decreased areas are related to mining industries based on spatial analysis
- Identified the sources of decreased night lights in fifteen post-Soviet countries by classifying high-resolution Google satellite images and locating their latitude and longitude in DMSP/OLS data
- Responsible for proposal writing, conceptualization, methodology, analysis, investigation, presentation

2018 **Cost-effective remote sensing image classification**
- Developed a light-weight convolutional network that can run on CPU for image classification
- Integrated the light-weight network with active learning to reduce the need of training samples
- Responsible for methodology, analysis, investigation, manuscript writing

2018 **Studying the urban expansion of Zhuhai city, China**
- Analyzed the urban expansion pattern of Zhuhai using spatial analysis (Local Moran's I)
- Identified Zhuhai as a polycentric city
- Responsible for investigation

2018 **Urban structure discovery in the Pearl River Delta**
- Discovered urban structure in the Pearl River Delta using mobile GPS data with complex network analysis and community detection (Gephi, NetworkX, Fast-unfolding algorithm)
- Explored the distribution of diseases with online medical records using complex network analysis
- Identified urban functional zones in Guangzhou and Foshan

2017 **Community detection with open street map road network and graph theory** (Class Project)
- Developed a C++ program to calculate the shortest path using Dijkstra algorithm (linked list implementation)
- Developed a label propagation algorithm with real distance constraint for community detection
- Evaluated the performance of community detection by calculating modularity
- Visualized the detected road network community in ArcGIS

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