

# Shengjie (Shawn) Liu

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## EDUCATION

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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

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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, Guangzhou, China  
Interviewer (Internship), China Labor-force Dynamic Survey (Zhuhai Team)  
- Conducted face-to-face interviews about job and migration history with 70 families in two communities

## JOURNAL PUBLICATIONS

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- 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

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#### 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

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#### 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 *3<sup>rd</sup> 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 *6<sup>th</sup> International Conference on Artificial Light at Night (ALAN)*, June 2020, Lleida, Catalonia, Spain.

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#### WORKING PAPERS

**Shengjie Liu**, Chu Wing So, Nok Yan 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)

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#### HONORS AND AWARDS

2020	Arctic Code Vault Contributor, GitHub
Nov 2019	Second Price (5 000 CNY), The 1 <sup>st</sup> 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

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#### PROFESSIONAL ACTIVITIES AND SERVICES

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

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#### 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

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#### 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

Last updated 16 December 2020