

# XIMENG CHENG

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## RESEARCH INTERESTS

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GIScience, spatio-temporal data mining, GeoAI, machine learning, explainable AI, time-series analysis, social sensing, urban studies, remote sensing, transportation, disaster assessment, complex network.

## SKILLS

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<b>Programming Related</b>	Python, Jupyter, PyTorch, TensorFlow, C#, SQL, C/C++, Matlab
<b>GIS Related</b>	ArcGIS, PostGIS, ENVI, GDAL, OpenStreetMap
<b>Languages</b>	Chinese, English

## EDUCATION

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<b>Doctor of Natural Science</b> Cartology and GIS, Peking University (PKU) Advisors: Prof. Yu Liu, Prof. Lun Wu	<i>September 2016 - August 2020</i>
<b>Master of Engineering</b> Cartography and Geographic Information Engineering, China University of Geosciences, Beijing (CUGB) Advisor: Prof. Tingyan Xing	<i>September 2013 - June 2016</i>
<b>Bachelor of Science</b> Geographic Information System, China University of Geosciences, Beijing (CUGB)	<i>September 2009 - June 2013</i> GPA: 3.65/4

## RESEARCH EXPERIENCE

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<b>Postdoc Researcher</b> Applied Machine Learning Group, Artificial Intelligence Department, Fraunhofer Institute for Telecommunications, Heinrich Hertz Institute (HHI)	<i>November 2021 - Present</i>
<b>Postdoc Researcher</b> High Performance Computing (HPC) Group, Gesellschaft für wissenschaftliche Datenverarbeitung mbH Göttingen (GWDG)	<i>August 2021 - October 2021</i>
<b>Research Assistant</b> Institute of Remote Sensing and Geographical Information Systems, Peking University (PKU)	<i>September 2016 - April 2021</i>
<b>Visiting Scholar</b> CyberGIS Center for Advanced Digital and Spatial Studies, Department of Geography and Geographic Information Science, University of Illinois at Urbana-Champaign (UIUC) Advisor: Prof. Shaowen Wang	<i>April 2019 - August 2019</i>
<b>Visiting Graduate Student</b> Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences (CAS) Advisor: Prof. Zhanfeng Shen, Prof. Jiancheng Luo	<i>November 2014 - January 2016</i>

## PUBLICATIONS AND PATENTS

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## Publications

1. **Ximeng Cheng**, Ali Doosthosseini, and Julian Kunkel. Improve the deep learning models in forestry based on explanations and expertise. *Frontiers in Plant Science*, 13:902105, 2022.  
<https://doi.org/10.3389/fpls.2022.902105>
2. **Ximeng Cheng**, Zhiqian Wang, Xuexi Yang, Liyan Xu, and Yu Liu. Multi-scale detection and interpretation of spatio-temporal anomalies of human activities represented by time-series. *Computers, Environment and Urban Systems*, 88:101627, 2021.  
<https://doi.org/10.1016/j.compenvurbsys.2021.101627>
3. **Ximeng Cheng**, Jianying Wang, Haifeng Li, Yi Zhang, Lun Wu and Yu Liu. A method to evaluate task-specific importance of spatio-temporal units based on explainable artificial intelligence. *International Journal of Geographical Information Science*, 35(10):2002-2025, 2021.  
<https://doi.org/10.1080/13658816.2020.1805116>
4. Lun Wu, **Ximeng Cheng**, Chaogui Kang, Di Zhu, Zhou Huang and Yu Liu. A framework for mixed-use decomposition based on temporal activity signatures extracted from big geo-data. *International Journal of Digital Earth*, 13(6):708-726, 2020.  
<https://doi.org/10.1080/17538947.2018.1556353>
5. Di Zhu, **Ximeng Cheng**, Fan Zhang, Xin Yao, Yong Gao and Yu Liu. Spatial interpolation using conditional generative adversarial neural networks. *International Journal of Geographical Information Science*, 34(4):735-758, 2020.  
<https://doi.org/10.1080/13658816.2019.1599122>
6. Xiaoyue Xing, Zhou Huang, **Ximeng Cheng**, Di Zhu, Chaogui Kang, Fan Zhang, and Yu Liu. Mapping human activity volumes through remote sensing imagery. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 13:5652-5668, 2020.  
<https://doi.org/10.1109/JSTARS.2020.3023730>
7. Jianying Wang, Lei Dong, **Ximeng Cheng**, Weijun Yang and Yu Liu. An extended exploration and preferential return model for human mobility simulation at individual and collective levels. *Physica A: Statistical Mechanics and its Applications*, 534:121921, 2019.  
<https://doi.org/10.1016/j.physa.2019.121921>
8. Shiliang Zhang, Di Zhu, Xin Yao, **Ximeng Cheng**, Huagui He and Yu Liu. The scale effect on spatial interaction patterns: an empirical study using taxi O-D data of Beijing and Shanghai. *IEEE Access*, 6:51994-52003, 2018.  
<https://doi.org/10.1109/ACCESS.2018.2869378>
9. Di Zhu, Fan Zhang, Shengyin Wang, Yaoli Wang, **Ximeng Cheng**, Zhou Huang and Yu Liu. Understanding place characteristics in geographic contexts through graph convolutional neural networks. *Annals of the American Association of Geographers*, 110(2):408-420, 2020.  
<https://doi.org/10.1080/24694452.2019.1694403>
10. **Ximeng Cheng**, Zhanfeng Shen, Tingyan Xing and Wen Dong. Damaged building extraction and rapid assessment for earthquake disasters based on high-resolution remote sensing images. *Journal of Natural Disasters*, 25(3):22-31, 2016. (In Chinese)  
<https://doi.org/10.13577/j.jnd.2016.0303>
11. **Ximeng Cheng**, Zhanfeng Shen, Tingyan Xing, Liegang Xia and Tianjun Wu. Efficiency and accuracy analysis of multispectral image classification based on mRMR feature selection method. *Journal of Geo-information Science*, 18(6):815-823, 2016. (In Chinese)  
<http://www.dqxxkx.cn/CN/10.3724/SP.J.1047.2016.00815>
12. Wen Dong, Zhanfeng Shen and **Ximeng Cheng**. The rapid assessment method of earthquake disaster based on high-resolution remote sensing target feature library. *Journal of Geo-information*

*Science*, 18(5):699-707, 2016. (In Chinese)  
<http://www.dqxxkx.cn/CN/10.3724/SP.J.1047.2016.00699>

## Patents

1. Lingling Li, Zhanfeng Shen, Yida Fan, Tong Tang, Qi Wen, Wei Wang, Ping Wang, Wen Dong, Wei Zhang, Yueguan Lin, Yan Cui, He Huang and **Ximeng Cheng**. Building vector boundary simplification method. Chinese patent: CN105787977A, 20/07/2016.
2. Zhanfeng Shen, **Ximeng Cheng**, Jiancheng Luo and Liegang Xia. Remote sensing character optimization algorithm for improving mRMR (min-redundancy max-relevance) algorithm. Chinese patent: CN104794496A, 22/07/2015.
3. Tingyan Xing, Chunmei Zheng, Junbao Xia, Xiao Nie, Hongliang Xing, Junbao Cheng, Hao Hou, Haizhi Zhang, Fang Yuan, Linqi Wu and **Ximeng Cheng**. Data configuration based oil and gas resource data integration method and integration platform. Chinese patent: CN104008161A, 27/08/2014.

## CONFERENCES

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1. **Ximeng Cheng**, Jost Arndt, Emilia Marquez, and Jackie Ma. Decomposition learning based on spatial heterogeneity: A case study of COVID-19 infection forecasting in Germany. *2023 European Geosciences Union (EGU) General Assembly, Vienna, Austria, April 2023*. (PICO presentation)
2. **Ximeng Cheng** and Yu Liu. Evaluation of spatio-temporal tensor data based on the explainable artificial intelligence methods. *2019 Chinese Geography Information Science Theories and Methods Annual Conference, Shanghai, China, October 2019*. (Oral presentation)
3. Di Zhu, **Ximeng Cheng**, Fan Zhang, Yong Gao and Yu Liu. Spatial interpolation based on conditional generative adversarial neural network. *2019 American Association of Geographers (AAG) Annual Meeting, Washington D.C., United States, April 2019*.
4. Zhiqian Wang, **Ximeng Cheng** and Yu Liu. Study on the precipitation weather influence on taxi behaviors based on the Fourier transform. *2018 Chinese Geography Information Science Theories and Methods Annual Conference, Taiyuan, China, November 2018*.
5. Xiaoyue Xing, Di Zhu, **Ximeng Cheng** and Yu Liu. Population mapping based on deep features of remote sensing imagery. *The 26th International Conference on Geoinformatics, Kunming, China, June 2018*.
6. **Ximeng Cheng** and Yu Liu. Urban mixed-use decomposition based on the temporal activity signatures. *2017 Chinese Geography Information Science Theories and Methods Annual Conference, Changsha, China, November 2017*. (Oral presentation)
7. *Spatio-temporal Patterns and Geographical Analysis, GIScience Symposium Series No.2, Beijing, China, October 2017*. (Conference organizer)
8. Di Zhu, Li Shi, Yuxia Wang, **Ximeng Cheng** and Yu Liu. Infer spatial interaction patterns from spatial distributions. *The 25th International Conference on Geoinformatics, Buffalo, United States, August 2017*.

## PROJECTS

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1. **2021.12-2024.11**, DAKI-FWS, Data- and AI- supported early warning system, Federal Ministry for Economic Affairs and Climate Action (BMWK), Germany (No.01MK21009A)
2. **2021.04-2023.03**, FORESTCARE, Single tree-based, satellite-supported forest ecosystem monitoring using auto-adaptive hyperdimension geodata analysis, Federal Ministry of Education and Research (BMBF), Germany (No.02WDG014E)

3. **2019.04-2019.08**, Doctoral student short-term aboard study project supported by Graduate School of Peking University (No.7101702197)
4. **2019.01-2023.12**, Towards theories and methods for spatial interaction networks derived from big geo-data, National Natural Science Foundation of China (No.41830645)
5. **2017.07-2021.07**, Big geo-data mining and spatio-temporal pattern discovery, National Key Research and Development Program of China (No.2017YFB0503600)
6. **2017.01-2021.12**, Methods for geo-spatial modeling and analyzing, National Natural Science Foundation of China (No.41625003)

## PEER REVIEWS

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2023 - Present	<i>Computers, Environment and Urban Systems</i>
2023 - Present	<i>International Journal of Digital Earth</i>
2023 - Present	<i>Annals of GIS</i>
2023 - Present	<i>Information Processing and Management</i>
2023 - Present	<i>Pest Management Science</i>
2023 - Present	<i>Journal of Agricultural, Biological, and Environmental Statistics</i>
2022 - Present	<i>Transactions in GIS</i>
2022 - Present	<i>International Journal of Environmental Research and Public Health</i>
2022 - Present	<i>Sustainability</i>
2021 - Present	<i>Electronics</i>
2021 - Present	<i>Scientific Programming</i>
2021 - Present	<i>Sensors</i>
2019 - Present	<i>IEEE Access</i>
2018 - Present	<i>International Journal of Geographical Information Science</i>

## AWARDS AND HONORS

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<b>2020</b>	<b>Excellent Graduate</b>	Peking University
<b>2019</b>	<b>Merit Student</b>	Peking University
<b>2019</b>	<b>Special Academic Scholarship</b>	Peking University
<b>2018</b>	<b>Special Academic Scholarship</b>	Peking University
<b>2017</b>	<b>Special Academic Scholarship</b>	Peking University
<b>2016</b>	<b>Excellent Graduate</b>	Beijing Municipal Education Commission
<b>2016</b>	<b>Excellent Graduate</b>	China University of Geosciences, Beijing
<b>2014</b>	<b>Merit Student</b>	China University of Geosciences, Beijing
<b>2013</b>	<b>Excellent Graduate</b>	China University of Geosciences, Beijing
<b>2012</b>	<b>Professional Scholarship</b>	China University of Geosciences, Beijing
<b>2011</b>	<b>Excellent Student Cadre</b>	China University of Geosciences, Beijing
<b>2011</b>	<b>Professional Scholarship</b>	China University of Geosciences, Beijing
<b>2010</b>	<b>Merit Student</b>	China University of Geosciences, Beijing
<b>2010</b>	<b>Outstanding Volunteer</b>	China University of Geosciences, Beijing
<b>2010</b>	<b>Professional Scholarship</b>	China University of Geosciences, Beijing

## COMPETITIONS

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<b>2015</b>	<b>Semi-final</b>	Beauty of Programming, Microsoft (China)
<b>2014</b>	<b>First Prize</b>	International Underwater Robot Competition (URC)
<b>2012</b>	<b>Second Prize</b>	Lan Qiao Cup Collegiate Programming Contest, China
<b>2012</b>	<b>First Prize</b>	Lan Qiao Cup Collegiate Programming Contest, Beijing
<b>2012</b>	<b>Third Prize</b>	Peking University Programming Contest (Guest)
<b>2011</b>	<b>Second Prize</b>	The Electrician Mathematical Contest in Modeling, China
<b>2010</b>	<b>Gold Medal</b>	Campus Programming Contest, China University of Geosciences, Beijing

## SERVICES AND ACTIVITIES

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- 2017-2019**    **Leader of the spatio-temporal analysis group**  
Spatio-temporal big data and social sensing laboratory, Peking University
- 2014**        **Member of University Robot Team**, China University of Geosciences, Beijing
- 2013**        **Volunteer** of 9th China (Beijing) International Garden Expo
- 2013**        **Volunteer** of Beijing Marathon
- 2012**        **Volunteer** organizer of sixty university anniversary, CUGB
- 2012**        **Volunteer** of Esri (China) User Conference, Beijing
- 2012**        **Volunteer** of 3rd Beijing Olympic City Sports & Culture Festival
- 2012**        **Volunteer** of Beijing Marathon
- 2012**        **Volunteer** of 2nd National Undergraduate Geological Skills Competition, China
- 2011-2012**   **Council member of Youth Volunteers Association**, CUGB
- 2011-2012**   **President of Youth Volunteers Association**  
School of Information Engineering, China University of Geosciences, Beijing
- 2010-2012**   **Member of University ACM/ICPC Team**, China University of Geosciences, Beijing
- 2010**        **Volunteer** of 1st Beijing Olympic City Sports & Culture Festival

## REFERENCES

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### **Yu Liu**

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School of Earth and Space Sciences  
Peking University  
liuyu@urban.pku.edu.cn

### **Jackie Ma**

Head of Applied Machine Learning Group  
Fraunhofer Institute for Telecommunications,  
Heinrich Hertz Institute, HHI  
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