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Alexander C. Michels

Research Interests

- Agent-Based Models
- CyberInfrastructure
- Economic Geography
- High-Performance Computing
- Network Science
- Spatial Analysis

Education

Ph.D. in Spatial Informatics **June 2019 - Present**
University of Illinois at Urbana-Champaign
– Advised by Dr. Shaowen Wang

M.S. in Geography and G.I.S. **August 2020 - Present**
University of Illinois at Urbana-Champaign

B.S. in Mathematics and Financial Economics **August 2015 - May 2019**
Westminster College
– Minor in Computer Science — Honors in Computer Science and Math — Graduated Cum Laude

Research Experience

Research Assistant Champaign, IL
CyberGIS Center & Geospatial Information Laboratory (CIGI) *June 2019 - Present*
– Building cyberinfrastructure using Docker Swarm, Hadoop and Kubernetes clusters. I manage an undergraduate research assistant and maintain the development branch of CyberGIS-Jupyter
– Programming spatially-explicit models for disease and land-use change

Informatics Researcher Los Angeles, CA
Institute for Pure and Applied Mathematics at UCLA / Praedicat, Inc. *June 2018 - August 2018*
– Worked for IPAM to develop a novel algorithm for computational fact-checking on knowledge graphs and a self-supervised machine learning algorithm for sentence importance which outperformed TF-IDF.

Publications

Journal Articles

Kang, J.-Y., **Michels, Alexander**, A. Crooks, J. Aldstadt, and S. Wang (2021). "An Integrated Framework of Global Sensitivity Analysis and Calibration for Spatially Explicit Agent-Based Models". In: *Transactions in GIS* Early View.n/a. URL: https://doi.org/10.1111/tgis.12837.

Kang, J.-Y., **Michels, Alexander**, F. Lyu, et al. (2020). "Rapidly Measuring Spatial Accessibility of COVID-19 Healthcare Resources: A Case Study of Illinois, USA". In: *International Journal of Health Geographics*. URL: https://doi.org/10.1186/s12942-020-00229-x.

Conference Papers

Michels, Alexander, A. Padmanabhan, Z. Li, and S. Wang (Oct. 2021). "Towards Reproducible Research on CyberGISX with Lmod and Easybuild". In: *Gateways 2021*. Zenodo. URL: https://doi.org/10.5281/zenodo.5569659.

Padmanabhan, A., Z. Xiao, R. Vandewalle, F. Baig, et al. (Nov. 2021). "CyberGIS-Compute for Enabling Computationally Intensive Geospatial Research". In: *SpatialAPI'21: Proceedings of the 3rd ACM SIGSPATIAL International Workshop on APIs and Libraries for Geospatial Data Science*. DOI: https://dataoceanlab.github.io/spatial-api-2021/files/paper_5.pdf.

Padmanabhan, A., Z. Xiao, R. Vandewalle, **Michels, Alexander**, and S. Wang (Oct. 2021). "Enabling Computationally Intensive Geospatial Research on CyberGIS-Jupyter with CyberGIS-Compute". In: *Gateways 2021*. Zenodo. URL: https://doi.org/10.5281/zenodo.5570056.

Michels, Alexander, J.-Y. Kang, and S. Wang (2020). "An Exploration of the Effect of Buyer Preference and Market Composition on the Rent Gradient Using the ALMA Framework". In: *Proceedings of the 3rd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation*. GeoSim '20. Seattle, Washington: Association for Computing Machinery, pp. 48–51. ISBN: 9781450381611. URL: https://doi.org/10.1145/3423335.3428167.

Kang, J.-Y., J. Aldstadt, **Michels, Alexander**, R. Vandewalle, and S. Wang (2019). "CyberGIS-Jupyter for Spatially Explicit Agent-based Modeling: A Case Study on Influenza Transmission". In: *GeoSim '19: Proceedings of the 2nd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation*. Ed. by H. Kavak, J.-S. Kim, and S. Wise. Chicago, Illinois: ACM, pp. 32–35. ISBN: 978-1-4503-6956-5. URL: https://doi.org/10.1145/3356470.3365531.

Awards

UIUC GIS Day Virtual Student Poster Competition November 2020
"Third Place" UIUC Department of Geography & Geographic Information Systems

Cyberinfrastructure Specialty Group Robert Raskin Student Competition April 2020
"First Place for Research in Geospatial Cyberinfrastructure" American Association of Geographers (AAG)

UCGIS Prize for Advances in Geospatial Problem Solving July 2019
"Advancing Reproducibility in Geospatial Research at the AAG-UCGIS Summer School 2019" AAG-UCGIS

Best Robot in Division Prize for Senior Unique Division April 2018
"Robot in the Division with the lowest Total Final Scores" Trinity Fire Fighting Robot Contest

North America Award for Level 2 April 2018
"The top North American robot in Level 2" Trinity Fire Fighting Robot Contest

COMAP International Mathematical Modeling Competition Honorable Mention January 2017
"excellent modeling and sensitivity analysis" COMAP International Mathematical Modeling Competition

Presentations

Oral Presentations

Towards Reproducible Research on CyberGISX with Lmod and Easybuild *October 2021*
Gateways 2021 Virtual

An Exploration of the Rent Gradient using the ALMA Framework *November 2020*
3rd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation Virtual

Particle Swarm Optimization for Calibration in Spatially Explicit ABMs *April 2020*
American Association of Geographers Virtual

Capturing the Predictive Power of Cortical Learning Algorithms *April 2019*
National Conference on Undergraduate Research Atlanta, GA

Computational Fact-Checking through Knowledge Graphs *January 2019*
AMS Contributed Paper Session at 2019 Joint Mathematics Meeting Baltimore, MD

Information Extraction and Aggregation for Business Profiling *July 2018*
Invited Talk at Institute for Pure and Applied Mathematics Los Angeles, CA

Repeated Play Games *April 2017*
MAA, Allegheny Mountain Section Meeting Pittsburgh, PA

Optimizing Throughput, Cost, and Safety in Toll Booth Plazas *February 2017*
Pi Mu Epsilon Regional Conference Youngstown, OH

Poster Presentations

The Effect of Buyer Preference and Market Composition on the Rent Gradient *November 2020*
UIUC GIS Day Champaign, IL

Particle Swarm Optimization for Calibration in Spatially Explicit ABMs *February 2020*
UIUC SESE Research Review Champaign, IL

CyberGIS-Jupyter for Spatially Explicit Agent-based Modeling *November 2019*
UIUC GIS Day Champaign, IL

CyberGIS-Jupyter for Sustainable and Reproducible Geospatial Analytics *November 2019*
UIUC GIS Day Champaign, IL

Computational Fact-Checking through Knowledge Graphs *January 2019*
Undergraduate Research Poster Session at 2019 Joint Mathematics Meeting Baltimore, MD

Teaching Experience

Teaching Assistant and Tutor New Wilmington, PA
Westminster College *August 2015 - December 2018*
– Assisted professors in grading, working with students individually, and developing curriculum for classes covering coursework in Calculus, Computer Science, and Operations Research.

Professional Associations

American Association of Geographers (AAG)
Specialty Groups:

- Cyberinfrastructure
- Economic Geography
- Socialist and Critical Geography
- Spatial Analysis and Modeling
- Transportation Geography

Professional Service

Session Organizer, Computation and Uncertainty of Spatial Accessibility *February 2022*
AAG 2022 Symposium on Data-Intensive Geospatial Understanding in the Era of AI and CyberGIS

Student Director, AAG CyberInfrastructure Specialty Group (CISG) *April 2021 - Present*
American Association of Geographers (AAG)

Technical Skills

Data Science: Data Science, G.I.S., Git, Machine Learning, Parallel Programming, Network Science

Languages: Python (& Cython), Bash, Java, C++, R

Technologies: Docker, Hadoop (HDFS/Spark/Yarn), Kubernetes, OpenStack, Terraform

Operating Systems: Linux (esp. Mint & Ubuntu), Windows