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Alexander C. Michels

Education

Ph.D. in Informatics — Champaign, IL
University of Illinois at Urbana-Champaign — *June 2019 - Present*
– Pursuing the Spatial Informatics concentration under Dr. Shaowen Wang

B.S. in Mathematics and Financial Economics — New Wilmington, PA
Westminster College — *August 2015 - May 2019*
– **Honors Thesis**: "Capturing the Predictive Power of Cortical Learning Algorithms"
– Minor in Computer Science — Graduated Cum Laude — Honors in Computer Science and Math — 3.7 GPA

Research Interests

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

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 Praedicat, Inc. automating information extraction, classification, and aggregation from web data for business profiling of over 52,600 companies and corporate entities.
– 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.

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.

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

Dr. Thomas R. Nealeigh Mathematics Scholarship March 2018
"Awarded to an outstanding junior or senior mathematics major" Westminster College

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

$ Fellowships & Grants

Computational Research Techniques Fellowship *June 2020*
Awarded funds to attend the TACC Summer Institute on Applied Parallel Programming TACC

Financial Opacity and Challenges to Forest Governance in Indonesia and Malaysia *February 2020*
Graduate Pursuit Member National Socio-Environmental Synthesis Center (SESYNC)

Publications

Peer-Reviewed Publications

Kang, Jeon-Young, **Michels, Alexander C**, Fangzheng Lyu, Shaohua Wang, Nelson Agbodo, Vincent L Freeman, and Shaowen Wang (2020). "Rapidly Measuring Spatial Accessibility of COVID-19 Healthcare Resources: A Case Study of Illinois, USA". In: *International Journal of Health Geographics*. DOI: 10.1186/s12942-020-00229-x.

Michels, Alexander, Jeon-Young Kang, and Shaowen 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, pp. 48–51. DOI: 10.1145/3423335.3428167.

Kang, J.-Y., J. Aldstadt, **A. C. Michels**, 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 Hamdi Kavak, Joon-Seok Kim, and Sarah Wise, pp. 32–35. DOI: 10.1145/3356470.3365531.

Submitted/Under Review

Kang, Jeon-Young, **A. C. Michels**, Jared Aldstadt, Andrew Crooks, and Shaowen Wang (2020). "An Integrated Framework of Global Sensitivity Analysis and Calibration for Spatially Explicit Agent-Based Models: A Case Study of Influenza Transmission". In: *Submitted to International Transactions in Geographic Information Science*.

Presentations

Oral Presentations

An Exploration of the Effect of Buyer Preference and Market Composition on the Rent Gradient using the ALMA Framework *November 2020*
3rd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation Seattle, WA, virtual

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

Decentralizing the World with Blockchain *April 2018*
Undergraduate Research & Arts Celebration New Wilmington, PA

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 2021*
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

Agent-Based Simulations for Repeated Play Game Theory *April 2017*
Undergraduate Research & Arts Celebration New Wilmington, PA

Professional Associations

American Association of Geographers (AAG)
Specialty Groups:

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

Professional Service

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

Skills

Data Science: Big Data, 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