Alexander C. Michels
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Mathematician and Computer Scientist
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Education

- **Westminster College** — New Wilmington, PA
  Bachelor of Science in Mathematics and Financial Economics — *August 2015 - Present*
  - Minor in Computer Science
  - Honors Thesis entitled "An Exploration of the Topological and Logical Properties of Hierarchical Temporal Memory Networks" focused on A. I., Cognitive Computing, Logic, and Topology
  - All-College Honors Program, Endowment Fund, Kappa Mu Epsilon, Men's Choir, Omicron Kappa Sigma, Pi Sigma Pi, and Secretary of Robotics Team

Professional Experience

- **Researcher** — Los Angeles, CA
  Institute for Pure and Applied Mathematics at UCLA / Praedicat, Inc. — *June 2018 - Present*
  - Selected to be a part of 2018's Research in Industrial Projects for Students (RIPS) at UCLA.
  - Worked for Praedicat, Inc. automating information extraction and aggregation from unstructured web data for business profiling of over 52,600 companies and corporate entities.
  - Used big data, deep neural networks, knowledge graphs, parallel programming, RDFs, and many other techniques to provide Praedicat, Inc. with a new tool for automatically finding information.
- **Software Engineer and Computer Support Specialist** — New Wilmington, PA
  Titan Radio and WCN 24/7 — *May 2018 - Present*
  - Responsible for the servers, virtual machines, computers, and streams required to keep the radio and television station operating.
  - Wrote various software solutions including one to update the Titan Radio weather conditions and weather forecast while no one was on the air and automatically Tweet Severe Weather Warnings.
- **Financial Analyst** — Various
  Program with Moody's Investors Service VP Ben Nelson — *December 2017 - Present*
  - Responsible for data science and providing macroeconomic perspective.
  - Companies we have focused on include PPG and Olin.
  - Presented a credit rating along with bond and stock recommendations to a panel of experts.
- **Teaching Assistant and Tutor** — New Wilmington, PA
  Westminster College — *August 2015 - Present*
  - Selected during my first year to tutor students and serve as a teaching assistant in mathematics and computer science courses.
  - Assisted professors in grading, working with students individually, and developing curriculum for classes covering coursework in Calculus, Computer Science, and Operations Research.
- **Research Assistant** — New Wilmington, PA
  Dr. Charles Shaffer — *January 2017 - May 2018*
  - Integrated cryptocurrency trading into Dr. Shaffer's algorithmic currency trading application.
  - We explored inefficiencies between exchanges and backtested technical strategies such as Donchian Channels and Bollinger Bands on Bitcoin, Ethereum, and Litecoin.

Research

Information Extraction and Aggregation from Unstructured Web Data for Business Profiling

- Created a positive feedback loop consisting of data management, a query formulator, a web crawler, a web scraper, classifiers, parsers, and a knowledge graph.
- Used Open Information Extraction techniques to handle unstructured data which we converted to subject-predicate-object triples and then used logic-based classification by querying our knowledge graph.

An Exploration of the Topological and Logical Properties of Hierarchical Temporal Memory Networks

- This is ongoing research as part of my Honors Research requirement at Westminster College and is supervised by a board of advisors.
- Working to improve the encoding and decoding mechanisms of Hierarchical Temporal Memory through topology and attempting to use fuzzy logic to improve the performance or forecasting ability.

Minimum Square Deviance k-Chinese Postman Problems

- Worked on this variation of the k-Chinese Postman Problem with Dr. Natacha Merz. We focused on finding solutions for lattice graphs like the square grid graph.
- Although we believe we made some headway, we were unable to prove any of our results because of the intractability of the problem.

Optimizing Throughput, Cost, and Safety in Toll Booth Plazas

- Lead a team of mathematicians over a single weekend in COMAP's International Mathematical Modeling Competition to produce a 20-page research paper.
- Received Honorable Mention for our solution, placing us in the top 13 in the United States and presented our results at 2017 Pi Mu Epsilon Regional Conference

Projects

Trinity Firefighting Contest

- Built and programmed an autonomous robot to tackle various challenges at the Trinity Firefighting Contest including putting out candles, navigating a maze, and rescuing a baby doll.
- My team won the Best Robot in Division Prize for the Senior, Unique Division and the North America Award for Level 2.

TrackChain

- Explored the technical details of blockchain technology including Elliptic Curve Cryptography, Network Flow Analysis, and Data Structure alternatives to a Merkle Chain
- Presented my research and decentralized application at Westminster's Undergraduate Research and Arts Festival

Skills

Languages: Python, Java, C++, Bash, R, HTML, CSS, XML, Javascript, Solidity, Clojure

Computer Science: Big Data, Blockchain, Cognitive Computing, Information Extraction, Machine Learning, Parallel Programming, Robotics, Web Development

Finance and Economics: Corporate Credit Analysis, Econometrics, Risk Analysis