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, and Fuzzy Logic
  - 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

- **Software Engineer and Systems Administrator** — New Wilmington, PA
  Titan Radio and WCN 24/7 — *May 2018 - Present*
  - Responsible for the network, servers, virtual machines, computers, and streams required to keep the radio and television station operating.
  - Wrote software to automate work and improve user experience including a program to automatically update the weather conditions on air and automatically Tweet Severe Weather Warnings.
- **Information Technology Intern** — New Castle, PA
  Treloar & Heisel — *September 2018 - Present*
  - Responsible for data science and automation necessary for building, maintaining, and utilizing databases including data validation, database normalization, and automated report generation.
  - Developed a variety of applications for company use in Javascript, Python, and Visual Basic.
- **Researcher** — Los Angeles, CA
  Institute for Pure and Applied Mathematics at UCLA / Praedicat, Inc. — *June 2018 -August 2018*
  - Selected to be a part of 2018's Research in Industrial Projects for Students (RIPS) at UCLA.
  - Worked for Praedicat, Inc. automating information extraction, classification, 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.
- **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

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

- Ongoing research in artificial intelligence modeled after the neocortex.
- 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.

Computational Fact-Checking Using Knowledge Networks

- Developed an algorithm in Python and Cython for computational fact-checking on knowledge networks called *StreamMiner* based on network flow, relational similarity, and discriminative path mining
- Presented our work at the Institute for Pure and Applied Mathematics and continually optmizing the algorithm's Graph Theory algorithm implementations in the hopes of publishing

Information Extraction and Aggregation from Unstructured Web Data for Business Profiling

- Proposed and implemented an architecture to perform information extraction, classification, and aggregation at scale. My work focused on Natural Language Processing, Classification, and Big Data.
- Produced high quality structured data at scale for business applications, designed a classification scheme that vastly outperforms TF-IDF, and worked with Knowledge Graphs for Computational Fact-Checking.

Algorithmic Game Theory

- Developed simple machine learning algorithms in Java to play repeated-play simultaneous games such as Chicken and the Colonel Blotto Game.
- Presented my results at Westminster's 2017 Undergraduate Research and Arts Celebration and the Mathematical Association of America's Allegheny Mountain Section 2017 Spring Meeting.

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.

Skills

Languages: Python (and Cython), Java, C++, Bash, R, HTML, CSS, XML, Javascript, Visual Basic

Computer Science: Blockchain, Parallel Programming, Robotics, Software Project Management, System Administration, Web Development

AI and Data Science: Artificial Intelligence, Big Data, Cognitive Computing, Information Extraction, Machine Learning (esp. Deep NN and Recurrent NN)

Finance and Economics: Algorithmic Trading, Corporate Credit Analysis, GAAP, Risk Analysis