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 - May 2019*
  - 3.7 GPA; Minor in Computer Science
  - Honors Thesis in Hierarchical Temporal Memory focused on A. I. and Fuzzy Logic
  - Endowment Fund, Honors Program, Kappa Mu Epsilon, Men's Choir, Omicron Kappa Sigma, Pi Sigma Pi, and Secretary of Robotics Team

Professional Experience

- **Data Science 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.
- **Software Engineer and Systems Administrator** — New Wilmington, PA
  Titan Radio and WCN 24/7 — *May 2018 - Present*
  - Responsible for the hardware and software 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 Java, Python, and Visual Basic.
- **Web Developer and Teaching Assistant** — New Wilmington, PA
  Westminster College — *August 2015 - Present*
  - Lead recruitment efforts including bringing a Girls Who Code Club to campus and developing a website for marketing and recruiting purposes using React and Ruby on Rails.
  - Assisted professors in grading, working with students individually, and developing curriculum for classes covering coursework in Calculus, Computer Science, and Operations Research.
- **Financial Analyst** — Various
  Program with Moody's Investors Service VP Ben Nelson — *December 2017 - June 2018*
  - Responsible for data science and econometrics on S&P 500 companies.
  - Presented a credit ratings and bond and stock recommendations to a panel of experts.

Research

Computational Fact-Checking through Relational Similarity based Path Mining
July 2018 - Present

- Developed an algorithm in Python and Cython for computational fact-checking on knowledge networks called *RelPredPath* based on network flow, relational similarity, and discriminative path mining
- Presented our work at IPAM and continually optimizing the algorithm's Graph Theory algorithm implementations in the hopes of presenting at conferences and publishing

An Exploration of the Logical and Topological Properties of Hierarchical Temporal Memory Networks
December 2017 - Present

- 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.

Minimum Square Deviance k-Chinese Postman Problems
August 2017 - December 2017

- 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.
- Unable to prove any of our results because of the intractability of the problem.

Algorithmic Game Theory
January 2017 - May 2017

- 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
January 2017

- 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

Information Extraction and Aggregation from Unstructured Web Data for Business Profiling
June 2018 - August 2018

- 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.

Trinity Firefighting Contest
December 2017 - April 2018

- 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.
- Won Best Robot in Division Prize for Senior, Unique Division and the North America Award for Level 2.

Skills

Computer Science: Parallel Programming, Robotics, Software Engineering, System Administration, Virtualization, Web Development

Data Science: A.I., Big Data, Cognitive Computing, Information Extraction, Machine Learning

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

Languages: Python (and Cython), Java, C++, Bash, R, HTML, CSS, XML, Ruby (and Ruby on Rails), Javascript (and React), SQL, Visual Basic

Software & Tools: AWS, Google Cloud, NLTK, Numpy, Pandas, scikit-learn, Selenium