Andrew **Tuma**

Data Scientist · Machine Learning Researcher

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Summary

Current data scientist and machine learning researcher studying deep learning for chaotic time series prediction. Passionate about numerical computing and its many forms, including numerical relativity, gravitational wave detection, computational fluid dynamics, and nonlinear dynamical systems.

Education

San Diego State University — *San Diego, CA*

M.S. in Applied Math — *Aug. 2020 - May. 2022*

- Thesis: Deep Learning Assisted Hankel Dynamic Mode Decomposition

University of Virginia — *Charlottesville, VA*

B.S. in Physics — *Aug. 2017 - May. 2020*

- Distinguished Major

Westmont College — *Montecito, CA*

B.S. in Physics (Transferred) — *Aug. 2016 - May. 2017*

- Presidential Scholar

Work Experience

Teknion Data Solutions — *Dallas, TX*

Data Scientist - Consulting — *March. 2022 - Now*

- Developed python workflow to combine various datasets using record linkage. Lead Tableau architect on project using Tableau Prep to clean and auto-populate a Tableau dashboard.
- Converted business critical and detailed SQL code generated in IBM Cognos Impromptu to functional Alteryx workflows.
- Participate and share ideas in biweekly machine learning paper readings.

Medarcus — *Los Angeles, CA*

Data Scientist — *Apr. 2021 - July 2021*

- Implemented a new probabilistic patient match algorithm, enabling parallelized computations for record linkage and deduplication.
- Delivered critical changes to previous codebase on short notice by leveraging POSTMAN, Docker, and Flask.
- Helped design a natural language processing machine to identify patient data more effectively using convolutional neural networks and word embedding techniques.

University of Virginia — *Charlottesville, VA*

Observatory Coordinator — *Aug. 2018 - Mar. 2020*

- Integrated the latest astrophysical news along with Q&A into our biweekly program for public viewings at the historic Leander McCormick Observatory.
- Operated and maintained the modernized 26-inch astrometric refractor telescope originally built in the 1880s.
- Taught guests how to properly use the 14-inch Celestron CGEM DX Schmidt-Cassegrain telescope along with the 6-inch brass Alvin Clark refractor.

Westmont College — *Montecito, CA*

Observatory Coordinator — *Sep. 2016 - May 2017*

- Operated the 16-inch and 24-inch research grade reflecting telescopes along with their component software MIRA AL to study and introduce different objects of the night sky to the public.
- Prepared lectures and interactive activities to engage the public and used social media to advertise the events, frequently resulting in record attendance.
- Worked in conjunction with the Santa Barbara Astronomical Unit (SBAU) to spark scientific curiosity through educational gatherings and presentations.

Research

Machine Learning for Nonlinear Dynamics — *San Diego State University*

Andrew Tuma, Chris Curtis — *May. 2021 - Present*

- PUBLICATION IN PROGRESS: Deep Learning Assisted Hankel Dynamic Mode Decomposition. Leverages deep autoencoder networks and times series embedding techniques to predict nonlinear and chaotic dynamics.

Techniques in Spacetime Visualization — *University of Virginia*

Andrew Tuma, David Nichols — *Aug. 2019 - June 2020*

- Utilized Python and Matplotlib visualization tools to design a new method for plotting tensor fields which intuitively represent eigenvector/eigenvalue information to fully describe gravitational wave emitting spacetimes.

Pulsed Nuclear Magnetic Resonance — *University of Virginia*

Andrew Tuma, Bellave Shivaram — *Jan. 2019 - April 2019*

- Examined the physical properties of several different hydrogen and fluorine nuclei by recording spin-lattice relaxation time, spin echoes, and free induction decay.

Pulsating Variable Stars — *Westmont College*

Andrew Tuma, Tom Whittemore — *Feb. 2017 - June 2017*

- Used MIRA AL software and the Westmont Observatory 24-inch reflector telescope to capture data on several different Delta-Scuti pulsating variable stars and then plotted the light curves to obtain information about the properties of the star IP Virginis.

Skills

Programming Python, Tensorflow, PyTorch, MATLAB, C, C++, ROOT, LaTex, Github

Languages English, Conversational Spanish and German

Presentation

UVA Gravity Group — *Charlottesville, VA*

New Methods in Spacetime Visualization — *2019*

- Introduced new methods of visualizing complex tensor fields representing gravitational wave emitting spacetimes using Python and Matplotlib.

Extracurricular Activity

Gravity Group — *Charlottesville, VA*

Member — *Aug. 2019 - Aug 2020*

- Presented and engaged in current research projects in gravitational physics.
- Attended weekly journal club readings to stay up-to-date on recently published research papers.

Society of Physics Students — *University of Virginia*

Member — *Aug. 2017 - May. 2020*

- Mentored and tutored younger students within the community in math and science.
- Participated in group GRE help sessions and undergraduate research meetings.

Teaching

2021	**Lead Graduate Teaching Assistant,** Math 141 - Pre-calculus	*San Diego State*
2017	**Lab Assistant,** Introduction to Physics Lab I & II	*Westmont College*
2017	**Teaching Assistant,** Introduction to Physics II	*Westmont College*
2016	**Teaching Assistant,** Introduction to Physics I	*Westmont College*

Honors & Awards

2020	**Dean's List,** University of Virginia	*Charlottesville, VA*
2017	**Dean's List,** Westmont College	*Montecito, CA*
2016	**Presidential Scholarship,** Westmont College	*Montecito, CA*
2016	**CoServ Electric Scholarship,** LEF Scholarship Ceremony	*The Colony, TX*
2016	**TCHS Track Booster Club Scholarship,** LEF Scholarship Ceremony	*The Colony, TX*

Coursework

- Computational Physics
- General Relativity
- Computational Fluid Dynamics
- Theoretical Astrophysics
- Computational PDEs
- Numerical Optimization
- Mathematical Physics
- Dynamical Systems and Chaos
- Partial Differential Equations