

CURRICULUM VITAE

MARTEN L. THOMPSON

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EDUCATION

University of Minnesota, Minneapolis, MN

Ph.D. in Statistics. Advised by Dr. Snigdhansu Chatterjee 2018 - 2023

Hamline University, Saint Paul, MN

B.S. in Mathematics. Advised by Dr. Frank Shaw 2012 - 2016

B.A. in Physics. Advised by Dr. Andy Rundquist 2012 - 2016

University of York, York, England

Student in Mathematics. 2015

ABILITIES

Skills: Bayesian analysis, MCMC, Gaussian processes, physics-informed machine learning, GANs, deep learning.

Languages & Libraries: Python, R, SQL, Java, TensorFlow, Git, C++.

ABILITIES

Skills: Bayesian/frequentist statistics, Gaussian processes, physics informed ML, deep learning.

Languages & Libraries: Python, R, SQL, Java, TensorFlow, Git, C++.

EMPLOYMENT

Intern in Development & Application of NASA Uncertainty Quantification Software

NASA Langley Research Center, Hampton, VA 2022-2023

- Ideated, researched, and developed a Physics Informed Generative Adversarial Network for improved inference on partial differential equations.
- Integrated and deployed deep learning model in Python package `pigan` for use within NASA research teams for physics-informed machine learning.
- Collaborated with Sandia National Laboratories to tailor their optimization software *Dakota* to NASA Langley's statistical research needs.
- The combined software improved uncertainty quantification for entry, descent, and landing models essential to coordinating multiple Martian payloads.

Consultant to the Minnesota Department of Agriculture

UMN Statistical Consulting, Minneapolis, MN 2019

- Learned client's needs, project history, and unknowns through in-person and written exchanges.
- Researched, employed, and presented results from predictive and inferential statistical models.
- Confirmed their needs were met through continuous dialogue. The MDA used findings to inform their recommendations and data collection for some 97 farmers and crop advisors.

Associate Application Analyst

Securian Financial Group, Saint Paul, MN

2016 - 2018

- Formulated solutions for internal and external clients individually and as an agile member.
- Ensured production-quality batch and web code through test-driven development, code reviews, and software development best practices.
- Oversaw all applications accessing a business unit's databases ensuring consistency, security, data integrity, and redundancy.

Alchemy Logic Systems, Santa Rosa, CA

Data Modeling Consultant.

2015 - 2018

- Created an anomaly detection method for incoming medical records to meet the best interests of the patient, practitioner, and platform.
- Developed a statistical summary of extant historic records to meet business needs.
- Aspects of the final product are incorporated in the patent 11,461,848.

PUBLICATIONS & PATENTS

Thompson, M., and Chatterjee, S. (2023). *A Bayesian Semi-Parametric Modeling Approach for Area Level Small Area Studies*. Calcutta Statistical Association Bulletin. Accepted, awaiting publication.

Thompson, M., Geraci, G., Bomarito, G., Warner, J., Leser, P., Leser, W. P., Eldred, M. S., Jakeman, J., and Gorodetsky, A. (2023). *Strategies for Automation of Model Tuning in Multi-fidelity Trajectory Uncertainty Propagation*. AIAA SCITECH 2023 Forum. <https://doi.org/10.2514/6.2023-1481>.

Thompson, M., Braverman, A., and Chatterjee, S. (2022). *A Dependent Multi-model Approach to Climate Prediction with Gaussian Processes*. Environmental Data Science, 1, e23.

Sharma, S., Thompson, M., Laefer, D., Lawler, M., McIlhany, K., Pauluis, O., Trinkle, D., and Chatterjee, S. (2022). *Machine Learning Methods for Multiscale Physics and Urban Engineering Problems*. Entropy, 24(8), 1134.

Anderson, J.M., Spurgeon, E., Stirling, B.S., May III, J., Rex, P.T., Hyla, B., McCullough, S., Thompson, M., and Lowe, C.G. (2022). *High resolution acoustic telemetry reveals swim speeds and inferred field metabolic rates in juvenile white sharks (Carcharodon carcharias)*. PloS one, 17(6), e0268914.

Alchemy, J.W., Brown, D.R., Penn, D.R., Moore, J.R., Artz, J.L., Weilepp, A.E., and Thompson, M.L. (2022). *Methods of Obtaining High Accuracy Impairment Ratings and to Assist Data Integrity in the Impairment Rating Process* (U.S. Patent No. 11,461,848). U.S. Patent and Trademark Office.

PRESENTATIONS & INVITED TALKS

SciTech - American Institute of Aeronautics and Astronautics 2023
Strategies for Automation of Model Tuning in Multi-fidelity Trajectory Uncertainty Propagation

Day of Data - University of Minnesota 2023
PINN-Point: Improving Machine Learning with Physics

Invited Seminar Series - Hamline University Physics Department <i>Introduction to Physics-Informed Machine Learning</i>	2022
Uncertainty Quantification for Machine Learning Integrated Physics Modeling - USACM <i>Location-Aware Discrimination in Physics Informed Generative Adversarial Networks</i>	2022
Joint Statistical Meeting - American Statistical Society <i>Agnostic Fay-Herriot Likelihood</i>	2022
International Conference on Climate Informatics - North Carolina Institute for Climate Studies <i>A Dependent Multi-model Approach to Climate Prediction with Gaussian Processes</i>	2022
Virtual Mini Conference - International Indian Statistical Association <i>Introduction to Python for Statisticians</i>	2022
Joint Statistical Meeting - American Statistical Association <i>Network Autoregression of the COVID Burden</i>	2021
The American Physical Society - April Meeting (co-author) <i>Computational Medical Apportionment Determination for Impairment Ratings</i>	2017
National Conference on Undergraduate Research <i>Modeling the Helicobacter</i>	2014
Physics Patrol Webinar - Hamline University <i>Invited speaker</i>	2014
Minnstate College Housing Conference - Hamline University <i>Invited speaker</i>	2014

SOFTWARE

agfh: Agnostic Fay-Herriot Model for Small Area Statistics - CRAN <i>cran.r-project.org/package=agfh</i>	2023
Colab Spellcheck - Chrome Web Store <i>github.com/MartenThompson/colab_spellcheck</i>	2021

HONORS AND AWARDS

Interdisciplinary Health Data Competition , University of Minnesota Finalist team, 2nd place	2021
Bernard H. Lindgren Teaching Assistant Award , University of Minnesota	2020
Lund Speaking Competition , Hamline University 2nd Place	2016

Scholarships, Hamline University

Fulford-Karp Scholarship	2014
Kent H. Bracewell Scholarship	2014
Dale Irwin Hayes Scholarship	2013
Presidential Merit Scholarship	2012

TEACHING

Instructor, University of Minnesota

Python and Statistical Analysis Short Course (creator/instructor)	2021
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Teaching Assistant, University of Minnesota

STAT 4893W Consultation and Communication for Statisticians	2019 - 2021
STAT 3011 Introduction to Statistical Analysis	2019
STAT 3022 Data Analysis	2018

PROFESSIONAL SERVICE

University of Minnesota

Graduate Student Liaison Committee - Founding Member	2020 - 2023
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Hamline University

Hamline University Honors - Executive Committee Chair	2013 - 2016
Society for Physics Students - Treasurer	2014 - 2015
Residential Housing Assc. - Program Communications Coord.	2013 - 2014

PROFESSIONAL SOCIETY MEMBERSHIP

American Statistical Association
Institute of Mathematical Statistics