Matt Reichenbach

https://mpreichenbach.github.io

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Research Interests

- **General:** Combining mathematical and computational tools to solve challenging, real-world problems.
- **Scientific:** Machine learning, remote sensing, ecological modeling, and data science.
- **Mathematical:** Applied functional analysis, mathematical modeling, numerical analysis, optimization, and dynamical systems.

Education

- **University of Nebraska-Lincoln** — Lincoln, NE
  Ph.D. in Mathematics (GPA: 3.8) — *Dec. 2020*
  - Dissertation: *Spectral Properties of a Non-compact Operator in Ecology*
  - Advised by Dr. Richard Rebarber and Dr. Brigitte Tenhumberg
- **University of Nebraska-Lincoln** — Lincoln, NE
  M.S. in Mathematics — *May 2017*
- **University of Colorado Boulder** — Boulder, CO
  Post-Baccalaureate Teacher Licensure in Secondary Mathematics — *Dec. 2013*
- **University of Colorado Boulder** — Boulder, CO
  B.A. in Mathematics (GPA: 3.86) — *May 2012*

Skills

Python: Implemented convolutional neural networks using **Keras** and the **Tensorflow** backend; generated training datasets with the **GDAL**, **NumPy**, and **OpenCV**, libraries; trained various classifiers using **scikit-learn**, and processed tabular data with **pandas**. Proficient user of the **Anaconda** and **Miniconda** distributions.

R: Processed fish telemetry data using the **tidyverse** libraries; fit hidden Markov models for fish behavior using **momentuHMM**, **moveHMM**, and **crawl**; interpolated spatial data using **automap**.

Additional Languages: MATLAB, LaTeX.

Applications: Git, QGIS, ArcGIS, the Microsoft Office suite, Google Docs.

Operating Systems: Windows, Linux.

Selected Employment

- **US Army Corps of Engineers - Geospatial Research Laboratory** — Alexandria, VA
  Research Mathematician — *Feb. 2021 to Current*
  - **Enhanced Terrain Processing:** Lead developer of deep-learning models which perform land-cover classification of high-resolution imagery; combined satellite and UAV imagery with publicly available land-cover data to create new datasets; trained models on a multi-GPU NVIDIA DGX machine; developed a Python library to simplify dataset-creation; incorporated the trained models into user-friendly ArcGIS toolbox.
  - **Acoustic Deterrence of Invasive Carp:** Lead developer of movement models to determine the effects of acoustic deterrents on carp behavior; incorporated sound intensity values in a pond as a novel covariate in hidden Markov models; generated a suite of data-processing tools for fish telemetry. This project is a collaboration with with scientists at USGS and USACE's Environmental Laboratory.

- **US Army Corps of Engineers - Geospatial Research Laboratory** — Alexandria, VA
  NSF Mathematical Sciences Graduate Intern — *Jun. 2020 – Aug. 2020*
  - **Enhanced Terrain Processing:** Developed deep-learning models to remove noise from synthetic-aperture radar (SAR) imagery; created synthetic datasets from publicly available imagery; acted as technical lead with minimal oversight from mentors.
- **University of Nebraska-Lincoln** — Lincoln, NE
  Graduate Teaching Assistant — *Aug. 2015 – Dec. 2020*
  - Taught courses as the instructor-of-record, directed recitation sessions, and tutored in the Mathematics Resource Center
- **Center for Science, Mathematics & Computer Education** — Lincoln, NE
  Instructor for MATH 806T: Number Theory and Cryptography — *Jul. 2019*
  - Co-taught this Master's-level course for in-service secondary teachers
- **Daewoo Elementary School** — Geoje-si, Republic of Korea
  Head Elementary English Teacher — *Feb. 2014 – Feb. 2015*
  - Taught four English lessons daily to 1st through 6th-grade students
  - Organized English-language initiatives and acted as the liaison between English teachers and school administrators
- **Laboratory for Atmospheric and Space Physics** — Boulder, CO
  Student Procurement Assistant VI — *Mar. 2010 – May 2013*
  - Maintained parts lists for NASA-funded projects, including instruments on the GOES-R, MAVEN, and TSIS satellites

Publications

[2] M. Reichenbach, R. Rebarber, and B. Tenhumberg, "Spectral properties of a non-compact operator in ecology," *Journal of Mathematical Biology*, no. 50, 82 2021.

[1] M. Reichenbach, K. Lasko, and E. Sava, "Denoising SAR using synthetic data and deep learning," *GRL White Paper*, 2020, prepared.

Awards

- **ERDC Award for Outstanding Team Effort** — Engineer Research Development Center
  Awarded to the Enhanced Terrain Processing team — *April, 2022*
- **Linda Bors Fellowship** — UNL Math Dept.
  Awarded to three graduate students annually for excellence in research — *Fall 2018*
- **Steven Hataaja Award** — UNL Math Dept.
  Awarded for excellent exposition by a graduate student — *Spring 2018*
- **Robert Noyce Teacher Scholarship** — CU Boulder Dept. of Education
  NSF-funded merit scholarship — *Spring 2013 & Fall 2013*
- **Dean's List** — CU Boulder
  Awarded to students with semester GPA greater than 3.75 — *Spring 2010, Sp. 2013, & Fall 2013*

Presentations

6. **American Fisheries Society Annual Meeting** — Spokane, WA
   Modeling the Effects of Acoustic Signals on Invasive Carp Behavior (20 min.) — *Aug. 2022*
5. **ERDC RD22 Conference** — Remote
   Modeling the Effects of Deterrents on Carp Behavior (20 min.) — *Apr. 2022*
4. **Math Club, University of Nebraska-Kearney** — Remote
   "Modeling Ecological Populations" (50 min.) — *Oct. 2020*

3. **Math Department Colloquium, Creighton University** — Omaha, NE
"Integral Projection Models in Mathematical Biology" (50 min.) — *Dec. 2019*

2. **Augustana University Math Club** — Sioux Falls, SD
"Population Models in Mathematical Biology" (50 min.) — *Nov. 2018*

1. **Colorado Council of Teachers of Mathematics Annual Conference** — Denver, CO
"The Impact of Inquiry-Based Teaching in Two High School Math Classrooms" — *Oct. 2013*

Service and Involvement

- **High school tutor** — Apr. 2022 to Aug. 2022
Northstar Tutors — *Washington, DC*
- **Chapter President** — Sep. 2019 to Sep. 2020
UNL Graduate Chapter of the American Mathematical Society — *Lincoln, NE*
- **Tutor for Native American high-school students** — Aug. 2019 to Mar. 2020
Lincoln Public Schools — *Lincoln, NE*
- **Project mentor** — Aug. 2019 to May 2020
UNL Math Dep. Directed Reading Program — *Lincoln, NE*
- **STAAR Seminar Co-organizer** — Aug. 2019 to Aug. 2020
University of Nebraska-Lincoln Math Dept. — *Lincoln, NE*
- **Volunteer** — Jan. 2017 to Jan. 2020
National Conference for Undergraduate Women in Mathematics — *Lincoln, NE*
- **Mentor to First-Year Graduate Students** — Aug. 2018 to May 2020
University of Nebraska-Lincoln Math Dept. — *Lincoln, NE*
- **Representative to Graduate Student Advisory Board** — May 2016 to May 2018
University of Nebraska-Lincoln Math Dept. — *Lincoln, NE*
- **UNL Math Day Volunteer** — Nov. 2015 to Dec. 2020
University of Nebraska-Lincoln Math Dept. — *Lincoln, NE*