Serena G. Lotreck

Interdisciplinary data scientist

Website | GitHub | LinkedIn | Scholar | lotrecks@msu.edu

Experience

ASSESSING PHOTORESPIRATORY ENERGY DEMANDS WITH OMICS AND MFA

January 2025 – Present | Michigan State University, East Lansing, MI | Supervisor: Dr. Berkley Walker

- **Summary:** Postdoctoral research project to assess the energy demands of photorespiration through transcriptomics, proteomics and metabolic flux analysis.
- **Responsibilities:** Primary project design, data pre-processing, programming implementation and testing, analysis and interpretation.

GENE CANDIDATE IDENTIFICATION WITH NATURAL LANGUAGE PROCESSING

February 2024 – August 2024 | Michigan State University, East Lansing, MI

- **Summary:** Built and evaluated a knowledge graph from the desiccation and drought tolerance literature. Implemented machine learning approach to attempt to identify gene candidates involved in desiccation tolerance.
- **Responsibilities:** Primary project design, data collection and munging, programming implementation and testing, analysis and interpretation.
- **Products:** Dissertation chapter, publicly available codebase

IMPROVING INTERDISCIPLINARITY THROUGH BIBLIOMETRIC ANALYSIS

October 2023 – August 2024 | Michigan State University, East Lansing, MI

- **Summary:** Used citation networks and topic modeling to explore the themes in desiccation tolerance research across life kingdoms. Leveraged network topology to design a rule-based recommendation system to increase topic diversity at a specialized desiccation tolerance conference.
- **Responsibilities:** Primary project design, data collection/munging, exploratory data analysis, algorithm design, writing and testing code, interpretation of results.
- **Products:** Conference talk at Desiccation Workshop 2024 (Limpopo, South Africa), first-author pre-print, publicly available codebase

PLANT SCIENCE KNOWLEDGE GRAPH CORPUS

August 2020 – October 2023 | Michigan State University, East Lansing, MI

- **Summary:** Developed a gold-standard natural language processing dataset of 250 plant science abstracts labeled with biological entities and relations. Performed an analysis of off-the-shelf neural network-based entity and relation extraction models to evaluate their potential for use in the plant sciences.
- **Responsibilities:** Primary project design, led a team of 6 in corpus annotation and guideline refinement. Designed and implemented model evaluation analyses.
- **Products:** First-author publication in in silico Plants, publicly available codebase

SATELLITE DATA FOR UNDER-RESOURCED CROP GROWTH MODELING

June 2022 - September 2022 | Corteva Agriscience, Johnston, IA | Supervisor: Dr. Sara Lira

- **Summary:** Integration of satellite data into crop growth models for cover crops to provide estimates for labor-intensive field-based measurements.
- **Responsibilities:** Worked with biologists and data scientists to adapt existing crop growth models to incorporate satellite-derived vegetative indices.

MULTI-OMIC INTEGRATION FOR COMPLEX TRAIT PREDICTION

August 2021 - November 2021 | Michigan State University, East Lansing, MI

- **Summary:** Analysis of machine learning models predicting Arabidopsis traits.
- **Responsibilities:** Data munging and feature engineering for methylomic data.
- **Products:** Publication in Nature Communications, publicly available codebase

Skills

PROGRAMMING

Python ●●●●●
R ●●●○○
bash ●●●○○

SOFTWARE PACKAGES

scikit-learn • spaCy • pandas • numpy • matplotlib • seaborn • networkx • git

LANGUAGES

Spanish ●●●●●
Scottish Gaelic ●●●○○

MENTORSHIP & TEACHING

Plant Genomics @ MSU REU Mentor • Data Science Capstone & Intro. Data Science, Teaching Assistant • Out 4 Undergrad Mentor • Publication in CourseSource • MSU QT-Grad Founding President • MSU Plant Biology Peer Mentorship Committee & Mentor • Rock Climbing Instructor, Cornell Outdoor Education

COMMUNICATION

Public speaking ●●●●●
Technical writing ●●●●◐
SciComm writing ●●●●◐

Education

MICHIGAN STATE U.

PhD in Plant Biology

August 2024 | East Lansing, MI

Advisors: Dr. Robert VanBuren & Dr. Mohammad Ghassemi
Concentrations in molecular (MPS) and computational (IMPACTS) plant science

Cum. GPA: 4.0 / 4.0

CORNELL UNIVERSITY

Bachelor of Arts in Biology

May 2019 | Ithaca, NY

Concentration in Biochemistry

Cum. GPA: 3.91 / 4.0