

Graduate Assistantship Job Description

Title: Developing machine learning models to analyze and monitor coral reef assemblages

Terms: This is a nine-month, full-time position requiring 20 hours per week for 30 weeks. The dates for the position begin the first week of classes (Fall 2024) and end after the final exam week (Winter 2025) August 26, 2024 – April 26, 2025. The GA is expected to be enrolled as a full-time student. The position offers an \$8,000 stipend and tuition waiver for 18 credit hours (\$4,000 and 9 credit hours per semester).

Research Responsibilities: The GA will be required to:

1. Meet regularly with faculty for mentorship throughout the project. 5%
2. Review existing image datasets and photomosaics relevant for the project. 5%
3. Review and improve prior work in extracting images of individual corals from photomosaics and videos (i.e., Python code). 5%
4. Review and improve prior work in image segmentation (i.e., Python code). 5%
5. Review and improve prior work in building machine learning (ML) classifiers (i.e., Python and Pytorch code). 40%
6. Develop new ML models to classify an expanded set of marine species. The focus of the project is to recognize stony, reef-building coral species. 10%
7. Evaluate the trained models on the suitability for deployment in climate resilience efforts given performance on coral reef photomosaics provided by collaborators. 10%
8. Evaluate the potential to 1) release the models publicly, 2) host the models for external groups to utilize, and/or 3) integrate the models with existing software in this space. 10%
9. Disseminate research findings through publishing in peer-reviewed journals or workshops 10%

Learning Outcomes: The responsibilities will reinforce the GA's understanding and proficiency in machine learning design, development, and operations. The research project will further develop the GA's abilities to program in Python, utilize Pytorch for ML projects, build a portfolio of ML expertise (image segmentation, image classification, and evaluation), write academic documentation, and present their work.

Qualifications: The GA must be enrolled in a Computing-related graduate degree (ACS, CYBER, DSA, or HIB) and be in good academic standing. The GA is expected to be proficient at software development in Python (demonstrated via formal coursework appearing on academic transcripts, programming portfolio GitHub, and a technical interview). They should have background knowledge in the fundamentals of ML (demonstrated via academic coursework appearing on academic transcripts or certifications).

Workstation: Students will have access to high performance computing resources (e.g., GPU-based systems). Access to the remote server is possible through the GA's personal

computer or else public machines available in GVSU computing labs. An office desk and space is available for the GA within the DCIH GA project space.

Orientation: All GAs must participate in the mandatory orientation provided by the Graduate School at the beginning of Fall 2024 (including the responsible conduct of research training), on Friday, August 23, 2024, 3:00-4:00pm in Loosemore Auditorium on the Pew campus. Two faculty advisors from the School of Computing will orient the GA in the domain, project scope, datasets, software, available computing resources, and initial roles during the first weekly meeting in Fall 2024.

Supervision: The GA's two faculty supervisors from the School of Computing will jointly mentor the student through weekly in-person meetings wherein upcoming research directions are set, tasks are assigned, technical issues are resolved, and weekly progress is evaluated. Weekly updates organized by the GA will be used to assess satisfaction of expected progress towards the project's scope of work.

Selection Process: Applicants must provide a cover letter and resume detailing their academic background, future professional goals, evidence that their background aligns with the stated qualifications and responsibilities, and three reference letters (which can be directly emailed to leidijon@gvsu.edu). There is no specific format required for these documents. Questions and completed applications can be submitted to Prof. Leidig (leidijon@gvsu.edu). After a review of these materials, qualifying applicants will be invited to a technical interview given by the two faculty supervisors to assess the student's proficiency in Python and fundamental ML concepts.

Contact Information:

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