

Open Thesis / Project

Pollen Detection and Classification Under Resource Constraints

Motivation

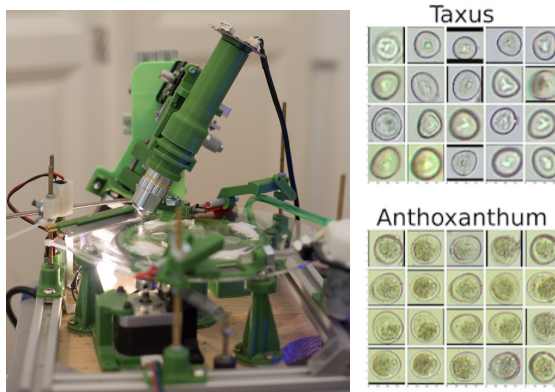
Automatic pollen sensing is important to understand the local distribution of pollen in urban environments and to give personalized advice to the citizens suffering from seasonal pollen allergies to help milder the symptoms. We built an automated pollen measurement system based on low-cost transmitted light microscope technology (see pictures below and read the publication cited at the bottom of the page). We now wish to optimize the system operation while minimizing computational resources necessary to run pollen detection and classification models locally. You will experiment with machine learning algorithms and optimize their performance for an on-board GPU to further minimize the inference time while preserving high model accuracy and generalization power. **Interested? Contact us for more details!**

Target Group

Students in ICE and Computer Science.

Thesis Type

Master Project / Master Thesis.



Pollen sensing system (left) and sample microscopic images of pollen (right). See: [N. Cao et. al, Automated Pollen Detection with an Affordable Technology, EWSN'20](#).

Goals and Tasks

In this project, you will optimize an automated pollen sensing system by optimizing inference time of several deep model. We record microscopic videos of pollen grains which are then processed on an AI-accelerator to detect, track and classify pollen. We wish to minimize the system's energy consumption while keep model accuracy high. The project includes the following tasks:

- Literature review on deep model optimization for resource-constrained devices while preserving accuracy of detection, tracking and classification tasks.
- Implement a set of optimizations on the provided AI accelerator and test the performance of optimized models together with their energy consumption and inference time.
- Summarize the results in a written report and present in the department.

Requirements / Skills:

- Experience with embedded systems and basic knowledge of deep learning models, creative thinking.
- Joy working with real systems and real data.
- Programming skills in Python.

Contact Person

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