

Group project proposal document

“Utrecht University Insect Image Recognition”



**Alpay Demirci, Arif Yildirim, Nazibul Mohammad Khan, Ömer Faruk Koran,
Ruben van de Rande, Julian Teulings, Viktoriya Dimitrova, Melih Akpınar**

V-OL-MAIFS-AIS1

22-09-2025

Introduction

This proposal describes our group project for the AI For Society minor. Our team will design and prototype an AI tool that identifies insect species from digital images. The tool will support monitoring biodiversity, ecological research, and sustainable agriculture by automating a process that currently requires intensive human effort.

Table of contents

| | |
|---|----------|
| 1 Purpose or goal | 4 |
| 1.1 Current situation..... | 4 |
| 1.2 Desired situation..... | 4 |
| 2 Deliverables..... | 5 |
| 2.1 Out of scope | 5 |
| 3 Requirements | 5 |
| 4 Quick overview on planning | 6 |
| 5 Cost or budget..... | 6 |

1 Purpose or goal

1.1 Current situation

Biodiversity monitoring is essential for research the nature, conserving it, and establish sustainable food production. Today the process of identifying species is manual, slow, and heavily reliant on expert knowledge. This creates bottlenecks in research and leaves farmers vulnerable to pest damage.

Problem:

- Manual identification is time consuming, expensive, and prone to human error
- Existing automated systems often lack sufficient accuracy or certain detail handling.
- Farmers and policymakers need faster and more reliable data to act on ecological and agricultural challenges.

1.2 Desired situation

A robust, scalable AI system capable of:

- Identifying insects and birds at species level resolution.
- Providing early alerts when harmful insects are detected.
- Allowing researchers, farmers, and citizen scientists to easily contribute and use biodiversity data.

Benefits:

- For researchers: Faster, higher-resolution monitoring and data collection.
- For farmers: Early pest detection to reduce crop losses.
- For conservationists: Improved data for tracking species and ecosystem health.
- For society: Democratized access to biodiversity monitoring through user friendly tools.

2 Deliverables

- **Prototype platform:** Web and mobile friendly demo the classifies insect photos.
- **Visualization dashboard:** Maps and graphs showing biodiversity trends and species distribution
- **Automated alert system:** Integration with n8n to notify farmers when pest species are identified.
- **Benchmark report:** Evaluation of model performance compared to human experts.
- **Field deployment checklist:** Recommendations for sensors, sampling, and data collection in real world settings.
- **Final report:** Documentation of methods, impact assessment, and scaling opportunities.

2.1 Out of scope

- Large scale deployment in field.
- Global dataset collection beyond available time and resources.
- Development of commercial or paid services during this project

3 Requirements

To successfully deliver this project, the team will need:

- **Data:** Access to insect image datasets, provided by Utrecht University and by looking for open-access resources.
- **Expertise:** Input and validation from ecological experts at Utrecht University and/or partner organizations.
- **Infrastructure:** Access to GPUs or cloud computing resources to train and evaluate AI models.
- **Feedback:** Interaction with stakeholders (farmers, researchers, citizens, scientists) to align design with real world needs.

4 Quick overview on planning

We will follow an iterative approach combining technical development with stakeholder engagement:

- **Weeks 3-5:** Literature review, project scoping, dataset collections, and baseline models.
- **Weeks 6-9:** Prototyping insect classification (vision models).
- **Weeks 10-13:** Model evaluation, robustness testing (for example background variation), and calibration.
- **Weeks 14-18:** Integration of models into a single platform, dashboard visualization, and pest alert system.
- **Week 19:** Final demo, marking last checklist, and report delivery.

We have also considered some buffer time in case anything unexpected occurs by for example having to troubleshoot or collect additional data.

5 Cost or budget

This is a student project, so no direct financial costs are expected. The main resources required include:

- **Datasets:** Provided by the partner or open-sources.
- **Infrastructure:** Computing power (cloud/GPU access).
- **Human resources:** Time investment by students and advisors

There still could be some external costs, if required, but these will be very small amounts, for example cloud credits or API access for datasets.