

Jiahua Wei
E-Mail: jiahua.wei@tuhh.de

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Bachelor-/ Project thesis at the Institute of Logistics Engineering

Title: Detection and Counting of Apple Blossoms based on Computer Vision Techniques

The commercial fruit cultivation field along the southern banks of the Elbe River in Hamburg and Lower Saxony is the second-largest contiguous fruit-growing area in Europe. In this context, the SAMSON Project was initialized to support farmers in the sustainable management of orchard areas through AI-powered automation systems.

One of the primary objectives of the project is to automate the detection of apples. Preceding this, the detection and counting of blossoms would provide early insight into the later growth stages of the trees. Additionally, fruit growers would be able to approximate the expected yield and subsequently thin fruits on overpopulated trees. As a long-term goal, this process enables predictive estimations regarding the developmental progression from blossoms to apples and facilitates accurate predictions about harvest yields.

To summarize: The main goal of this work is to investigate, implement and train currently existing object detection algorithms to automatically detect apple flower clusters on trees. An advanced detection algorithm facilitates the process of counting flower clusters in a subsequent phase, thereby providing early indicators of apple growth for the purpose of yield prediction.

Task definition:

- **State of the Art research:** Analysis of the currently used detection and counting algorithms in literature.
- **Implementation of the Algorithm:** Annotation of the collected data and implementation of an environment to train the detection and counting algorithms.
- **Data evaluation and analysis:** Performance testing of the implemented Algorithms and validation through ground truth data collected from the field.

Requirements:

- Students of engineering or computer science
- Interest in automaton, machine learning and computer vision
- Prior experience with Python and PyTorch is welcomed but not mandatory