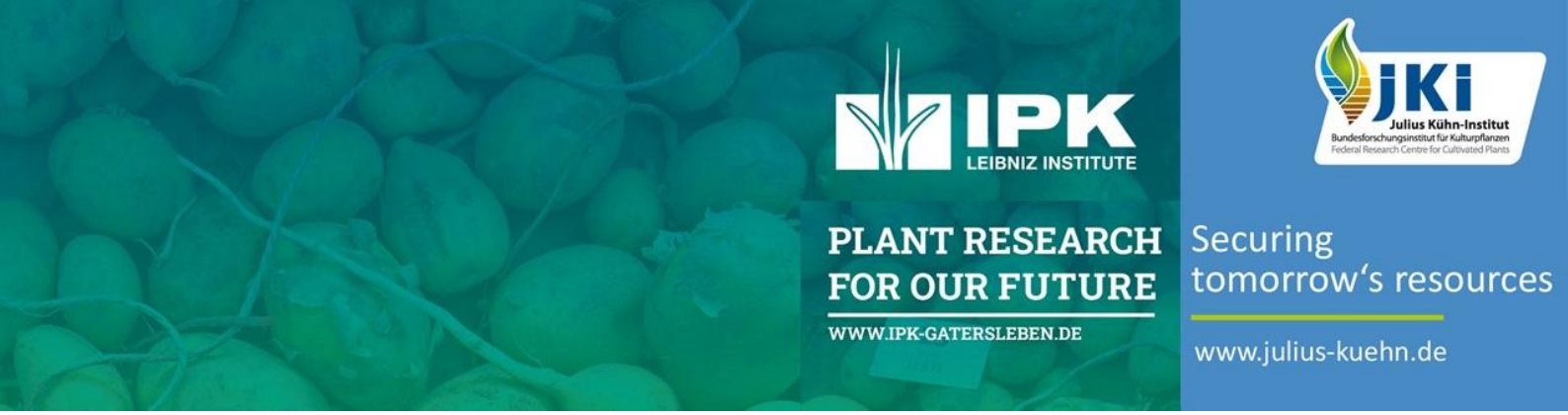

MSc thesis "Assessing Phenotypic Diversity of Potato Tubers Genebank Accessions with Machine Learning Models"

Institute for Breeding Research on Agricultural Crops - based in Groß Lüsewitz

The project

Genebank accessions are a valuable resource for potato breeding and the development of climate-resilient varieties. The IPK potato genebank maintains approximately 6,000 accessions, including modern cultivars, traditional landraces, and wild relatives. Characterizing the phenotypic diversity of this collection requires efficient, high-throughput phenotyping approaches. This project aims to characterize the phenotypic diversity of the genebank collection by integrating information from historical RGB and newly acquired hyperspectral images using machine learning approaches to extract relevant phenotypic features and assess diversity within and across accessions.

Research activities and methods

The activities of the current project involve (but are not limited to):

- Develop and evaluate an image analysis pipeline:
  - Prepare samples to/and acquire hyperspectral images.
  - Automate resizing and contour finding of images.
  - Use Deep-Learning approaches with convolutional neural networks (CNN), which are robust to variable image background and image quality to extract features.
- Predict tuber shape parameter, tuber size, tuber colour, etc.
- Perform phenotypic diversity analysis.

Qualification and interest

We are looking for candidates with the following qualification and interest:

- Enrolled in a graduate program in (bio)informatics, quantitative biology, agricultural science, or related fields.
- Willingness to learn image analysis processing.
- Interest to learn machine learning algorithms.
- Interest in statistical analyses and interpretation.
- Competent in written and spoken English.
- Motivation and good work ethics.

Our offer

- a research-oriented MSc thesis at the interplay between the Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) and the Institute for Breeding Research on Agricultural Crops which is part of the Federal Research Center for Cultivated Plants (JKI) starting March 2027.
- an international and multi-disciplinary group with expertise on biostatistics, quantitative genetics, plant genomics, molecular genetics, plant breeding, bioinformatics, and plant physiology working on current topics of breeding methodology and crop genetics.
- an enabling working environment and friendly colleagues, state-of-the-art plant cultivation facilities, laboratories, and an experimental field.
- Our institute can be reached within 17 minutes by train from Rostock central station.

More information

For further details on project description and application, please contact

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