

## Proposal for a Research Internship/Project Thesis

**Topic:** Evaluation and Comparison of Tuning Hyperparameters of the CFBS Classifiers

**Description:** Today, the majority of plastic waste is thermally recycled (burned), since it is often not possible to separate it by type using conventional methods. Multi-spectral imaging (MSI) however allows a clear recognition and identification. By using multi-camera systems, each of them with different filters mounted, multiple images of the same scene are recorded, capturing different spectral bandwidths. In order to decide for the optimal filter selection to cover all important spectral information, the Conditional Filter Band Selection<sup>1</sup>(CFBS) algorithm has been developed. In order to further improve the classification precision of that algorithm, the hyperparameters of the employed classifiers shall be optimized.

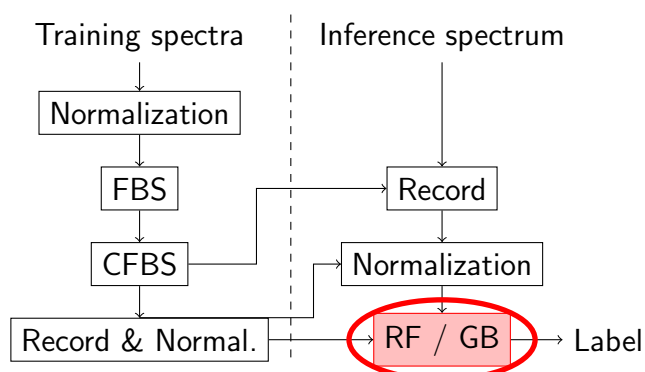


Figure 1: The filter selection and multispectral classification procedure of CFBS. The highlighted part is in the focus of this work.

The goal of this work is to find an optimal classifier hyperparameter setting to further improve the classification results for the classifiers Random Forest and Gradient Boosting used in the CFBS algorithm.

- Tasks:**
- Investigation of existing Conditional Filter Band Selection algorithm
  - Investigation of common methods for optimizing hyperparameters for classifiers such as grid search or randomized search
  - Investigation and adjustment of underlying classifiers of CFBS
  - Evaluation and comparison of results

**Prerequisites:** Knowledge of Python programming, basic knowledge in ML/DL

**Supervisor:** Katja Kossira, M.Sc., room 06.022, e-mail: [katja.kossira@fau.de](mailto:katja.kossira@fau.de)

**Professor:** Prof. Dr.-Ing. André Kaup

**Available:** Immediately (July 2024)

<sup>1</sup>K. Kossira: Conditional Optimal Filter Selection for Multispectral Object Classification, ICIP 2024.