Lehrstuhl für Multimediakommunikation und Signalverarbeitung
Universität Erlangen-Nürnberg

LMS

Proposal for a Bachelor Thesis

Topic: **Comparison and Evaluation of varying Noise- and Cross-Validation-Score thresholds for the Two-Step Conditional Filter Band Selection**

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 scene are recorded, capturing different bandwidths. However, household waste does not only consist out of plastic samples, instead also other materials such as metal or paper can be found. Therefore, the Two-Step Conditional Filter Band Selection algorithm has been developed[1]. In order to determine the optimal filter selection while keeping the required amount of cameras to a minimum, the signal-to-noise threshold SNR_{th} and cross-validation-score threshold cvs_{th} shall be optimized.
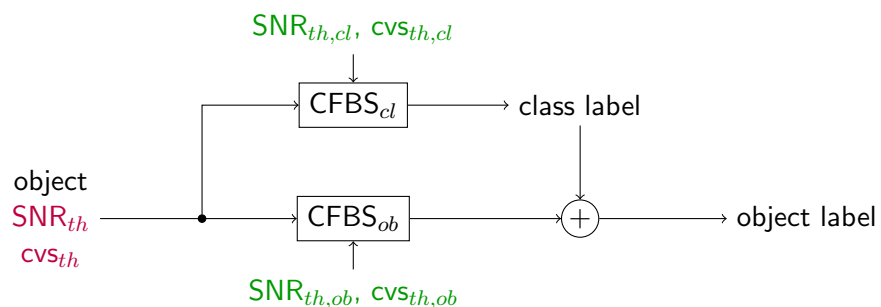

Figure 1: Pipeline of TS-CFBS algorithm. The current principle follows the highlights in red, while the green adjustments shall be implemented in this thesis.

The goal of this work is to adjust the existing algorithm by introducing an individual SNR- and cvs-threshold for the CFBS iterations. The results shall be evaluated and compared to the conventional procedure, which is marked in red within the figure.

Tasks:
- Investigation of underlying Two-Step Conditional Filter Band Selection algorithm
- Examination of different SNR- and cvs-thresholds for the TS-CFBS
- Evaluation and comparison of results

Prerequisites: Knowledge of Python programming

Supervisor: Katja Kossira, M.Sc., room 06.022, e-mail: katja.kossira@fau.de

Professor: Prof. Dr.-Ing. André Kaup

Available: Immediately (July 2024)

---

[1]K.Kossira: Two-Step Conditional Filter Band Selection for Multispectral Object Classification, 2024.