spectroscopy or Raman scattering spectroscopy are commonly used, thanks to their complementarities. Some vibrational modes are more active in a technique than in the other depending on the molecule symmetry and on chemical groups. To generate reliable results, the comparison with reference spectra database is absolutely necessary to unambiguously identify polymer type. Given the large number of spectra to analyze and since the spectra libraries usually consist of spectra of pure substances, thus spectra obtained from environmental samples are expected to have low congruity compared to reference spectra. The current solution does not allow easy assignment and fast identification of particles. In order to extend this identification, an alter- native solution is based on multivariate analysis. The spectra were analyzed using Independent Component Analysis (ICA). It consists to separate multivariate signal into subcomponents, sup- posing the mutual statistical independence of the non-Gaussian source signals. This method of identifying microplastic particles using multivariate methods is very powerful, as it takes into account the whole spectrum. This method helps to identify particles type by identifying copoly- mers and plasticizers, and to distinguish plastic particles and fibers from non-plastics. Those approaches will be presented on both Raman scattering and FTIR techniques, and perspectives on fast microplastic identification will be discussed.

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Keywords: Microplastics, Spectroscopic Identification, Multivariate analysis

Deep Learning vs Classical Computer Vision Techniques for Microplastics Classification

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Two key elements in the monitoring of the amount of microplastics in the oceans is the standarization of sampling protocols, and the development of automatic tools to reduce the time consuming task of counting and classifying the particles. The use of Artificial Intelligence techniques, more specifically the use of Computer Vision, could speed up the processing the microplastics samples, both from the sea and the beaches.

In this work, a comparison between two approaches for classifying microplastic particles is presented (Fig. 1). Five types of particles commonly found in the Canary Island beaches are considered. Three corresponds to plastics: pellet, lines and fragment; and two to non plastics particles: oil and organic debris. The first approach is the Computer Vision classical pipeline which is made up of three main stages: image preprocessing, feature extraction and finally the classification stage. The classifier is trained using as input the features extracted in the second stage. On the other hand, Deep Learning is considered as the second approach. In this case, an end-to-end classifier is obtained because the three stages of the classical approach are subsumed into the training stage. Thus, only a set of labeled images is used and the method learns the features to extract and also how to combine them.

For the classical approach a set of features based on color, geometry and texture of the particles is fed to a classifier Random Forest, K Nearest Neighbor and Support Vector Machines has been considered. For the Deep Learning approach, a Convolutional Neural Network has been trained because this architecture has shown good results in other classification tasks. The best result is obtained with the Deep Learning approach with 97.4

Keywords: Deep Learning, Computer Vision, Microplastic Classification

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Microplastics identification and quantification with Py-GCMS – an improved method for reliable weight related data

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Microplastics are one of the emerging contaminants in the marine environment. Numerous studies have been published on their spatial distribution in the marine environment in the last years. Most of these studies used optical and (vibrational) spectroscopic techniques, such as FT-IR and led to particle abundance related data. However, for modelling mass balances of MP and thus the distribution and fate of MP in the different marine compartments, reliable weight related data is essential. Thermoanalytical techniques coupled to gas-chromatography mass-spectrometry have the poten- tial to create these weight related data. A recent Curie-Point (CP) pyrolysis gas-chromatography mass-spectrometry (Py-GCMS) method (Fischer and Scholz-Böttcher, 2017) demonstrated the identification and quantification of 8 environmentally relevant polymers in environmental sam- ples after sufficient sample clean-up. Weight related data was obtained using external calibration curves and successfully demonstrated with recovery experiments of spiked fish samples. Although the used CP-Py-GCMS is promising regarding the quantification of MP in