

Identification of Animal Fibers in SEM-images via Machine Learning

Motivation

Animal fibers are an important material for fabric production, possessing desirable characteristics such as thermal insulation, moisture wicking, lustre and softness. Specialty fibers such as cashmere excel at one or more of the above properties, and achieve premium prices on the market. This makes them an attractive target for adulteration, and adulteration rates between 15-60 % have been reported for cashmere products. To counteract adulteration, animal fiber identification is performed. Currently, identification is realized manually using SEM-images. Manual fiber identification is subjective in nature and requires extensively trained experts to achieve reliable results, calling for its automation by means of Machine Learning.

Goal

Your goal is to establish a workflow for the automated identification of animal fibers in SEM-images via Machine Learning. To this end, you will identify, implement and benchmark pipelines proposed in literature on an exhaustive in-house dataset. Apart from the classification accuracy under the closed set, you will also investigate algorithmic performance under the Open Set (i.e. when training & test set do not follow the same data distribution). Here, you will adapt proposed OOD-measures such as Max-Logit, Maximum-Softmax-Probability or the Energy Score to the task at hand. Based on these initial assessments, you will devise and implement algorithmic improvements, e.g. by means of feature engineering.

Who you are

- You love tackling challenges
- You are interested in digital image processing
- You are experienced with the python programming language
- Ideally, you possess prior knowledge/experience in the field of ML and relevant python frameworks (Sklearn, Skimage, OpenCV)

What we offer

- An interesting & challenging topic in Machine Learning
- The opportunity to shape your own thesis topic
- Supervision by experts in the field
- Top-notch equipment coupled with a pleasant working atmosphere

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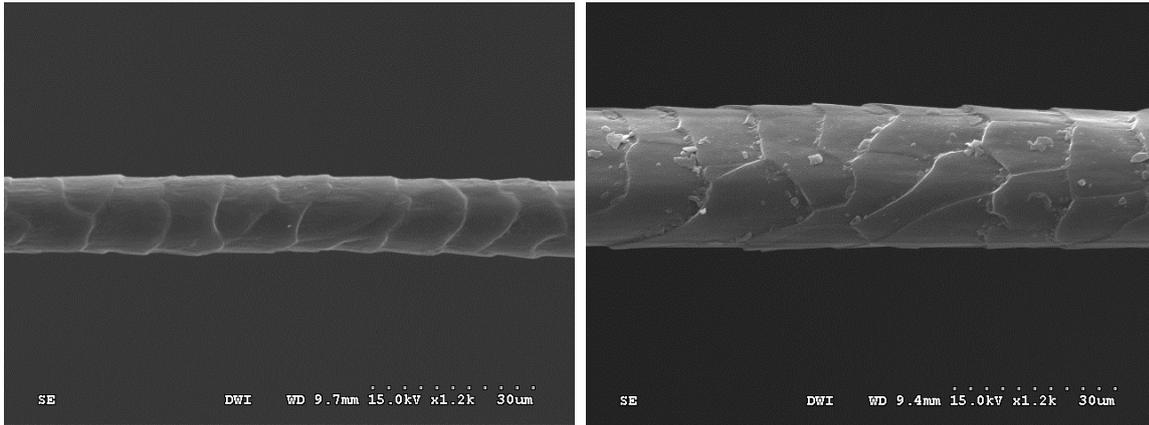


Figure 1: Reference images of cashmere (left) and wool (right) fibers