PARAMETER-FREE CLUSTERING: APPLICATION TO FAWNS DETECTION

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1. INTRODUCTION

About 500000 wild animals are killed by mowing machines every year in Germany. In particular, during the first cutting of grass in May or June, many young fawns are killed in their first days of life. Within the research project "Game Guard" [1], a sensor system is being developed for agricultural mowing machines to detect fawns hidden in meadows under mowing: when an alarm is raised appropriate rescue procedures will save the fawns from being injured or killed by the mower [2]. Beside a microwave radar system, infrared detectors are scanning the meadows. If they detect a deviation in temperature, two types of cameras (thermal infrared and visible) are taking a picture at the current location. This paper focuses on the parameter-free algorithm that will be adopted to detect within both the infrared and optical images the locations containing a fawn hiding in the grass.

2. PROPOSED METHODOLOGY

This paper proposes a parameter-free, model independent methodology based on data compression as a valid alternative to classic image analysis methodologies, which are heavily dependant on the assumed data models. These methods are totally model-free and data-driven, and may be successfully employed for image classification and indexing regardless of sensor characteristics: this allows exploiting with the same approach the information contained in both the optical and infrared images for each location considered.
In the first step images are collected by cameras positioned on an extension of the mowing machine which looks perpendicularly down on the meadow from a distance ranging from 1 to 1.5 meters: two sample infrared pictures are reported in Fig.1, more are available at [3].

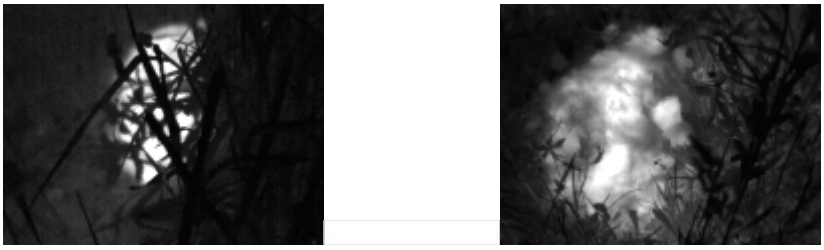

Fig. 1. Sample infrared images containing a fawn hiding in the grass (left) and no fawn (right).

The algorithm has then circa 60 seconds to process the data and raise an alarm if a fawn is hiding in the grass. This is done via a methodology based on the similarity metric described in [4] and more intensively applied to classification and detection of different objects in Earth Observation images in [5].
The result is a good separation of the patches containing fawns, even when these are almost totally covered by vegetation: this confirms that data compression, which haves its major advantage in its universal applicability, can be a powerful and reliable instrument to discover similarities within the data.

3. REFERENCES

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