Towards Automated Biometric Identification of Sea Turtles (Chelonia mydas)

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Abstract. Passive biometric identification enables wildlife monitoring with minimal disturbance. Using a motion-activated camera placed at an elevated position and facing downwards, images of sea turtle carapaces were collected, each belonging to one of sixteen Chelonia mydas juveniles. Then, co-variant and robust image descriptors from these images were learned, enabling indexing and retrieval. In this paper, several classification results of sea turtle carapaces using the learned image descriptors are presented. It was found that a template-based descriptor, i.e. Histogram of Oriented Gradients (HOG) performed much better during classification than keypoint-based descriptors. For our dataset, a high-dimensional descriptor is a must because of the minimal gradient and color information in the carapace images. Using HOG, we obtained an average classification accuracy of 65%.

Keywords: *content-based image retrieval; invariant feature descriptor; multimedia databases; template matching; visual animal biometrics.*

1 Introduction

Biometric identification of sea turtles within a population is essential for behavioral and ecological study, allowing researchers to estimate vital statistics such as growth rate, survivorship, foraging patterns and population size. Traditional methods of permanent marking and artificial tagging induce stress and possibly harm to the animals. Furthermore, tag loss is common because of various factors, namely elapsed time after tagging, study area, target species, size of animal, piercing site and tag properties (e.g. material, color and design) [1-5]. Individual sea turtles can also be recognized via photographic identification of their natural marks, for example, based on coloration patterns around the head area [6], facial profiles [7] and facial scute patterns [8]. Still, the mark-recapture process puts a considerable amount of stress on the animal.

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