

Automatic morphology: Application on biological images

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ABSTRACT

Morphology is an important characteristic of biological analysis. Knowing the morphology of an object does not only help us generate information about the object or re-construct the object but we also classify the objects. Indicating the morphology in a biological image is a large field and having many methods from manual methods to semi-automatic or automatically. In the content of this article, we proposed a method to automatically determine the characteristics to define the morphology in biological images, specifically on beetles. Through segmentation and registration, our method is used to determine the landmarks on the images. The experiment is done with two datasets. The result is evaluated by the coordinates of automatic landmarks and the centroid size of all estimated landmarks.

Keywords

Automatic morphology, landmarks identification, image registration.

1 INTRODUCTION

In biology, morphology analysis is widely used to keep the changing information of the organism or detecting the difference information between the organisms. From the result of morphology analysis, we can conclude the evolution of an organism family, or we may classify the organisms. Especially in agriculture, morphology is one of the best ways to learn about the variations of the insect on crops. The morphology methods may be divided into the groups by the features which are used by the methods such as shape, structure, color, pattern or size of the object. In the aim to study the potential links between these variations and agricultural ecosystems, a set of 291 beetles has been collected with all the information about the sex, place where they are found and agricultural practices in each field were recorded. For each beetle, the morphometric landmarks have been defined on each part (each insect includes five parts) of the insect by the biologists. Morphometric landmarks are points that can be defined in all specimens and located precisely. Landmarks are widely used in many biological studies and they are currently included into the classification procedures.

In this paper, we focus on a method that can automatically identify landmarks on 2D images of beetles. The

method mainly includes three stages: firstly, we extract the feature of the object in the image; secondly, the automatic landmarks are identified by image registration; finally, a refinement of the estimated landmarks is done by cross-correlation.

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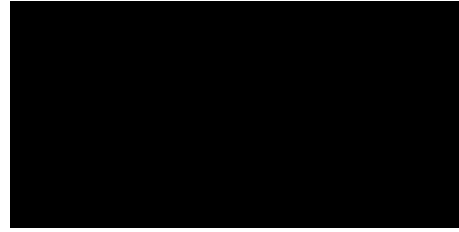


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6 ACKNOWLEDGMENTS

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7 REFERENCES

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