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Image-based object recognition in man, monkey and machine

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Abstract

Theories of visual object recognition must solve the problem of recognizing 3D objects given that perceivers only receive 2D patterns of light on their retinae. Recent findings from human psychophysics, neurophysiology and machine vision provide converging evidence for 'image-based' models in which objects are represented as collections of viewpoint-specific local features. This approach is contrasted with 'structural-description' models in which objects are represented as configurations of 3D volumes or parts. We then review recent behavioral results that address the biological plausibility of both approaches, as well as some of their computational advantages and limitations. We conclude that, although the image-based approach holds great promise, it has potential pitfalls that may be best overcome by including structural information. Thus, the most viable model of object recognition may be one that incorporates the most appealing aspects of both image-based and structural-description theories.



Keywords

Object recognition; Image-based model; Structural description

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