A conceptual framework of computations in mid-level vision

Jonas Kubilius[1,2], Johan Wagemans[2], & Hans P. Op de Beeck[1]
[1]Laboratory of Biological Psychology, KU Leuven, Belgium
[2]Laboratory of Experimental Psychology, KU Leuven, Belgium

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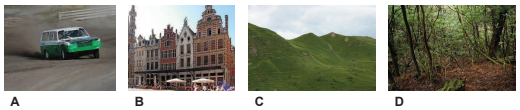
Intermediate representations

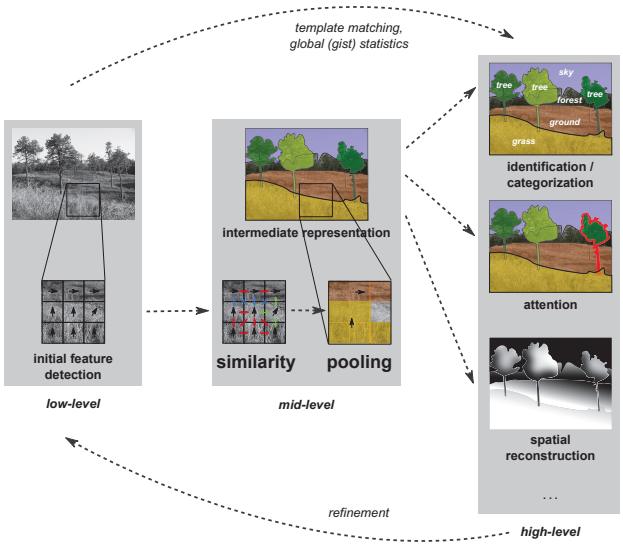
Segmented, interpolated behind occlusions, and ordered in depth

Pre-semantic

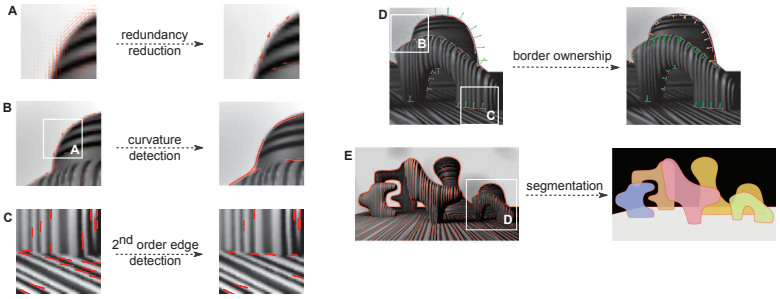


Suited for multiple tasks: information about objects, spatial layouts, and textures

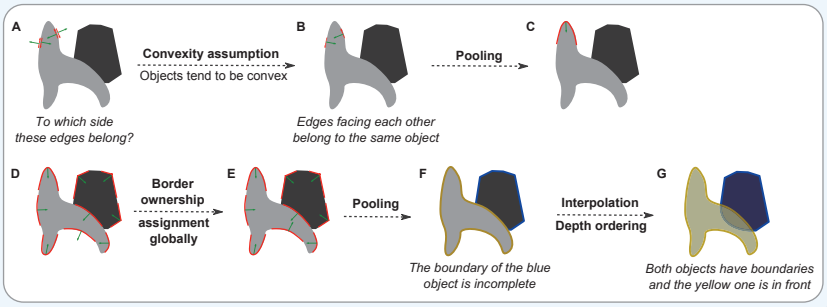
Architecture



Intermediate computations

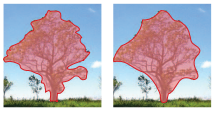


Border ownership



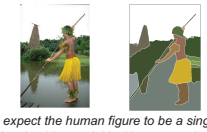
Problems with evaluating performance

(A) Lack of ground truth



Which one is the correct segmentation?

(B) Misleading influence of semantic knowledge



We expect the human figure to be a single item but why should a model lacking semantics know it?

(C) What counts as correct?

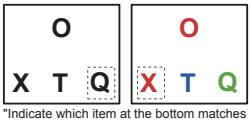
Commonly, both are accepted as correct but human observers would never report the one on the left.

(D) Black box models

The dog might be detected due to the background but we will never know.

(E) Contextual influence

Different outcomes depending on subtle differences in stimuli

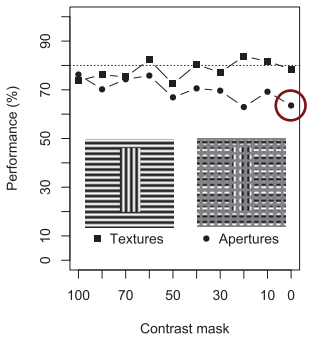


"Indicate which item at the bottom matches the one at the top best."

Use artificial semantically-uninformative 3D scene models for a better evaluation

Some experimental evidence

Can rats disriminate between vertically and horizontally oriented bars defined by second-order features?



Robust discrimination even with little or no local cues.

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jonas.kubilius@ppw.kuleuven.be | klab.lt | @qbilius