Morphological Transformations

Course: Computer Vision

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Outline

Intro

Simple operations based on the image shape.

- Commonly applied on binary images (might also exist for gray-scale).
- Two basic transformations: erosion and dilation.
- Other transformations result from their combinations.

Erosion

Erodes away the outermost part of an object (thinning of the border).

OpenCV

Output pixel equals 1 *iff* all pixels inside the kernel are 1, or eroded otherwise.

scikit-image

Output pixel equals the minimum over all pixels in the neighborhood.

Dilation

Opposite than erosion. Thickens a border.

OpenCV

Output pixel equals 1 if at least one pixels inside the kernel is 1.

scikit-image

Output pixel equals the maximum over all pixels in the neighborhood.

Opening

Erosion followed by dilation.

Removes small spots.

Closing

Dilation followed by erosion.

Connects small cracks.

Morphological Gradient

Difference between dilation and erosion of an image.

White top-hat

Image minus its morphological opening.

Highlights bright spots on the image that are smaller than the kernel.

Black top-hat

Morphological closing minus the original image.

Highlights dark spots on the image that are smaller than the kernel.

Skeletonize

Reduces each connected component in a binary image to a single-pixel wide skeleton.

Only binary images.

Convex hull

Highlights the set of pixels included in the smallest convex polygon that surrounds all white pixels in the input image.

Only binary images.

Recap

- Definition of morphological operations.
- Erosion and dilation.
- Opening and closing.
- Morphological gradient.
- White top-hat and black top-hat.
- Skeletonize.
- Convex hull.

Q&A

Thank you!

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