IPAC Questions

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April 6th, 2020

Question 1.1: Define the idempotence property that is satisfied by certain image operators.

An image operator is idempotent if it can always be applied consecutively multiple times without changing the result on the image. An operator Ψ is idempotent if and only if:

$$\Psi(I) = \Psi\Psi(I)$$

Question 1.2:

1. Indicate whether dilations (δ_B) and erosions (ε_B) are idempotent.

   [Answer yes or no]

   No.

2. Indicate whether openings (γ_B) and closings (φ_B) are idempotent.

   [Answer yes or no]

   No.

3. Indicate whether alterned filters ($\varphi_B\gamma_B$ and $\gamma_B\varphi_B$) are idempotent.

   [Answer yes or no]

   Yes.

Question 1.3: Enumerate one segmentation algorithm based in neighbourhood processing.

For example, the Grassfire algorithm implemented in class is a segmentation algorithm based in neighbourhood processing.

Question 1.4: Which kind of algorithms / techniques are commonly used for semantic image segmentation?

Deep learning, more specifically Convolutional Neural Networks are used in semantic image segmentation for object recognition, segmentation and classification. Some existing networks capables of extracting and classifying objects from images are Mask-RNN, Faster-RCNN, YOLO v2, YOLO v3 and LC.

Techniques in this topic vary from using Fully convolutional networks, using Up-sampling or using a pyramid method to using dilated convolutions.