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Theoretical test

To make an efficient classification in computer vision, the algorithms must be trained on a huge amount of annotated data. However, in several fields such as biomedical, environment and others, the data is often not annotated and the annotation is expensive. To work around this problem we can use image annotation methods. One of these techniques consists in using only active-learning which is however not totally automatic, since it is based on pretrained images. Another method described in [1] consists of combining FCN (fully convolutional network) networks [1, 2] and active-learning so that the annotation is automatic (without the interaction with a human expert).

Indeed, during the execution of the second technique, active learning uses information (the uncertainty of the images and the similarity between the images) provided by the FCN networks to iteratively suggest the images to be annotated. One limit of this method is linked to the fact that active learning is an iterative technique which is therefore NP-hard.

Concerning active learning (in deep learning), it is a set of methods based on neural networks to select the fewest most informative examples possible in order to build the training set of models in an iterative way.

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[1] Yang, L., Zhang, Y., Chen, J., Zhang, S., & Chen, D. Z. (2017, September). Suggestive annotation : A deep active learning framework for biomedical image segmentation. In *International conference on medical image computing and computer-assisted intervention* (pp. 399-407). Springer, Cham.

[2] Long, J., Shelhamer, E., Darrell, T. : Fully convolutional networks for semantic segmentation. In : CVPR. pp. 3431–3440 (2015