Computer Vision

CRF-based identification of ROIs on histopathological images

Supervisor

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Keywords

Conditional Random Fields; Markov Random Fields; Optimization; Image Segmentation; Prior-Knowledge Modeling; Histopathology

Scope of work

Computer vision in histopathology (the microscopic study of tissues) is plagued by the very high variability of the image patterns inducing robustness issues. Previous experiences confirm that the use of robust algorithms together with inputs from the doctor is a sound approach.

Markov random fields (MRFs) are an undirected-graph variation of the better-known Bayesian networks. Unlike the latter, MRFs have been remarked for their good results w.r.t. low-level signal processing tasks such as image segmentation by modeling the local topology of the data.

Conditional random fields (CRFs) can be viewed as an evolution of MRFs incorporating additional non-local property into the model. Thus, CRFs allow the incorporation of higher-level prior-knowledge into the problem corresponding to semi-global or global properties. On the other hand, CRFs introduce several new challenges compared with MRFs such as the loss of the local Markov property potentially inducing convergence issues.

This internship involves the application of CRFs to the identification of regions of interest (ROIs) on histopathological images using the morphological features of the images modeled through local properties and prior-knowledge from the doctors (global properties).

Required profile

- Engineer degree or master degree student (final year)
- Strong background in mathematics, machine learning and signal processing
- Experience with technical computing languages (MatLab/Python)

Duration 6 months

Gratification Approx. 800 € / 1,400 SGD per month

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