Master Project

at the Pattern Recognition Lab

Cell Detection in Bright-Field Microscope Images

Motivation: Cells in bright field microscope images show high diversity in contrast, visual appearance, and size. Other challenges include the transparency of the ultra-thin cells and the illumination artifacts. We have developed a novel cell detection algorithm which adapts to such difficult circumstances. The algorithm learns the cell centers and is immune to the illumination changes and the change in the size and the orientation of the cells. In addition, it is fully automatic and does not need manual tuning of its parameters.

Despite these advantages, it still needs your motivation and computer science skills!

Your task is to provide an efficient object-oriented C++ implementation of the algorithm. The code should be integrated into a basic C++/CLI image processing library that uses OpenCV and IntelIPP. The integration will be in close collaboration with the company ASTRUM IT GmbH. Your work will include unit tests in C# for your written modules to ensure high code quality. This master project will give you the great opportunity to incorporate your programming skills and machine learning knowledge in a real-life application. The work will be in the context of the interdisciplinary research project COSIR: Combinations of Chemical-Optical Sensors and Image Recognition. Your participation in this project will help the biologists to proceed more efficiently in their research and at the same time will deepen your engineering faculties.

Good knowledge in at least some of these topics is required:

- C++ (the most important skill)
- MATLAB (language of the current implementation - 2nd most important skill)
- C++/CLI (language of the library)
- C# (language of the unit tests)
- OpenCV

Start date: April, 18th *or later*

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