

DEVELOPMENT OF SOFTWARE FOR COMPUTER-AIDED COLOCALIZATION OF 3D-MICROIMAGES OF INTRACELLULAR STRUCTURES

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Current work is dedicated to the development of computer software for semiautomatic co-localization of objects on the three-dimensional images obtained with laser scanning microscopy (Computer-Aided Co-localization System). The main aim of this software is colocalization of polymeric nano-complexes with various cellular compartments using the fluorescent signals of corresponding dyes.

The main goal of this work was the design of a computer program for accelerated processing of large arrays of three-dimensional images, excluding as much as possible the subjective estimation of the researcher. Moreover the system had to be developed as fast as possible, had to be readily open for on-line modifications and improvements. Also a backward compatibility with previous “manual” co-localization results had to be maintained.

The software was built in Matlab® (by Mathworks®), which greatly aided fast prototyping and development 1) in part owing to the Matlab® programming language, tailored for working with large multidimensional data arrays and 2) because of a great amount of image processing procedures integrated in the package and downloadable separately.

The image processing problems solved within this research are: 1) filtration of the signal from non-specific staining; 2) filtration of the dyes` cross-talk effect; 3) reconstruction of the cells` boundaries based on incomplete information (incorrect or absence of the membrane dyeing).

The usage of the developed software substantially accelerated the analysis of experimental data, which gave an opportunity for carrying out more experiments and accumulating more statistical data needed for the research.

References

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