COMPUTATIONAL IMAGE ANALYSIS IN BIOMEDICINE:
METHODS AND APPLICATIONS

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SUMMARY

The computational analysis of images, which has become a paramount research topic, is very
challenging as it usually comprises complex tasks like as of segmentation, i.e. the detection, of imaged
structures, matching and registration, i.e. alignment, of structures, tracking of structures in images,
deformation estimation between structures and 3D reconstruction from images. For example, to
analyze the behavior of organs from medical image sequences, first the input images should be
segmented, then suitable features of the organs under analysis should be extracted and tracked along
the sequences and finally, the tracked behavior should be analyzed.

Despite the inherent difficulties, computational methods of image analysis have been more and more
used in a wide range of important applications of our society, exceptionally in Biomedicine.

In this talk, computational methods of image analysis that we have developed in order to analyze
structures in biomedical images will be introduced; particularly, those developed for image
segmentation, matching, registration, tracking and 3D shape reconstruction. Furthermore, their use in
several biomedical applications will be presented and discussed.

Keywords: Computer Vision, 3D Vision, Segmentation, Registration, Tracking, Matching,
Deformable Models, Stochastic Filters, Volumetric Methods

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