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Models and Algorithms in Medical Imaging

Wednesday, 19 September 2018 09:00 (1 hour)

Medical Imaging techniques rely on different physical principles to obtain signals from the human body. Medical images are more than
pictures, they are data, and they can be explored through image analysis techniques to go well beyond the mere visual inspection by
radiologists. Image processing and data mining techniques are used to extract useful information from medical images to assist
clinicians in the diagnosis and follow up of diseases, and for the planning, guidance and monitoring of treatments. Significant progress
has been made in the last few decades by applying data mining techniques to the problems of image segmentation, image registration,
feature extraction and interpretation, relying on the typical instruments of the artificial intelligence, e.g. data driven models built with
machine learning techniques. The latter are rapidly leaving space to deep learning applications, thanks to the recent availability of
suitable computing power.
An overview on the data mining approaches used in Medical Imaging will be provided, with realistic examples in the field of
neuroimaging with magnetic resonance. The problems of data harmonisation and confounding parameters in multicenter studies will
be highlighted, with particular reference to the ARIANNA project, which has built an interdisciplinary research platform for
neuroimaging-based studies of Autism Spectrum Disorders.

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