

International Workshop on Signal Processing (IWSP 2018)

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Kish Island

Neonatal Head Modeling using MR and CT images

by Prof. Hamid Abrishami Moghaddam

Abstract:

Construction of a realistic neonatal head model including bone, fontanels and soft tissues using medical imagery is an important issue in many applications. For example, solving inverse problems for source localization in electroencephalography (EEG) and magnetoencephalography (MEG) requires 3D geometry of principal structures of the head. Moreover, most of the longitudinal morphological and functional studies of neonatal cerebral development need standard head models for inter-individual comparison and structural development analysis. Principally, cranial hard tissues are visible in CT scans, while cerebral soft tissues are mostly visible in MR images. Therefore, a multimodal approach is indispensable for creating a complete neonatal head model including hard and soft tissues.

In this presentation, different steps required for creating a neonatal bimodal MR-CT head template including skull segmentation, inter-modality inter-subject registration and group-wise template creation are introduced. Furthermore, an application of the created bimodal template for segmenting neonatal skull from MR images will be introduced. We will also show how the created templates in different neonatal age ranges may be useful for longitudinal studies of neonatal head development.

About the speaker:

Dr. Hamid Abrishami Moghaddam was born in Iran, in 1964. He received the B.S. degree in electrical engineering from the Amirkabir University of Technology, Tehran, Iran, in 1988, the M.S. degree in biomedical engineering from the Sharif University of Technology, Tehran, in 1991, and the Ph.D. degree in biomedical engineering from the Université de Technologie de Compiègne, Compiègne, France, in 1998. In 1998, he joined the faculty of electrical engineering at K.N. Toosi University of Technology (KNTU) as assistant professor of biomedical engineering. Since 2002, he has been directing Machine Vision and Medical Image Processing Lab. (MVMIP) at KNTU in which he realized several national and international research projects in the field of imaging and image processing.

Since 2004, he has been collaborating with the GRAMFC laboratory, Université de Picardie Jules Verne, Amiens, France, as an invited researcher on medical image processing. He is currently a professor of biomedical engineering at KNTU. His research interests include pattern recognition, image processing, and machine vision, of which he has published more than 150 articles in peer reviewed scientific journals and conferences. Dr. Abrishami Moghaddam chaired the Machine Vision and Image Processing (MVIP2003) conference in Iran, in 2003. He is one of the founders of the Iranian Society of Machine Vision and Image Processing and the Iranian Society of Nondestructive Testing. He is a member of the editorial board of the Iranian Journal of Biomedical Engineering and Iranian Journal of Machine Vision and Image Processing.

Location

Workshop venue: Iran Telecommunication Research Center (ITRC), North Kargar st., Tehran, Iran.

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