It is our pleasure to organize a special issue on ONCO-MEDIA (ONtology and COntext related MEdical image Distributed Intelligent Access) project. This special issue is the summary of the presentations in the international symposium of the 26th annual meeting of Japanese Society for Medical Imaging Technology (JAMIT) at Tsukuba International Convention Center on July 20th.

Nowadays, many modalities and types of medical images which represent not only morphological changes but also functional and physiological information are employed for clinical diagnosis as well as for research purposes. The size of medical image databases has grown up to GB scale and their processing, analysis, indexing, fusion, retrieval as well as statistical analysis demand heavy computation. In this sense, high resolution whole body MRI scan, fusion analysis of functional neuroimaging and diffusion tractography represent illustrative examples of traditional computation limitation. In order to maximize the exploitation of those various imaging modalities for clinical diagnosis, high performance information system are needed to extract and index the image features and associate them with the reference behavioral, physiological, biochemical and pathological information.

Content-based visual information retrieval (CBVIR) or Content-Based Image Retrieval (CBIR) has been one on the most vivid research areas in the field of computer vision and many CBIR programs and tools have been developed to formulate and execute queries based on the medical image visual content and to help browsing. However, answers to many questions with respect to semantic descriptors, semantic gap, medical image and report fusion indexing or context-sensitive navigation and query are still unanswered. In this context, the aim of ONCO-MEDIA project is to deploy a medical image semantic content-based application on a large scale grid testbed, by taking into account the context of the user and of the navigation and query and by matching semantic visual concepts extracted from the medical image with those (textual) extracted from the associated medical reports. In this special issue, current approaches toward the goal of the ONCO-MEDIA project are organized.

Dr. Patrick Brezillon et al. describe how to identify and model a correct context for each case of CBIR.

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processing. Their approach consists of two steps, the user’s query management and medical image domain knowledge-related semantic indexing. Dr. Johan Montagnant is exploring the application of grid computing to CBIR by optimizing the load distribution over the very large scale EGEE GRID infrastructure, and applied Gabor filters to efficiently extract the texture features to achieve effective indexing of large medical databases.

These new approaches are supported by Global Resource Information Database (GRID) computing technologies. Dr. Yoshio Tanaka features how their new middle-ware for GRID computing, especially high performance remote call procedure NinfG, satisfied e-Science, and supported the projects of Hybrid QM/MD simulation and Global Earth Observation. Dr. Epifanio Bagarinao et al. reports the development of a GRID based application for functional brain imaging, which consists of real-time and dynamic processing of fMRI and database for functional image retrieval. The CBIR for these new types of medical images with temporal and physiological information is an approach for higher dimensional medical images.

Mei-Ju Su et al. have been developing a CBIR application dedicated to dementia, and tested the performance of the initial version to handle the diagnosis of Alzheimer’s disease. Their experience will contribute to prompt implementation of the Grid technologies to the current information platform of the hospitals. Dr. Asmâa Hidki et al. reviews the activities of MedGIFT project in their university hospital and addresses how clinicians can participate to the development and contribute to the evolution of CBIR. The topic covers investigation of the user’s search behavior, combination of the visual features with semantics for effective image retrieval and user-centered evaluation framework.

This special issue is conjuncted with two original articles. ‘Prospective study for semantic inter-media fusion in contrast-based medical image retrieval’ by Miss R Teodorescu et al. evaluates various techniques of UMLS-based semantic fusion of medical media (medical images and associated medical reports) to overcome complexity of the medical knowledge and to achieve content-based image retrieval. Another article by Dr. Rafael Saldana will follow this special issue by indicating mathematical modeling of image analysis and its practical application which will probe the validity of ONCO-Media technologies and challenges.

We hope this special issue can be the initiative for the future direction of medical GRID, a seamless virtual machine, to merge computer assisted diagnosis and medical image filing, as well as to achieve full examination of the human function. Here, we acknowledge the support for the international symposium and this special issue by Dr. Tohoru Takeda, the General Chair of the JAMIT 26th Annual Meeting.