[SY03] Meet the New Face

SY03-01

Analysis on Brain MR Images Using Deep Learning

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With the development of machine learning and computer vision systems, there have been studies to utilize these techniques for quantifying and generalizing the information latent in medical images for disease analysis, early diagnosis, and treatment monitoring. In this talk, we will introduce several algorithms for brain image processing. Specifically, we will introduce deep learning based automatic segmentation methods for quantifying thin vessels or abnormal regions, and a sparsity-based classification method for extracting brain pattern changes affected by HIV disorder and mild cognitive impairment.

Keywords : Deep learning, Machine learning, Brain MRI, Segmentation

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SY03-02

Confessions of a Newbie Researcher: Trials and Errors Experienced in the Brain Tumor Radiomics Research

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Radiomics is a emerging field that applies advanced computational methods to automatically extract high-dimensional quantitative imaging features to provided meaningful information directed to pathologic, genomic data, or various clinical endpoints.

Trials and errors was confronted during the brain tumor radiomics research, due to non-ideal practical situations. Experiences on small datasets, imbalanced dataset, and the struggle to avoid overlapping future researches while maintaining clinical significance will be discussed.

Lastly, future concerns on radiomics research field will be discussed, including autosegmentation of brain tumor, deep learning-based radiomics model, and radiomics versus deep learning. Several ongoing researches will be briefly introduced.

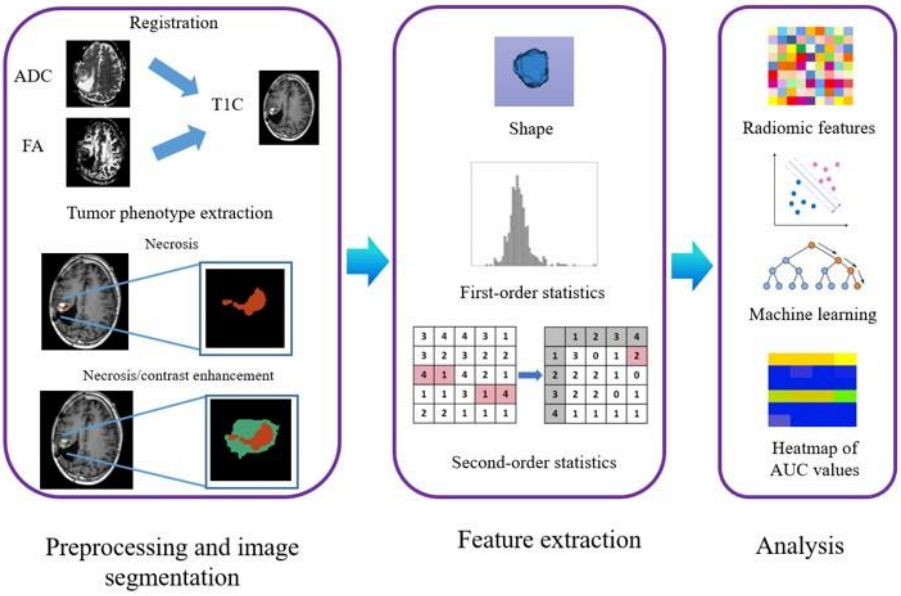

Figure 1. Radiomics pipeline.

Keywords : Brain tumor; Machine learning; Radiomics

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SY03-03

Clinical Applications and Future Perspectives of Ultrashort TE Imaging

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Tissues and tissue components with ultrashort-T2 relaxation times of less than approximately 1 ms cannot be reliably detected by conventional MRI pulse sequences due to limitations on the minimum achievable echo time (TE). Zero echo time (ZTE) and ultrashort echo time (UTE) pulse sequences for MRI offer unique advantages of being able to detect signal from rapidly decaying short-T2 tissue components (ex. components in myelin, 0.1-0.4 ms; cortical bone, 0.4 ms; tendon, 1 ms; ligaments, 1 ms; lung parenchyma, 0.5-3 ms) by using specialized acquisition and reconstruction techniques. In this session, I would like to talk about characteristics of UTE and ZTE pulse sequences and several previous studies to evaluate the clinical applications of those sequences in the musculoskeletal, chest, brain or head & neck imaging. Also, I want to introduce our recent study to assess the usefulness of non-contrast enhanced MRA by using a point encoding time reduction with radial acquisition (PETRA), the representative UTE pulse sequence, for follow-up after stent-assisted coil embolization of an intracranial aneurysm.

Keywords : Zero echo time, Ultrashort echo time, PETRA

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SY03-04

Transient measurements of brain damages in an ischemic infarction animal model in a rat by photo-thrombosis

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The cerebrovascular accident (CVA) is the critical issue in the brain disease. For analysis/diagnosis of CVA and the development of the therapeutic technology, we established the ischemic infarction model in rat by the photochemically induced thrombosis. The photothrombotic ischemia model was established and the result was verified by the non-invasive imaging and histological study.

Keywords : Cerebrovascular accident(CVA), Photothrombosis