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J-BHI Special Issue on "Emerging Challenges for Deep Learning"

Due to the proliferation of biomedical imaging modalities such as Photoacoustic Tomography, Computed Tomography (CT), Optical Microscopy and Tomography, Single Photon Emission Computed Tomography (SPECT), Magnetic Resonance (MR) Imaging, Ultrasound, and Positron Emission Tomography (PET), Magnetic Particle Imaging, EE/MEG, Electron Tomography and Atomic Force Microscopy, massive amounts of biomedical and health informatics data are being generated on a daily basis. How can we utilize such big data to build better health profiles and better predictive models so that we can better diagnose and treat diseases and provide a better life for humans? In the past years, many successful learning methods such as deep learning were proposed to answer this crucial question, which has social, economic, as well as legal implications.

A number of significant problems plague the processing of big biomedical and health informatics data, such as data heterogeneity, data incompleteness, data imbalance, and high dimensionality. What is worse is that many data sets exhibit multiple such problems. A majority of existing learning methods can only deal with homogeneous, complete, class-balanced, and moderate-dimensional data. Therefore, data preprocessing techniques including data representation learning, dimensionality reduction, and missing value imputation should be developed to enhance the applicability of deep learning methods in real-world applications of biomedicine and health informatics.

This special issue aims to provide a diverse, but complementary set of contributions to demonstrate new developments and applications that covers existing above issues in data processing of big biomedical and health informatics data. We would also like to accept successful applications of the new methods, including but not limited to data processing, analysis and knowledge discovery of biomedical and health informatics data.

- Feature extraction by deep learning or sparse codes for biomedical and health informatics
- Data representation of biomedical and health informatics
- Dimensionality reduction techniques (subspace learning, feature selection,
- sparse screening, feature screening, feature merging, etc.) for biomedical and health informatics
- Information retrieval for biomedical and health informatics
- Kernel-based learning for multi-source biomedical and health informatics
- Incremental learning or online learning for biomedical and health informatics
- Data fusion for multi-source biomedical and health informatics
- Missing data imputation for multi-source biomedical and health informatics
- Data management and mining in biomedical and health informatics
- Web search and meta-search for biomedical and health informatics
- Biomedical and health informatics quality assessment
- Transfer learning of biomedical and health informatics

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Key Dates

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