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Editorial

Special Issue on "Machine Learning/Deep Learning in Medical Image Processing"

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Many recent studies on medical image processing have involved the use of machine learning (ML) and deep learning (DL) [1,2]. In ML, features are frequently extracted from medical images to aid in the interpretation of useful information. However, this process might hinder the images from being fully utilized. In contrast to ML, DL does not require such feature extractions. In fact, DL outperforms a combination of ML and feature extraction in computer vision [3]. Therefore, DL has been used more frequently in recent medical image studies.

This special issue, "Machine Learning/Deep Learning in Medical Image Processing", has been launched to provide an opportunity for researchers in the area of medical image processing to highlight recent developments made in their fields with ML/DL. Seven excellent papers that cover a wide variety of medical/clinical aspects are selected in this special issue [4–10]. Of these, four papers were related to radiology (computed tomography (CT) and nuclear medicine) and two were related to pathology (prostate carcinoma and oral squamous cell carcinoma). These seven papers have been summarized as follows:

- Nishio et al. proposed and evaluated a method for automatic pancreas segmentation from CT images [4]. Their method consists of a deep U-net and combinations of data augmentation, and is demonstrated to be superior to the baseline U-net and conventional data augmentation.
- Urase et al. proposed combining sparse-sampling CT with DL-based reconstruction to detect the metastases of malignant ovarian tumors [5]. Results demonstrate their method to be more useful in detecting metastases than the conventional residual encoder-decoder convolutional neural network (RED-CNN) method.
- Bhattacharjee et al. introduced two lightweight CNN architectures and an ensemble ML method for binary classification between the two grade groups of prostate tissue (benign vs. malignant) [6]. The classifications achieved by their models were promisingly accurate.
- Martino et al. investigated the tumor segmentation of pathology images [7]. Their important contribution was the construction of the Oral Cancer Annotated (ORCA) dataset [11], which contains ground-true data derived from the well-known Cancer Genome Atlas (TCGA) dataset [12].
- Saratxaga et al. proposed a DL model for the automatic classification (benign vs. malignant) of optical coherence tomography images obtained from colonic samples [8].
- Park et al. proposed a regression neural network-based DL model [9] to measure airway volume and investigated the accuracy of those measurements. Results showed a good correlation between the manual and model-based measurements.
- Papandrianos et al. proposed a DL model for the binary classification (normal vs. coronary artery disease) [10]. Single-photon-emission CT images of myocardial perfusions were the required inputs for this model and results demonstrate the efficacy of their DL model over existing models in nuclear medicine.

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These seven papers are expected to tremendously benefit readers in various aspects of medical image processing. I believe that this special issue contains a series of excellent research works on medical image processing with ML and DL.

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