Editorial

Special Issue on Intelligent Processing on Image and Optical Information III

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1. Introduction

Intelligent image and optical information processing have paved the way for the recent epoch of the new intelligence and information era. Certainly, information acquired through the use of various imaging techniques is of tremendous value; thus, an intelligent analysis of them is necessary to make the best use of it.

The objectives of intelligent processing range from the refinement of raw data to the symbolic representation and visualization of the real world. The image and optical information are acquired through various sources and imaging methods [1]. Thus, extracting and manipulating the descriptive features are essential for such a task [2]. It comes through unsupervised or supervised learning based on statistical and mathematical models or computational algorithms [3,4]. With recent advances in computing power and learning algorithms, many applications have become more practical and further development is expected [5].

This Special Issue focuses on the intelligent processing of images and optical information. Various aspects of intelligent processing are investigated for object recognition, image fusion, and optical positioning. Supervised learning based on convolutional neural networks (CNNs) is becoming a popular approach that has revolutionized image classification. CNNs have proven suitable for analyzing visual information due to their ability to learn essential features directly from pixel-level data. Image fusion effectively combines multiple images into a single composite image to upgrade the quality of the pixel. Optical positioning or visible light positioning is a powerful tool that utilizes visible light signals for the precise positioning of an object or device in indoor environments.

Four research papers and one review paper were verified through a thorough review process. Many valuable and recent technologies are provided to solve the real problems in the selected papers. The third volume of the Special Issue on the topic is closed. It is anticipated that the scope of intelligent processing will be even broader in the future.

2. Intelligent Processing on Image and Optical Information Vol. III

This Special Issue was introduced to collect the latest research on relevant topics and, more importantly, to address the current practical and theoretical challenges. In the following, the papers are categorized into several subtopics: CNN-based object recognition, image fusion, and visible light positioning.

2.1. CNN Based Object Recognition

Supervised training requires labeled data consisting of objects of interest and corresponding annotations. Manual annotation of large data sets is a labor-extensive task; weakly supervised learning can alleviate the burden of manual annotation. 'Weakly Supervised Learning for Object Localization Based on an Attention Mechanism' by Nojin Park and Hanseok Ko [6] proposes a method for performing object localization tasks without bounding box annotation in the training process by employing a two-path activation-map-based classifier.

Bengali has a complex curvature of characters and a similar writing style. 'BenSignNet: Bengali Sign Language Alphabet Recognition Using Concatenated Segmentation and Convolutional Neural Network' [7] and 'BengaliNet: A Low-Cost Novel Convolutional Neural Network for Bengali Handwritten Characters Recognition' [8] are presented for Bengali sign language and Bengali handwritten character recognition, respectively. In the former paper, Abu Saleh Musa Miah, Jungpil Shin, Md Al Mehedi Hasan, and Md Abdur Rahim addressed a novel method for recognizing Bengali sign language to achieve a generalization property in large datasets. A CNN-based model called BenSignNet was developed to extract the features and classify the sign language alphabets. In the latter paper, Abu Sayeed, Jungpil Shin, Md. Al Mehedi Hasan, Azmain Yakin Srizon, and Md. Mehedi Hasan proposed a low-cost novel CNN architecture for the recognition of Bengali handwritten characters. Its high accuracy will be beneficial for developing automated recognition tools for Bengali handwritten characters.

2.2. Image Fusion

Image fusion is useful for improving image quality by combining two or more images. In their review paper, 'A Survey of Multi-Focus Image Fusion Methods', Youyong Zhou, Lingjie Yu, Chao Zhi, Chuwen Huang, Shuai Wang, Mengqiu Zhu, Zhenxia Ke, Zhongyuan Gao, Yuming Zhang, and Sida Fu [9] reviewed multi-focus fusion algorithms based on transform domain, boundary segmentation, deep learning, and the combination of them. In addition, the subjective and objective evaluation standards are listed, and eight common objective evaluation indicators are described in detail.

2.3. Visible Light Positioning

Visible light positioning has significant potential to enable indoor positioning and location-based services in a variety of industries and applications. Md Habibur Rahman, Mohammad Abrar Shakil Sejan, and Wan-Young Chung [10], in their paper, 'Multilateration Approach for Wide Range Visible Light Indoor Positioning System Using Mobile CMOS Image Sensor' analyzed coordinate information from multiple light-emitting diode lights simultaneously to achieve centimeter-level accuracy for real-time indoor positioning.

Conflicts of Interest: The author declares no conflict of interest.

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