Mathematical Biosciences and Engineering

MBE, 17(5): 5147–5149.
DOI: 10.3934/mbe.2020278
Received: 24 July 2020
Accepted: 25 July 2020
Published: 31 July 2020

http://www.aimspress.com/journal/MBE

Editorial

Biomedical and health information processing and analysis

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Biomedical and health information processing and analysis is playing an increasingly important role in life sciences and medicine. Relevant technologies are developing rapidly and help to assess surgical risks, process electronic medical records (EMR) or medical images, and provide precision medicine. This special issue aims to present some research about the application of medical data mining, and bioinformatics in processing or analyzing biomedical and health information.

There are 7 full length articles in this special issue. All articles are focused on medical data mining and bioinformatics.

Wan et al. [1] proposed a ELMo-ET-CRF model to extract medical named entities from Chinese EMR. The model used a Chinese medical domain-specific pretrained ELMo model as embedding layer, an encoder from transformer (ET) as encoding layer, conditional random field (CRF) as decoding layer, respectively. The model achieved competitive performance to the current state-of-the-art method on CCKS 2019 datasets.

Che et al. [2] integrated temporal convolutional network (TCN) and CRF for biomedical named entity recognition. The model significantly reduced training time while achieved comparable performance to the state-of-the-art methods on GENIA and CoNLL-2003 datasets.

Based on a pre-trained language model, Zhang et al. [3] presented a novel encoder-decoder structure for Chinese clinical event detection. The structure integrated contextual representations and character embeddings to improve semantic understanding. The experiments demonstrated the novel structure achieved the best precision, recall and F1-score.

Cheng et al. [4] optimized the U-Net for retinal blood vessel segmentation by adding dense blocks. This optimization improved the sensitivity of small blood vessels and outperformed state-of-the-art methods on two public datasets DRIVE and CHASE_DB1.

Liu et al. [5] proposed four methods, namely SESOP, STSSO, SESOP-MFIR and STSSO-MFIR,

for the surgical outcome monitoring. The methods were optimized by standardizing variables, replacing statistics, and upgrading the control limits from asymptotic to time-varying. The experiments showed that the methods could effectively monitor surgical outcomes and early shifts.

Zhang et al. [6] proposed an anomaly detection method based on local density. By integrating with homomorphic encryption, the method could effectively and efficiently perform anomaly detection in the case of multi-party participation without leaking the private data of participants.

Hou et al. [7] developed a knowledge representation model named precision medicine ontology (PMO) to represent the relationships among 11 fields related to precision medicine, such as diseases, phenotypes, genes, mutations, drugs, etc., in 93 semantic relationships. Compared with the existing work, PMO covered mutations, genes and gene products more extensively, and had richer term set including 4.53 million terms.

In conclusion, this special issue provides 7 outstanding full-length research articles, mainly about the application of medical data mining, and bioinformatics in processing or analyzing biomedical and health information. We sincerely express our gratitude to all researchers who accepted our invitation and contributed to this special issue. In addition, we also thank MBE for editing assistance.

Acknowledgments

The work is supported by Natural Science Foundation of China (No. 61772146 and No. 61672450) and Guangzhou Science Technology and Innovation Commission (No. 201803010063).

Conflict of interest

The authors declare that they have no conflict of interest.

References

1. Q. Wan, J. Liu, L. N. Wei, B. Ji, A self-attention based neural architecture for Chinese medical named entity recognition, *Math. Biosci. Eng.,* **17** (2020), 3498–3511.
2. C. Che, C. G. Zhou, H. Y. Zhao, B. Jin, Z. Gao, Fast and effective biomedical named entity recognition using temporal convolutional network with conditional random field, *Math. Biosci. Eng.,* **17** (2020), 3553–3566.
3. Z. C. Zhang, M. Y. Zhang, T. Zhou, Y. L. Qiu, Pre-trained language model augmented adversarial training network for Chinese clinical event detection, *Math. Biosci. Eng.,* **17** (2020), 2825–2841.
4. Y. L. Cheng, M. N. Ma, L. J. Zhang, C. J. Jin, L. Ma, Y. Zhou, Retinal blood vessel segmentation based on Densely Connected U-Net, *Math. Biosci. Eng.,* **17** (2020), 3088–3108.
5. J. Q. Liu, X. Lai, J. Y. Wang, Paul B. S. Lai, X. P. Zhang, X. Y. Zhu, A fast online monitoring approach for surgical risks, *Math. Biosci. Eng.,* **17** (2020), 3130–3146.
6. C. K. Zhang, A. Yin, W. Zuo, Y. Y. Chen, Privacy preserving anomaly detection based on local density estimation, *Math. Biosci. Eng.,* **17** (2020), 3478–3497.
7. L. Hou, M. Wu, H. Y. Kang, S. Zheng, L. Shen, Q. Qian, et al, PMO: A knowledge representation model towards precision medicine, *Math. Biosci. Eng.*, **17** (2020), 4098–4114.