Review of: "EEG-based Emotion Classification using Deep Learning: Approaches, Trends and Bibliometrics"

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Potential competing interests: No potential competing interests to declare.

This paper is intended to offer an extensive review of Deep Learning methods with application to EEG signals for the identification and classification of emotions.

1. Abstract: not properly written.

2. In the introduction section, explain different emotions based on the theories of Ekman and Rubert Plutchik and elaborate on Russell's wheel.

P. Ekman, Basic Emotions. Handbook of Cognition and Emotion, 2005, pp. 45–60.

R. Plutchik, In search of the basic emotions, Contemp. Psychol.: A Journal of Reviews 29 (6) (1984) 511–513.

James Russell, A circumplex model of affect, J. Pers. Soc. Psychol. 39 (6) (1980) 1161–1178.

3. In the introduction section, explain the advantages and disadvantages of different physiological signals: Electroencephalogram (EEG), temperature, electrocardiogram (ECG), electromyogram (EMG), galvanic skin response (GSR), and respiration (RSP).

4. In the introduction section, summarize a detailed overview of the reviewed papers, including information on the journal, year of publication, citations, the AI technique employed, and modality in a table.

Jafari, M., Shoeibi, A., Khodatars, M., Bagherzadeh, S., Shalbaf, A., García, D. L., ... & Acharya, U. R. (2023). Emotion recognition in EEG signals using deep learning methods: A review. *Computers in Biology and Medicine*, 107450.

Li, X., Zhang, Y., Tiwari, P., Song, D., Hu, B., Yang, M., ... & Marttinen, P. (2022). EEG-based Emotion Recognition: A Tutorial and Review. *ACM Computing Surveys (CSUR)*.

Houssein, E. H., Hammad, A., & Ali, A. A. (2022). Human emotion recognition from EEG-based brain–computer interface using machine learning: a comprehensive review. *Neural Computing and Applications*, 1-31.

Yu, C., & Wang, M. (2022). Survey of emotion recognition methods using EEG information.*Cognitive Robotics*, *2*, 132-146.

Islam, M. R., Moni, M. A., Islam, M. M., Rashed-Al-Mahfuz, M., Islam, M. S., Hasan, M. K., ... & Lió, P. (2021). Emotion recognition from EEG signal focusing on deep learning and shallow learning techniques. *IEEE Access*, *9*, 94601-94624.

Zhang, J., Yin, Z., Chen, P., & Nichele, S. (2020). Emotion recognition using multi-modal data and machine learning techniques: A tutorial and review. *Information Fusion*, *59*, 103-126.

Shu, L., Xie, J., Yang, M., Li, Z., Li, Z., Liao, D., ... & Yang, X. (2018). A review of emotion recognition using physiological signals. *Sensors*, *18*(7), 2074.

5. Developing highly efficient emotion recognition algorithms based on AI techniques requires large datasets with a considerable number of subjects. Therefore, datasets play a crucial role in emotion recognition. Please explain several datasets available and put their information into a table.

research. There are several datasets available for this purpose.

6. EEG signals are susceptible to both external and internal artifacts, making emotion recognition a challenging task. To overcome these challenges, different pre-processing techniques have been proposed. These techniques can be broadly categorized into two groups: low-level and high-level techniques. Please discuss these low- and high-level pre-processing techniques in detail.

7. Are there controversies in this field? What are the most recent and important achievements in the field? In my opinion, answers to these questions should be emphasized. Perhaps, in some cases, the novelty of the recent achievements should be highlighted by indicating the year of publication in the text of the manuscript.

8. Please explain and clarify the challenges associated with emotion recognition using DL techniques. Emotion recognition researchers encountered several challenges in obtaining high classification performances, such as the unavailability of EEG datasets containing a large number of subjects, multimodal datasets, emotion datasets for brain disorder diagnostics, EEG data imbalance, explainable artificial intelligence (XAI), DL models, and hardware resources.

9. The discussion section is modest and needs to be rewritten. The discussion should be organized around arguments, avoiding simply describing details without providing much meaning.

10. Conclusion: The section is modest and needs to be rewritten.

11. You should add a future works section. Explain the potential for future research to explore new methods and techniques in various fields. The recommendations put forth in this section are of great significance for practical research on emotion recognition in the near future. Some of the future research on emotion recognition includes datasets, DL techniques, XAI, hardware resources, and uncertainty. By focusing on these future works, we can pave the way for more successful outcomes in studying and understanding human emotions through DL techniques.

12. English is modest. Therefore, the authors need to improve their writing style. In addition, the whole manuscript needs to be checked by native English speakers.