
Special Issue: Advances in fuzzy deep learning algorithms for biomedical data

Aim and Scope:

Deep learning is one of the most important revolutions in the field of artificial intelligence over the last decade. Approaches under this family of models have achieved great success in different tasks such as computer vision, image processing, biomedical analysis and related fields. Researchers in deep and shallow machine learning including those working in computer vision, image processing, biomedical analysis and other fields comprising multi-dimensional data. Fuzzy set theory is a branch of artificial intelligence capable of analysing complex biomedical data, which has been one of the state of the art methodologies, leading to the enhanced performance in various medical applications to prevent, diagnose, and treat diseases. Compared to the traditional data analytics and decision support techniques, fuzzy sets and their extensions are effective white-box tools for representing and explaining the complexity and vagueness of the information, especially to reduce uncertainty. However, the relatively low learning efficiency and performance also hinder their applications in the medical domain. Therefore, in the last few years, integrating deep learning and fuzzy systems has been an emerging and promising topic with applications in healthcare.

When tied with experienced clinicians, researchers in fuzzy deep learning can play a significant role in understanding and working on complex medical data, which ultimately leads to improved patient care. Developing novel fuzzy deep learning algorithms suited to deal with medical data still remains a challenge. Healthcare and biomedical sciences have become data-intensive fields, with a strong need for sophisticated data mining methods to extract knowledge from the available information. Biomedical data pose several challenges in data analysis, including high dimensionality, class imbalance and scarcity of annotated data featuring enough quality for modelling purposes. Although current research in this field has shown promising results, several research issues need to be explored, including novel feature selection methods to improve predictive performance along with interpretation, and to explore large scale data in biomedical sciences.

This special issue aims to bring together the current research progress (from both academia and industry) on fuzzy deep learning algorithms to address the challenges of biomedical complex data. Special attention will be devoted to novel contributions related to feature selection, class imbalance, data fusion, explainability and biomedical use cases comprising real-world data. This special issue aims at providing an opportunity for collecting some advanced work in the fuzzy deep learning, including compilation of the latest research, development, and practical experiences as well as up-to-date issues, reviewing accomplishments, assessing future directions and challenges in this field. It will bring both researchers from academia and practitioners from industry to discuss the latest progress, new research topics, and potential application domains.

Topics:

The topics relevant to the special issue include (but are not limited to):

- Fuzzy deep learning for computer aided detection and diagnosis
- Fuzzy deep learning for neuroimaging
- Fuzzy deep learning for radiographic data
- Fuzzy deep learning for biomedical image classification and ROI localization
- Fuzzy deep learning for genomics
- Explainable fuzzy deep learning for prediction of healthcare variations
- Fuzzy deep learning for multimodality neuroimaging data fusion systems
- Fusion of fuzzy deep learning and big data for future challenges
- Explainability of fuzzy deep learning in all its forms (counterfactuals, local explanations, relevance attribution, etc)
- Advanced fuzzy deep learning techniques for the risk prediction of COVID-19

Submission guidelines:

All authors should read 'Information for Authors' before submitting a manuscript

<http://cis.ieee.org/ieeetransactions-on-fuzzy-systems.html>

Submissions should be through the IEEE TFS journal website

<http://mc.manuscriptcentral.com/tfs-ieee>. It is essential that your manuscript is identified as a Special Issue contribution.

Ensure you choose 'Special Issue' when submitting.

A cover letter must be included which includes the title "Advances in fuzzy deep learning algorithms for biomedical data".

Important Dates:

Submission Deadline: ~~December 01, 2023~~ **February 28, 2024**

Notification of the first round review: February 2024

Revised submission due: May 2024

Final notification: August 2024

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