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J-BHI Special Issue on “Fuzzy Systems and Computational Methods for Brain Signals and Neuroimaging: Challenges and Future Trends”

Given the important challenges associated with the processing of brain signals obtained from neuroimaging modalities, fuzzy sets and systems have been proposed as a useful and effective framework for the analysis of brain activity as well as to enable a direct communication pathway between the brain and external devices (brain computer/machine interfaces). While there has been an increasing interest in these questions, the contribution of fuzzy systems has been diverse depending on the area of application. On the one hand, considering the decoding of brain activity, advanced computational intelligence methods that handles uncertainty such as fuzzy sets and systems, represent an excellent tool to overcome the challenge of processing extremely noisy signals that are very likely to be affected by non-stationarities, invariants and poor generalisation. On the other hand, as regards neuroscience research, possibility and fuzziness has equally been employed for the measurement of smooth integration between synapses, neurons, and brain regions or areas. In this context, the proposed special issue targets a specialized forum that can serve as a medium for computational intelligence researchers who want to utilize advanced techniques, such as fuzzy systems and fuzzy logic, to simulate and express uncertainty for analysis of brain signals and neuroimaging data. Any area related to neuroscience such as computational neuroscience, brain computer/machine interfaces, neuroscience, neuroinformatic, neuroergonomics, computational cognitive neuroscience, affective neuroscience, neurobiology, brain mapping, neuro-engineering, and neurotechnology is appropriate.

This special issue focuses on recent advances, challenges, and future perspectives about fuzzy systems and computational methods applied in brain signal and neuroimaging, studied in different domains of knowledge. Thus, we invite researchers to contribute original work related to this special issue, exploiting recent methodology using computational and mathematical techniques in brain signal and neuroimaging, and addressing the challenges in developing dedicated systems for various clinical applications, while proposing new ideas and directions for future development.

Topics of interest include, but are not limited to, the following:

- Fuzzy systems and computational methods for the analysis of brain signals from any functional or structural neuroimaging modalities (fMRI /MRI, PET/SPECT, EEG, MEG, fNIRS, DOI, EROS, etc.)
- Fuzzy systems for uncertain modelling of brain computer/machine interfaces (BCI/BMI).
- Brain computer/machine interfaces (all paradigms, transfer learning, multi-modal BCI, Neural Prostheses) powered by Fuzzy Systems and computational methods.
- Fuzzy systems the simulation of brain processes in computational neuroscience.
- Fuzzy systems for Neuroscience applications and the understanding of brain processes.
- Neuroinformatic tools based on fuzzy systems.
- Deep Fuzzy Networks.
- Internet of Brain Things.
- Neuro-rehabilitation.
- Neuro-robotics.

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