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Title: Some synchronization problem of Octonion Valued Neural Networks and its applications

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Abstract:

This paper investigates the problem of fixed-time synchronization (FTS) for a novel class of octonion-valued neural networks (OVNNs) incorporating both discrete and distributed time delays. Several new norm properties are established within the octonion domain, forming the foundation for analyzing FTS and fixed-time projective synchronization (FTPS) of OVNNs with mixed delays. Unlike existing decomposition-based approaches for quaternion- and octonion-valued neural networks, this work introduces an enhanced one-norm method based on a non-separation analytical framework. By constructing appropriate Lyapunov functions and controllers, the proposed scheme ensures synchronization within a preassigned fixed time while significantly reducing computational complexity and conservatism. The results are presented in a compact and generalized form, offering easily verifiable synchronization criteria applicable to systems with mixed delays. The effectiveness and superiority of the proposed method are demonstrated through two numerical examples, highlighting faster convergence, versatile activation functions, and improved analytical tractability compared to existing techniques.

Biography: Mr. Vaibhav Agrawal is currently a Research Scholar in the Department of Mathematical Sciences at the Indian Institute of Technology (Banaras Hindu University), Varanasi. His research interests include Dynamical Systems, Control Theory, and Neural Networks. He has published a research article in the prestigious journal *Neurocomputing*, with several more works in progress. Mr. Agrawal has accumulated four years of dedicated research experience in these advanced areas of study.