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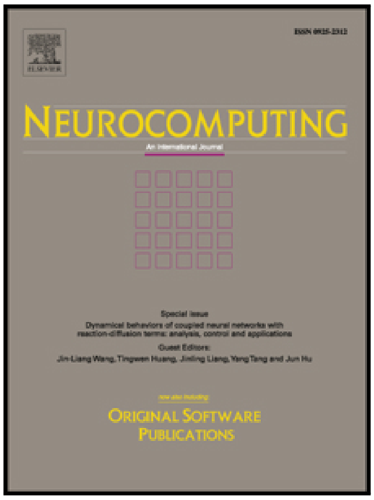

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A New System of Global Fractional-order Interval Implicit Projection Neural Networks*

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Abstract. The purpose of this paper is to introduce and investigate a new system of global fractional-order interval implicit projection neural networks. An existence and uniqueness theorem of the equilibrium point for the system of global fractional-order interval implicit projection neural networks is obtained under some suitable assumptions. Moreover, Mittag-Leffler stability for the system of global fractional-order interval implicit projection neural networks is also proved. Finally, two numerical examples are given to illustrate the validity of our results.

Key Words and Phrases: Interval implicit projection neural networks; Fractional-order calculus; Equilibrium point; Mittag-Leffler stability.

1 Introduction

This paper deals with a new system of global fractional-order interval implicit projection neural networks (FIIPNN) in $R^n \times R^m$ as the following form:

$$\begin{cases} {}_0^C D_t^\alpha x(t) = P_{K_1(x(t))}[x(t) - \rho\,(Ax(t) + A^* y(t)) - \rho a] - x(t),\ t \geq 0, \\ x(0) = x_0 = (x_{10}, x_{20}, \ldots, x_{n0})^\top, \\ {}_0^C D_t^\alpha y(t) = P_{K_2(y(t))}[y(t) - \lambda\,(By(t) + B^* x(t)) - \lambda b] - y(t),\ t \geq 0, \\ y(0) = y_0 = (y_{10}, y_{20}, \ldots, y_{m0})^\top, \end{cases} \tag{1.1}$$

where $\alpha \in (0,1)$, ${}_0^C D_t^\alpha$ is the Caputo fractional derivative, $K_1 : R^n \to 2^{R^n}$ and $K_2 : R^m \to 2^{R^m}$ are two point to set mappings with nonempty, closed and convex values, $P_{K_1(x(t))}$ and $P_{K_2(y(t))}$ are two implicit projection operators, $\rho > 0$ and $\lambda > 0$ are two constants, $a = (a_1, a_2, \ldots, a_n)^\top \in R^n$ and $b = (b_1, b_2, \ldots, b_m)^\top \in R^m$

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