J. of Ramanujan Society of Mathematics and Mathematical Sciences
Vol. 12, No. 2 (2025), pp. 01-26

DOI: 10.56827/JRSMMS.2025.1202.1 **ISSN (Online): 2582-5461**

ISSN (Print): 2319-1023

MULTIVARIATE SYMMETRIZED AND PERTURBED A-GENERALIZED LOGISTIC COMPLEX VALUED TRIGONOMETRIC AND HYPERBOLIC NEURAL NETWORK ACCELERATED APPROXIMATION

George A. Anastassiou

Department of Mathematics,
Department of Mathematical Sciences,
University of Memphis, Memphis, TN 38152, U.S.A.

E-mail : ganastss@memphis.edu

(**Received:** *Jan. 17, 2025* **Accepted:** *Jun. 05, 2025* **Published:** *Jun. 30, 2025)*

Abstract: Here we research the multivariate quantitative symmetrized and perturbed approximation of complex valued continuous functions on a box by complex valued symmetrized and perturbed multivariate neural network operators. These approximations are derived by establishing Jackson type inequalities involving the modulus of continuity of the used function's high order partial derivatives. The types of our approximations are trigonometric and hyperbolic. Our multivariate symmetrized operators are defined by using a multivariate density function generated by a q-deformed and λ-parametrized A-generalized logistic function. These dynamic approximations are pointwise and of the uniform norm. The related complex valued feed-forward neural networks are with one hidden layer.

Keywords and Phrases: q-deformed and λ-parametrized A-generalized logistic, complex valued symmetrized multivariate neural network approximation, complex valued multivariate quasi-interpolation operator, modulus of continuity, trigonometric and hyperbolic dynamic approximation.

2020 Mathematics Subject Classification: 41A17, 41A25, 41A99, 42A10.