NED UNIVERSITY JOURNAL OF RESEARCH

CUSTOM NONLINEAR ACTIVATION FUNCTIONS FOR POTHOLE AND SPEED BUMP IMAGE CLASSIFICATION USING CONVOLUTIONAL NEURAL NETWORKS

Author(s): **Anupama Jawale[1], Ganesh Magar[2]**

https://doi.org/10.35453/NEDJR-ASCN-2024-0074.R2

Volume: **XXII**

No: **1-2**

Pages: **65-82**

Date: **March 2025**

Abstract:
Convolutional neural network models utilise various activation functions, which are crucial in determining whether a neuron is activated. These activation functions are typically categorised into linear and nonlinear types. Ten popular nonlinear activation functions are compared in this paper with four proposed custom activation functions for binary classification of a road image dataset, distinguishing between potholes and speed bumps. Accuracy results indicate that the Softplus activation function outperforms others, achieving an accuracy of 97.82 percent with 0.05 loss. The proposed activation functions rank within the top five, with accuracies as follows: ArcTan (96.80 percent), xArcTan (95.93 percent), weighted ArcTan1.5 (94.62 percent), weighted ArcTan1 (94.19 percent).

For full paper, contact:
Prof Muhammad Masood Rafi
Editor-in-Chief, NED University Journal of Research
Ph: +92 (0)21 99261261-8 Ext: 2413; Fax: +92 (0)21 99261255
Email: NED-Journal@neduet.edu.pk
Website: http://www.neduet.edu.pk/NED-Journal

[1] Head, Department of Information Technology, Narsee Monjee College of Commerce and Economics, Mumbai - 400049, India, Ph. +91(022) 42338007, Email: anupama.jawale26@gmail.com.
2 Professor, PG Department of Computer Science, SNDT Women's University, Mumbai - 400049, India, Ph. +91(0) 8551095789, Email: drgmmagar@gmail.com.