Activation Functions

Deep neural networks have been successfully used in diverse emerging domains to solve real world complex problems with many more deep learning(DL) architectures being developed to date. To achieve these state-of-the-art performances, the DL architectures use activation functions (AFs), to perform diverse computations between the hidden layers and the output layers of any given DL architecture. This paper presents a survey on the existing AFs used in deep learning applications and highlights the recent trends in the use of the activation functions for deep learning applications. The novelty of this paper is that it showcases a model which adapts to the best activation function based upon the data-set and loss function.

The main mathematical framework of this activation function deals with the following equation

$$f(x) = Ax + x = x \text{ if } x > 0$$
$$= Ax \text{ if } x <= 0$$

Where A is the negative slope controlling parameter and its learnable during training with back-propagation. If the term A= 0 the function can be written as

$$f(xi) = \max(o, xi) + ai \min(0, xi)$$

Dataset used for implementing this particular project is BankNote_Authentication.
Data were extracted from images that were taken from genuine and forged banknote-like specimens. For digitization, an industrial camera usually used for print inspection was used. The final images have 400x 400 pixels. Due to the object lens and distance to the investigated object gray-scale pictures with a resolution of about 660 dpi were gained. Wavelet Transform tool were used to extract features from images. Which has,Variance, skewness, curtosis, entropy, class as the features.