

Neural Networks in Matlab: A Study on implementation Neural Networks in Matlab

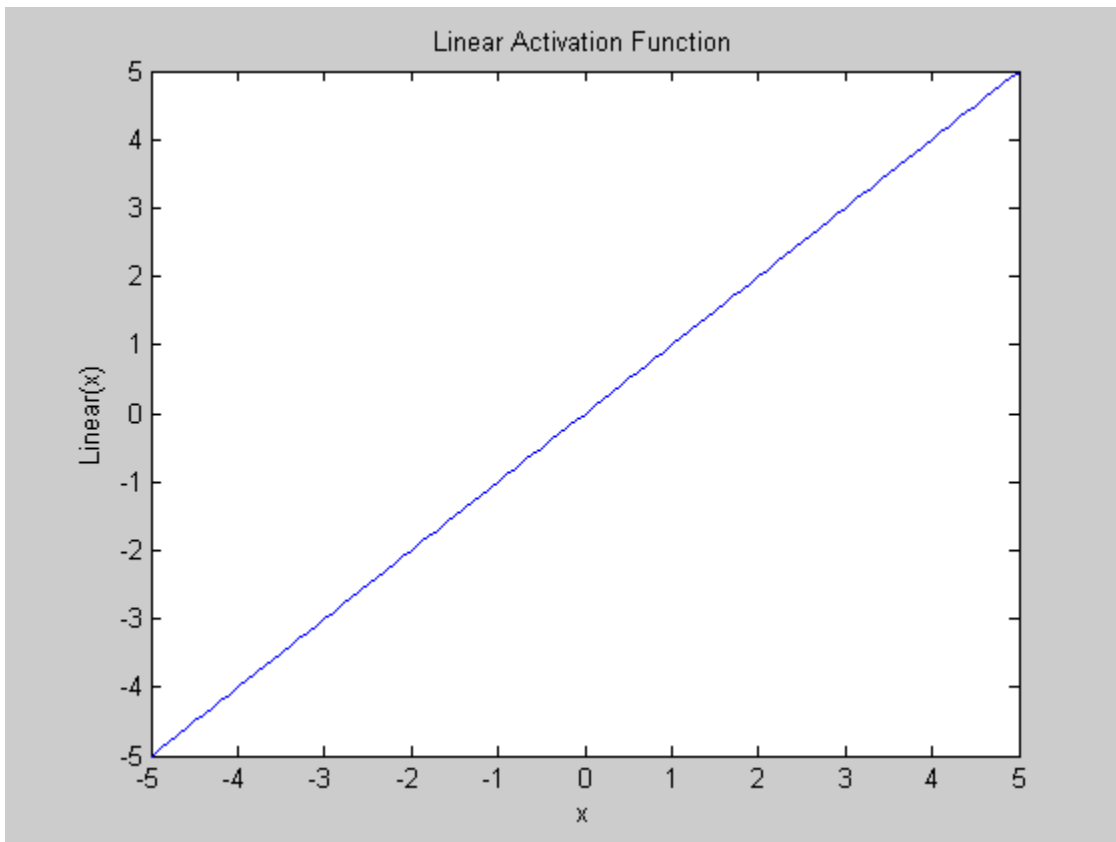
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Abstract

The purpose of this document is to perform a study of Neural Networks using Matlab. The

The Linear Activation function

A linear activation function is a simple function of whatever the input into the function is, is the output. The significance of this transfer function is that it is used in the ADALINE network, a network similar to the Perceptron. They both suffer the same limitation: they are limited to linearly separable problems.



```
>> x=[-5:0.1:5];
>> y=x;
>> plot(x,y);
>> title('Linear Activation Function');
>> xlabel('x');
>> ylabel('Linear(x)');
```

Steepest Descent Algorithms

Widrow-Hoff learning, or the LMS algorithm, is a gradient descent algorithm. The LMS algorithm minimizes mean square error by trying to move the decision boundaries as far from the training patterns as possible. It is a popular implementation for signal processing experts. For example, it is used in telephone systems to reduce or cancel echo.

A descendent of the **LMS** algorithm, developed by Widrow, is called temporal back-propagation.

Mean Square Error

$\hat{F}(x) = (t(k) - a(k))^2 = e^2(k)$, where $e^2(k)$ is the expectation of the squared error.

The steepest descent, or gradient descent, algorithm works in the following way: We start with some initial 'guess' for our weight vector. We update the weight vector such that, at each step, we move a short distance in the direction of the greatest rate of decrease of the error, i.e. in the direction of the negative gradient.

Dynamical Systems/Neural Networks

Questions

1. What is a steepest descent algorithm?
2. What applications would you use the steepest descent algorithm for?
- 3.

References

Hines, Wesley J., “Matlab Supplement to Fuzzy and Neural approaches in Engineering”,

http://www.cnel.ufl.edu/nsbook/chapter15_Estimation_of_the_gradient_th.html

<http://www.neurosolutions.com/products/nsbook/>