

# Research of New Non Iterative Fastest Neural Network Algorithm

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**ABSTRACT:** The goal of Artificial Intelligence is to develop working computer system that are truly capable of performing tasks that require high levels of intelligence . Intelligent computers have to be created with the principle of “human-brain-in computer”style for the advanced computing problems of complexities with the promise of providing definite, accurate & effective solutions. Computers are fastest, but with lack of logical common sense reasoning & theorem proving.This paper focus on the two objectives .First, research of a new recursive algorithm to increase speed of parallelism & next on challenges of artificial neural networks while solving the advanced computational problems.

**KEYWORDS:** Recursion, Algorithm,Intelligent, Artificial Intelligence, Neural networks

## I. INTRODUCTION

Algorithm is sequence of steps leading to the solution of problem[2]. Analysis of algorithms[37] provides proof of the correctness of algorithms, allows for the accurate prediction of program performance, and can be used as a measure of computational complexity.Recursion[39] is a powerful concept in the development of program with the ability for a function to refer to itself to solve a problem. There are two types of recursion: Direct & indirect recursions.[1]. Depth of the Recursion[38] is the maximum number of levels referred during its execution.

Intelligence is quick & accurate response to a stimulus.

Intelligence is the ability to acquire,understand & apply knowledge to exercise thought & reason and branch of Computer Science & Engineering for learning , developing & exhibiting intelligent is Artificial Intelligency. Artificial neural network[41] achieves intelligent results by using massively parallel computations & learning them. Depending on number of layers neural networks classified into single layer& multilayer neural networks , respectively.

Various Learning types are available including Supervised, Unsupervised & **reinforced**.

## II. RELATED WORK

Recurrent networks :

Artificial neural network consists of three types of layers [Diagram 1 ][7]

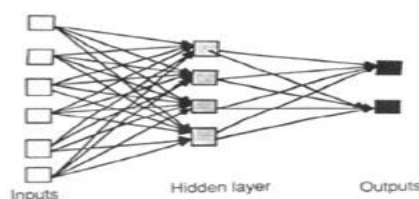


Diagram1: layered Neural network

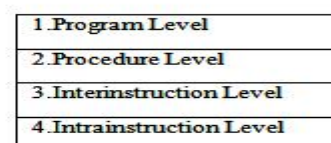


Diagram2: processing levels

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INPUT LAYER : No computation is done but they receive external signals

OUTPUT LAYER : Receives the signals from neurons.

HIDDEN LAYER: It lies between input and output layer.

At each step, activations of output units are compared with desired activations & propagate errors backward through the network. When training is completed, network will be capable of performing sequences of activations. Recurrent networks can update more than one unit. But due to recursive nature it suffers the memory overload. Recurrent networks can be trained with back propagation algorithm. At each step, we compare the activations of output units with desired activations & propagate errors backward through the network. When training is completed, network will be capable of performing a sequence of actions.

The term “recursive” reflects the fact that a local computation is recursively applied to each node in the input graph to yield a result which depends on the whole input data structure. The local computation is performed by a neural network and this choice guarantees the possibility to extend the supervised learning paradigm to neural networks for structured domains.

## SCOPE OF RESEARCH:

Recurrent networks [6] can update more than one unit. But due to recursive nature it suffers the memory overload. It involves overhead of saving return address, formal parameters, local variables upon entry & restore these values on completion.

It has demerit of doubtful of long sequence learning.

Parallel processing [27] can be challenged in four levels [Diagram 2]:

Program level, Procedure level, Inter instruction level, Intra instruction level [32]

The program level is implemented by algorithm.[29]

The Intra instruction level is implemented by hardware.[28]

From 1 to 4 hardware role increases. From 4 to 1 software role increases.

Now we can focus on the following recursive algorithm to find n<sup>th</sup> term in the sequence 0,1,1,2,....

Algorithm: a(n)

step 1: if (n==0) then return 0;

step 2 : if(n==1) then return 1;

step 3: call (a(n-1) + a(n-2))

This is based on the formula

$A(N) = A(N-1) + A(N-2)$  FOR  $N > 1$

= 0 IF  $N = 0$

= 1 IF  $N = 1, \dots, \dots, (1)$

## PROPOSED METHODOLOGY:

The same task can be done by new algorithm created as follows using algorithm B

Algorithm: b(n)

step 1: if (n==0) then return 0;

step 2 : if(n==1 or n==2) then return 1;

step 3: call (b(n-3) + 2 b(n-2))

Depth of recursive levels for a(5) [Diagram 3]. A recursive algorithm based on new created formula as follows leads to levels [Diagram 4]. Existing recursive algorithm[38] on formula (1), requires 20 calls for F(5), but same task is done by new recursive algorithm based on formula(2), more efficiently with just 6 calls. It achieves speed processing.

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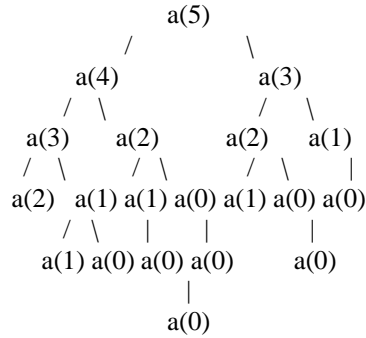


Diagram 3: Depth of Recursion for a(5)

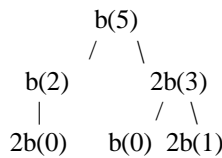


Diagram 4: Levels for new recursive algorithm b

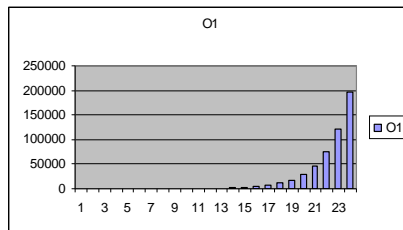


Diagram 5: Graph for recursive algorithm based on equation a for a(25)

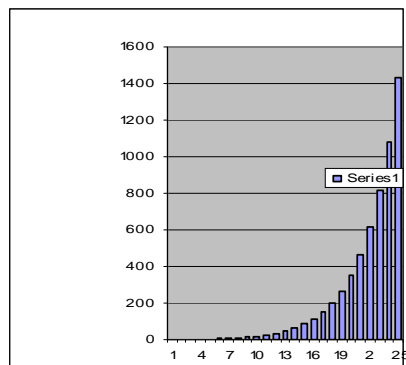


Diagram 6: Graph for recursive algorithm based on equation b for b(25)

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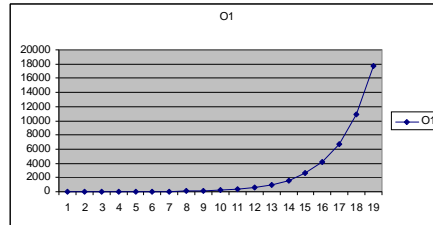


Diagram 7: Graph for recursive algorithm based on equation a for a(20)

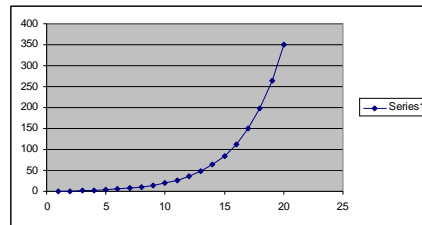


Diagram 8: Graph for recursive algorithm based on equation b for b(20)

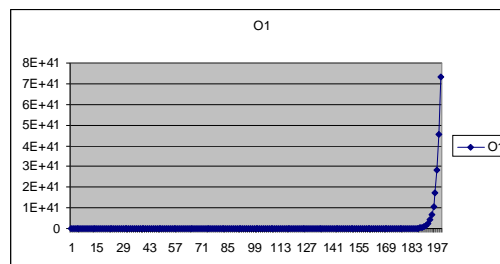


Diagram 9: Graph for recursive algorithm based on equation a for a(200)

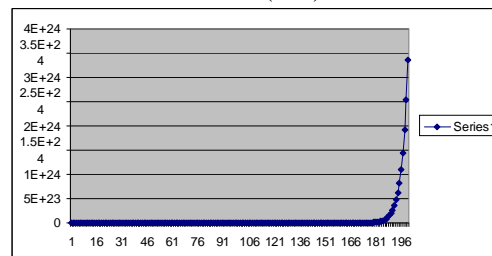


Diagram 10: Graph for recursive algorithm based on equation b for b(200)

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A	B
01	1
02	1
04	2
07	3
12	4
20	6
33	8
54	11
88	15
143	20
232	77

Table 1: Comparisons of recursive calls based on algorithms a & b respectively

### III. RESULTS & CHALLENGES

Recursive algorithm performances based on equations (1) & (2) are displayed in the following tables with headings A & B, respectively. [table 1].

Graph for recursive algorithm based on equation a for a(25) [Diagram 5].

Graph for recursive algorithm based on equation b for b(25) [Diagram 6].

Graph for recursive algorithm based on equation a for a(20) [Diagram 7].

Graph for recursive algorithm based on equation b for b(20) [Diagram 8].

Graph for recursive algorithm based on equation a for a(200) [Diagram 9].

Graph for recursive algorithm based on equation b for b(200) [Diagram 10].

Some of the advanced computational areas of neural networks includes:

Water purification

Beverage production

Embedded computing[33].

Oil & gas industries

Multimedia communications[21]

Image processing[20].

Data flow supercomputers[22].

Mobile computing[23].

Predictions for foreign exchange rates

Medical & Engineering

Clouds [44].

Software development [24].

Apart from storage & processing time, parallelism level other challenges are as follows.

Neural networks have proved to be effective in solving a wide range of problems. As problems become more & more demanding, they require larger neural networks, and the time taken for learning is consequently more. Parallel implementations of learning algorithm are vital for useful applications.

Learning simultaneously for more than one task is not possible. For complex situations learning is very difficult & time consuming appealing for optimization methods. Slow convergence & usually requires hundreds or thousands of training presentations for learning to take place.

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Less space for storage.

Retraining is required in case of damage to the network.

Training is very difficult due to presence of hidden units.

## IV. CONCLUSIONS

In artificial neural networks the calculation to minimise errors in supervised learning depends on algorithm used which is normally based on optimisation techniques & hence new algorithm b is preferable than algorithm a. In unsupervised training if input pattern is applied then neural network provides output response indicating class to which input pattern belongs . If class not found for pattern then new class is created . To achieve this algorithm b is quite faster than algorithm a. Based on the implementation results of recursive algorithm, it can be concluded that algorithm b is faster with less recursive calls than algorithm a & can improve the speed of parallel processing at algorithmic levels. Today's computers are knowledgeable but far away from being intelligent which is difficult to achieve & processing intelligence even more difficult to overcome the challenges faced by it, for sophisticated applications

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### BIOGRAPHY



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