



An Overview of Neural Network as an Application in Software Engineering

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Abstract— *Neural network is information processing paradigm that is inspired by the way biological nervous system process information like brain. It acts as a powerful modelling when the resulting outcome is unknown. In this paper we are using neural network in order to estimate most miscellaneous issues of software engineering such as testing, security etc. Neural network can recognize and learn mutual relationship between input data sets and corresponding target values. It has been one of the technologies used during software implementation & testing phase of SDLC. It has adaptive nature which makes it to learn by example. Objective of this paper is to present a feasible way of combining software engineering & neural network for achieving higher accuracy.*

Keywords— *Neural network, Software engineering, Software metric, Matlab, Security.*

I. INTRODUCTION

1.1 SOFTWARE ENGINEERING

Software engineering is the branch that is used to solve the problems like cost, maintenance, quality, timeliness by producing good software within budget. Its primary aim is to produce software quickly & release it into the market under the deadline. It is used to develop software for resolving various issues for various purposes like testing, security, maintenance, cost estimation, time & effort estimation.. Today people are expecting high quality software with minimum cost, this is the main objective of Software engineering. The role software applications play in today's antagonistic computer environment is very important. It is not remarkable to discover that software applications running the transportation systems, communication systems, medical equipment, banking systems, domestic appliances and other technologies that we depend on.

1.2 REASONS FOR USING SOFTWARE ENGINEERING

To prevent any type of cyber attack is indispensable, because a single attack may destroy the security of computer system. It is used to develop Software for resolving various issues for various purposes like testing, security, maintenance, cost estimation, time & effort estimation. It becomes very costly to resolve these issues at later stage of system development life cycle (SDLC) than when it is integrated during the early stage of SDLC. Today people are expecting high quality software with minimum cost, this is the main objective of Software Engineering. Neural Network may be used in order to estimate most miscellaneous issues of Software Engineering such as security.

1.3 APPLICATIONS OF SOFTWARE ENGINEERING

- a) System Software
- b) Real Time Software
- c) Artificial Intelligence Software
- d) Web Based Software
- e) Business Software
- f) Engineering and Scientific Software
- g) Embedded Software
- h) Personal Computer Software

1.4 SOFTWARE METRIC

Software metric is used to measure some property of a piece of software or its specifications. For example reliability, usability, maintainability, cohesion coupling etc . The purpose is to obtain deeper insights into how a metrics program can be useful in managing and improving software organization. It is useful for decision making of software managers. These metrics provide ways to evaluate the quality of software. The neural network in matlab is used for predictions of these features and predict by simulating the neural network.

1.5 SECURITY

Now a day's technology is getting very advance. People are using laptops to access various applications and software to make their life easy and simple. But one malicious attack is able to spoil private & crucial information. To gain access to user resources, system security is very important procedure. Recently among many access control mechanisms, authentication has become an important issue. Password authentication is very common mechanism that is widely used to authenticate an authorized user. Security is not only a unique feature of the software, but also an important part of the software. While using the advance technology one must be ensure about the security of their system for example, Is the system secure enough to keep the crucial data. If software is not secure then all its operations can exhibit to attacks

II. NEURAL NETWORK

A neural network (NN) is powerful data modelling tool that is able to capture & represent intricate input-output. Research of neural network get started in 1940. Its techniques are based on the principle of learning from historical data. NN technology gives a computer system an amazing throughput to actually learn from input data. Its motivation is to develop artificial system that could perform intellect tasks similar to human brain. They are built from large number of simple processing elements that personally deals with a huge problem. A software tool (MATLAB) was used to process neural network.

Neural network techniques theory has been receiving significant attention. The main characteristics of NN are that they have the ability to learn complex nonlinear input-output relationship. Artificial neural network (ANN) is a network of neurons & set of processing elements & weighted connections. Processing element is component of neural network where computations are performed. Processing element simply multiply an input by a set of weights & a nonlinearly transforms the result into an output value.

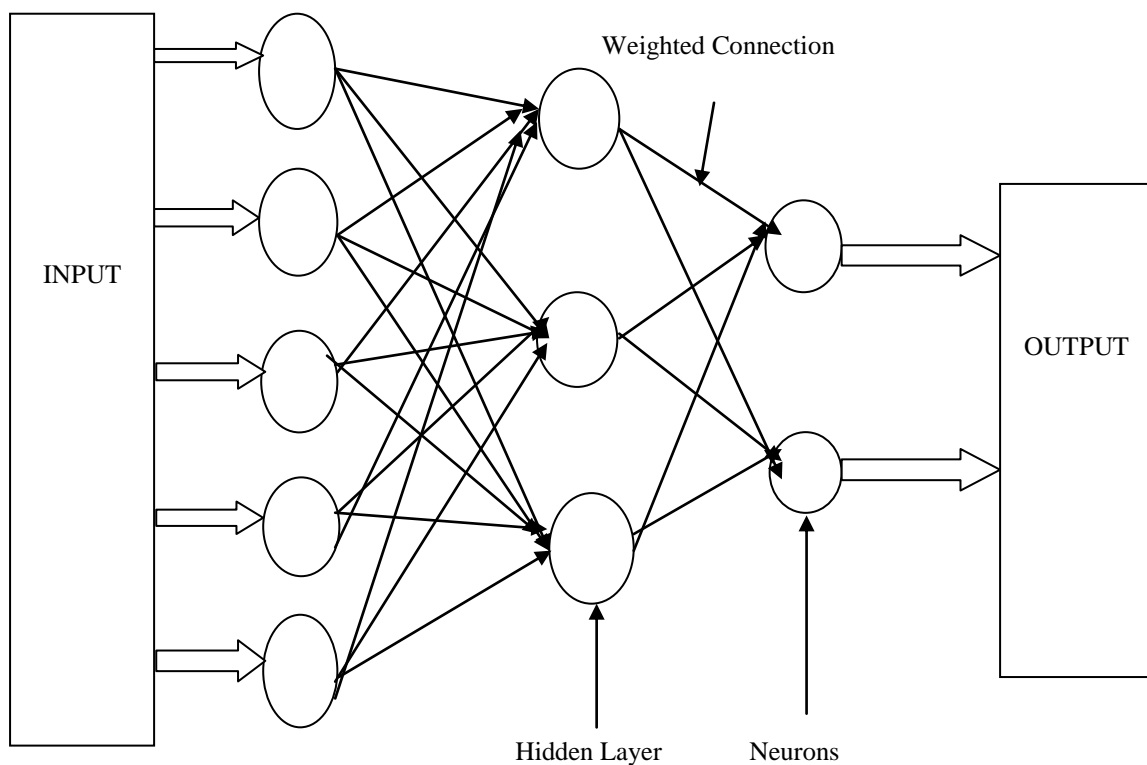


Fig.1.1 Neural Network

Here input nodes represent the independent variable, hidden layer amends the data & output layer define the target or dependent variable [18].

2.1 APPLICATIONS

1. Discover trends in time series data.
2. Pattern recognition, speech recognition, character recognition.
3. Travelling Sale man's Problem
4. Medicine, Electronic Nose, Security, and Loan Applications.
5. Image compression, Stock market prediction.
6. Intelligent searching
7. Fraud detection
8. Quality control, Process modelling & control
9. Travelling salesman's problem
10. Monitoring the condition of machinery
11. Engine management

2.2 ADVANTAGES OF NEURAL NETWORKS

1. NN can perform the task that a linear program is unable to execute.
2. Because of their parallel nature, it can continue without any problem even if an element of the nn fails.
3. A neural network learns and does not require to be reprogrammed.
4. It can be implemented in any application without any difficulty.
5. NN can discover all possible, complex nonlinear relationships between input and outputs.
6. NN does not require excessive statistical training.
7. In economic or in financial modelling they can be synthesized without making use of the detailed, explicit knowledge of the underlying process.

2.3 DISADVANTAGES

1. NN are complex to design & model analytically.
2. It is not capable of solving the classic exclusive-or (XOR) problems.
3. It requires training to function & training cases should be consistent.
4. The architecture of NN is distinct from the architecture of microprocessors therefore requires to be imitated.
5. For large NN's high processing time is needed.
6. For supervised learning results must be known in advance.
7. If the set of requested consequences changed, the net must be retrained
8. Limited or noisy training data may result in unpredictable & absurd output.

III. BACKPROPAGATION ALGORITHM

A neural network is manipulated by supervised learning method, the back propagation algorithm on a set of test cases applied to the original version of the system. Back propagation means "backward propagation of errors". It is useful for the networks that have no feedback & connection loops. This algorithm is capable of handling large learning problems with more parameters & more complicated technologies. This algorithm is a way to train hidden units, just what need to do? It can train any number of layers, any pattern of connectivity that permits a partial ordering of the nodes from input to output is allowed. Multilayer network overcomes the

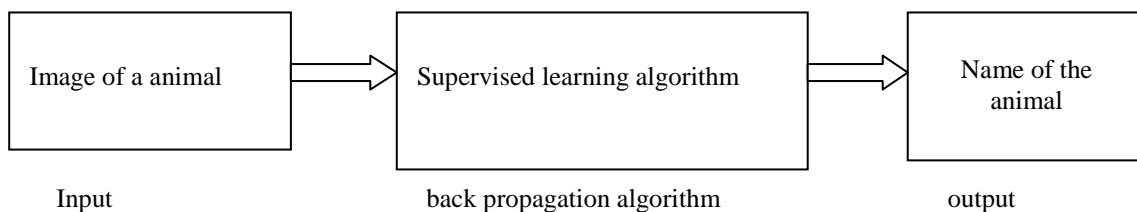


Fig 1.2: Example of back propagation algorithm

Limitation of single layer network. The second layer also learns the feature of the first layer & learns to identify simple shapes such as rectangle. Each higher layer is used to learn more & more about the features that can be used to classify the image.

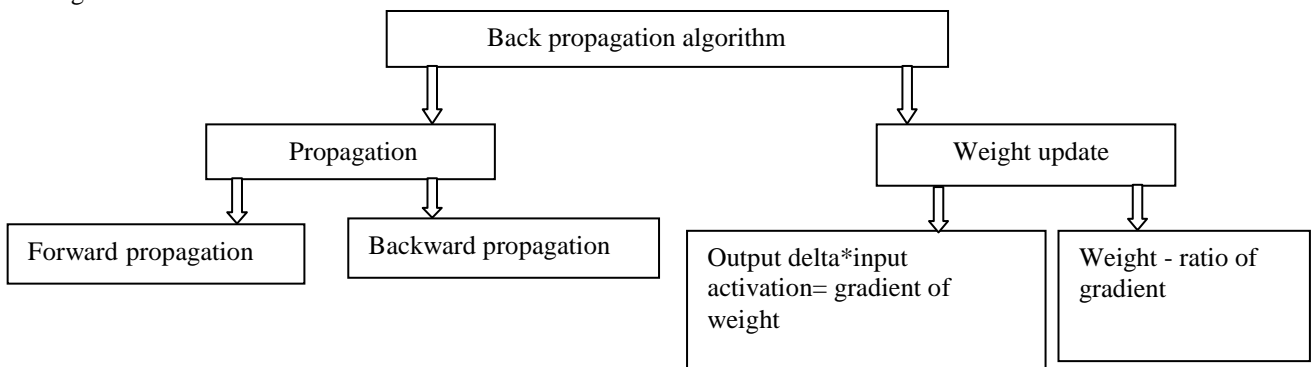


Fig 1.3: Phases of Back propagation algorithm

In this algorithm error propagates backward from output nodes to input nodes. It calculates how the error changes as each weight is increased or decreased slightly.

IV. PURPOSE OF MATLAB TOOLS

Matlab stands for matrix laboratory that is required tool for the work that we do in our lab. Matlab portrays the commands & subroutines that might be commonly used by mathematicians. Matlab allows matrices manipulation , plotting of functions & data , implementation of algorithms, creation of user or interfaces, interfacing with programs written in other languages including C, C++, java , Forton. Matlab supports developing applications with graphical user interface features. Now a day's matlab is used in education & many other domains. It allows users to solve problems accurately & produce code efficiently.

V. WORK FLOW DIAGRAM

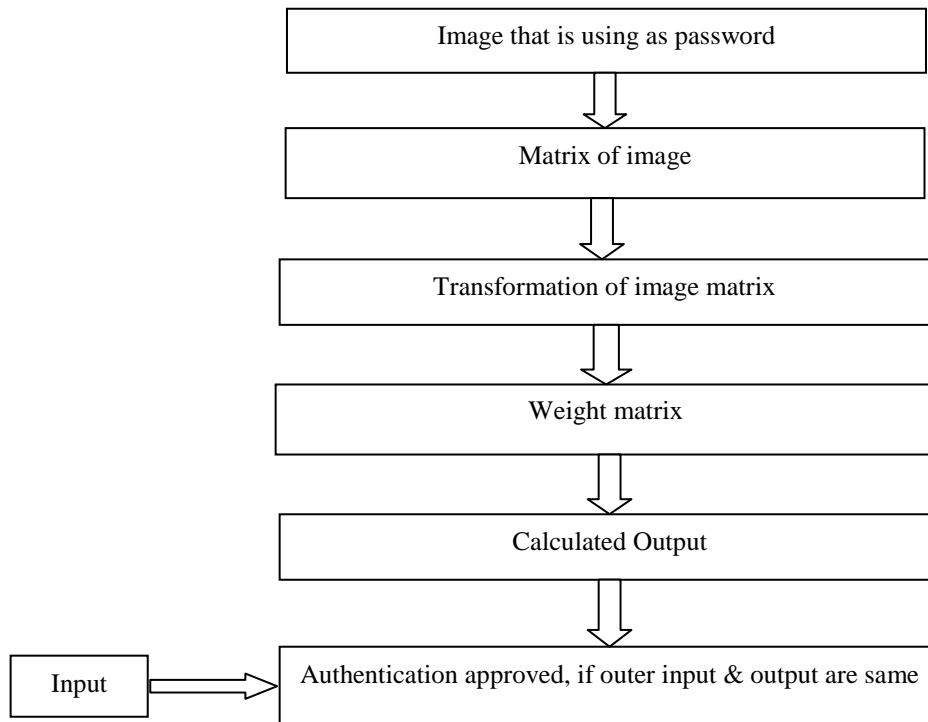


Fig.1.4. Basic process of image recognition procedure

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VI. CONCLUSIONS

Neural networks are better than computer for processing of sensorial data such as pattern recognition, voice recognition. Neural network is act like brain which is a key to smart & complex vision systems for research applications. Back propagation algorithm is used to measure the error which is back propagate to the network to get the desired output. Security is essential measure to authenticate a user, so as to prevent unauthorized persons to get your private data. So neural network is used as a better way which has remarkable degree of fault tolerance.

ACKNOWLEDGMENT

My first and foremost sincere thanks to my guide Dr. Sandipan Gupta (Professor), Eternal University Baru Sahib & my cousin Mehak Aggarwal for enhancing my knowledge in this area. No words are adequate to express my feelings of profound gratitude to my research guide for his keen interest, expert guidance.

Very special thanks go out to my family for the continuous support provided by them throughout my life. I must acknowledge my father who is inspiration for me. I would love to express my deep love and appreciation to my mother for making me learn patiently in difficult hours and my lovely sister and sweet brother, for giving me their unconditional love, their support & a positive way to come out from hard time.

REFERENCES

- [1] A. Adebiyi, johnnes Arreymbi and Chris Imafidon, "Security Assessment of Software Design using Neural Network," *IJARAI International Journal of Advanced Research in Artificial Intelligence*, vol. 1, No. 4, 2012
- [2] Chintala Abhishek, Veginati Pavan Kumar, Harish Vitta, Parveen Ranjan Srivastava "Test Effort Estimation Using Neural Network," in *J.Software Engineering & Applications*, 2010
- [3] Meenakshi Vanmali, Abraham Kandel "Using a Neural Network in the Software Testing Process".
- [4] By Louise Francis "The Basics of Neural Networks Demystified".
- [5] Surendra Pal Singh*, Prashant Johri, "A Review of Estimating Development Time and Efforts of Software Projects by Using Neural Network and Fuzzy Logic in MATLAB," *International Journal of Advanced Research in Computer Science and Software Engineering*.
- [6] Manoj Kumar Singh, "Password Based A Generalize Robust Security System Design Using Neural Network," *IJCSI International Journal of Computer Science Issues*, Vol. 4, No. 2, 2009.
- [7] Mr.Swapnesh Taterh , Prof(Dr.)K.P Yadav ,Prof(Dr.)S.K Sharma, "Threat Modeling and Security Pattern Used in Design Phase of Secure Software Development life Cycle," *International Journal of Advanced Research in Computer Science and Software Engineering*, Volume 2, Issue 4, April 2012.
- [8] Doshi Shreyas, "Software Engineering for Security: Towards Architecting Secure Software".

- [9] P.Howard “*Matlab 7.0 Basics*”.
- [10] Smita K.Chaudhari, G.A. Kulkarni ,“ANN implementation for classification of noisy numeral corrupted by salt & pepper noise,” *International Journal of Advanced Research in Computer Science & Electronics Engineering*, volume 1, issue 5, july 2012.
- [11] *Chapter-11 Basic Matlab Programming.*
- [12] Jake Ryan, Meng-Jang Lin, Risto Miikkulainen, “*Intrusion Detection with Neural Network*” .
- [13] RC Chakraborty, “*Fundaments of Neural Network’s*”.
- [14] *Derivation of Back propagation Algorithm*
- [15] *The Back propagation Algorithm*
- [16] *Lectures 38-41-Learning Methods-NN*
- [17] Girish Kumar jha, *ARTIFICIAL NEURAL NETWORKS AND ITS APPLICATIONS*, I.A.R.I., New Delhi-110 012
- [18] K.K. Aggarwal and Yogesh Singh, *Software Engineering*, 2nd ed, 2006.
- [19] [http://wiki.answers.com/Q/What are the advantages and disadvantages of network adapter#slide=3for](http://wiki.answers.com/Q/What_are_the_advantages_and_disadvantages_of_network_adapter#slide=3for)
- [20] www.wikipedia.com