

Predictive Modelling In Civil Engineering Using Neural Network: Review

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Abstract- This paper presents artificial neural network model for predicting construction project duration. ANN is a hypothesis about the processing of information stimulated by the natural means of the nervous system (for example, information about brain processes). ANN is used to solve many design problems that are difficult to solve by conventional methods of engineering mechanics. Here using optimised artificial neural network to minimize claims in construction project. The use of ANN application in civil engineering has increased revenues worldwide over the past decades. ANNs are widely used in construction because of their strong non-linear relationship between known and unknown problems.

Keywords- ANN, Civil Engineering, Construction, Mechanics, Neural.

I. INTRODUCTION

ANN are a form of artificial intelligence that attempts to mimic the functions of the human brain and nervous system. ANN is an information system that connects very simple neurons networks. Although the development of analytical or empirical models is possible in some simplified situations, the most advanced processes are diverse. Therefore, they are less general, realistic and less costly than the regression process, since they have a greater ability to produce different results and answers apply. This area aims to explore how some of the intellectual functions of the human brain can be duplicated and applied, enabling people to develop technological products and propose related theories. In recent years, the advance of the genetic algorithmic program introduced several new mathematical tools and absorbed civil engineering because the latest accomplishment of applications. We can expect, alongside the pc technology, the genetic algorithm in engineering application are going to be additional general and more practical. If 'ANNs area unit to become additional wide accepted and reach their full potential, they ought to not solely established a decent work to the standardisation of validation knowledge, but, however the prediction should even be plausible in terms of the link modelled and strong beneath a good vary of conditions' and that 'while ANN validation against error alone could manufacture accurate predictions for scenario the same as those contained in the coaching

knowledge, they will not be strong beneath totally different conditions unless the link by that the info were generated has been adequately calculable.' Recently artificial neural network (ANN) models are widely applied to numerous relevant applied science areas such as geo-technical engineering, structural engineering, water resource engineering etc. within the field of civil engineering, several issues, particularly in engineering design, construction management and deciding program were influenced by several uncertainties that might. The planned agent orienting methodology and resulting application organises construction data into a structure that permits the scholars to undertake additional self-directed, systematic and scientific exploration. Flood applied artificial neural network to stimulate interest among the engineering analysis community for developing the next generation results show that this approach needs the design of some terribly subtle genetic secret writing mechanism in order to develop the desired high order network structures and utilize development mechanism determined in the nature like growth, organisation and multi-stage objective perform. Neural networks analysis is artificial intelligence has recently provided powerful system that works as a supplement or a complement to such conventional professional system. It poses variety of enticing properties for modelling a fancy mechanical behaviour or a system: universal perform approximation capability, resistance to abuzz or missing information, accommodation of multiple non-linear variables for unknown interaction and good generalization capabilities. In this paper, neural network square measure introduced as a promising management tool which will enhance current automation efforts within the applied science as well as its application in geo-technical engineering, structural engineering, traffic engineering and in construction management. Basic neural networks architectures square measure delineated and its applications in various field of applied science is additionally mentioned. Future possibilities of group action neural network and skilled systems as a basis for developing economical intelligent systems are delineated.

Artificial Neural Network (ANN)

Artificial Neural Network (ANN) may be a branch of computer science that concerned within the analysis, design and application of intelligent computer. ANN may be a

massively parallel distributed processor a created of easy that encompasses a natural propensity for storing experimental information and creating it on the market to be used. It's Associate in Nursing scientific discipline paradigm that is impressed by the manner biological nervous systems, such as the brain, method data. It's composed of an oversized number of extremely interconnected process components (neurons) operating in unison to unravel specific drawback. 'The neural network is structured to perform nonlinear theorem classification'. The performance and process complexity of neural networks square measure chiefly supported network architecture, that usually depends on the determination of input, output and hidden layer.

Architecture of Neural Network

In general, an artificial neural network can be divided into three parts: -

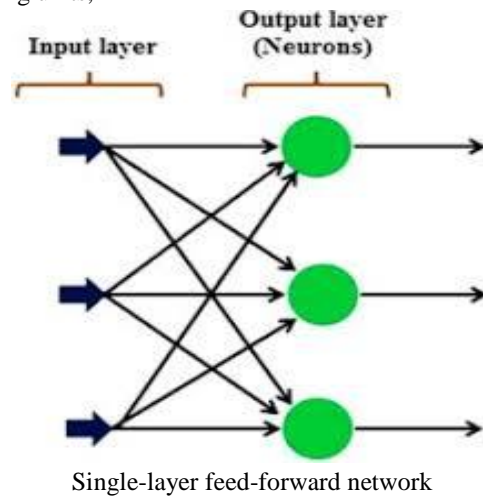
1. Input Layer: -This layer gains information in the form of data, signals, features or measurements from external sources. These inputs area unit sometimes normalised within the limit made by activation functions.
2. Hidden Layer: These layers carry with it no. Of neurons which area unit accountable for extracting patterns to the method or system being analysed. These layers perform most of the inner process from a network.
3. Output Layers: This layer additionally consists of no. of neurons and so is accountable for producing and presenting the ultimate networks outputs, which results from the processing performed by the neurons in the previous layer.

The main design of artificial neural networks considering the neuron deposition, still as however they're interconnected and how its layer is composed, can be divided as follows: -

A. Single-Layer Feed-forward Network: -

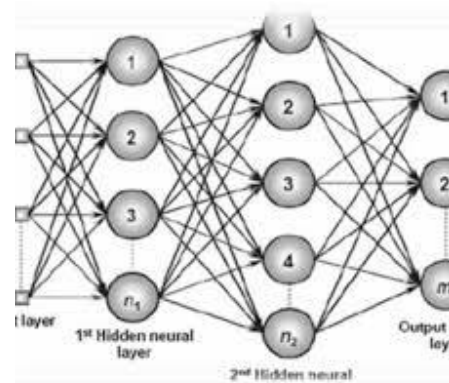
This artificial neural network has only one input layer and corresponding only one output layer. Figure show a simple-layer feed-forward network composed of inputs and outputs.

processing units,



B. Multiple-Layer Feed-forward Network: -

This artificial neural network has one or more hidden layer between input layer and output layers. It is generally used for complex problem like system identification, process control, optimization, and robotics and so on. Figure shows a feed-forward network with multiple layers composed of one input layers with 'n' sample signals, two hidden neural layers consisting of 'n1' and 'n2' neurons respectively, and finally, one output neural layer composed of 'm' neurons representing the respective output values of the problem being analysed.



Multiple-layer feed-forward network

II. CONCLUSION

It is clear that ANNs are with success applied to several civil engineering areas like prediction, decision-making, risk analysis, resources optimisation, classification

and choices etc. Most of the mathematical models fail to resolve such advanced behaviour. ANN's area unit supported solely input and output knowledge by which model will perpetually be updated to get higher output by showing new knowledge become obtainable.

REFERENCES

- [1] Applicability of Construction and Demolition Waste Concrete in Construction Sector-Review; N. K. Dhapekar; International Journal of Civil Engineering Research. ISSN 2278-3652 Volume 8, Number 2 (2017), pp. 131-138;@ Research India Publications <http://www.ripublication.com>.
- [2] Structural Health monitoring of piers and abutments by X-ray diffraction technique.; N.K. Dhapekar.; Recent Developments ,future challenges and opportunities for rural development in globalized environment; Volume1; Issues1;PP1; M.M.C.T,Raipur,C.G.
- [3] Comparative study of analysis of plane trusses with and without axial deformation with three degree of freedom.; N. K. Dhapekar; International journalof advances in management technology and engineering scienceVolume2;Issues2;PP142;Choicecollege of arts and commerce(CCAC)
- [4] Effective utilization of construction and demolition waste concrete-review; S.P. Mishra & N. K. Dhapekar; Research Journal of engineering sciences; Volume 6;PP1-4; Indian Science Community association.
- [5] Integreated approach to construction and demolition waste management in Raipur.; N. K. Dhapekar, Abhinav Singh, Gautam, GulshanChandrakar; International journal of advance research in science and engineering; Volume 6; PP1-3; AR research publications.
- [6] Vikash Singh, SamreenBano, Anand Kumar Yadav, Dr.Sabih Ahmad “Feasibility of Artificial Neural Network in Civil Engineering” Volume: 3; International Journal of Trend in Scientific Research and Development; Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470; IJTSRD.
- [7] D.-S. Jeng, D. H. Cha and M. Blumenstein “Application of Neural Network in Civil Engineering Problems”.
- [8] Ossama A. Hosny, Mohamed M. G. Elbarkouky, Ahmed Elhakeem “Construction Claims Prediction and Decision Awareness Framework using Artificial Neural Networks and Backward Optimization”. KICEM Journal of Construction Engineering and Project Management; ISSN 2233-9582.
- [9] Testing of strength of recycled aggregate concrete using Microsilica and it's applicability.; Dr. P. S. Charpe& N. K. Dhapekar; Journal of advances and scholarly researches in allied education.; Volume 16; PP625-627; Ignited minds journal.
- [10]SeunghuiLee,SungwonJung , and Jaewook Lee “Prediction Model Based on an Artificial Neural Network for User-Based Building Energy Consumption in South Korea”. Department of Architecture, Sejong University, Seoul 05006, Korea, Correspondence: swjung@sejong.ac.kr; Tel.: +82-02-3408-3289
- [11]Silvana Petruseva1, Vahida Zujo2, Valentina Zileska-Pancovska “Neural Network Prediction Model for Construction Project Duration”. et. al.; International Journal of Engineering Research and Technology; Vol. 1 (02), 2012, ISSN 2278 – 0181
- [12]ASCE. (2000). "Artificial neural networks in hydrology. I: Preliminary concepts." J. Hydrologic Engineering, 5(2), 115-123.
- [13]Erzin, Y. (2007). "Artificial neural networks approach for swell pressure versus soil suction behavior." Canadian Geotechnical Journal, 44(10), 1215-1223
- [14]Dr. P. S. Charpe& N. K. Dhapekar “Microstructural analysis of recycled aggregate concrete using Microsilica” SHODHAYTAN 6 (11),157-160, 2019
- [15]Microstructural analysis of recycled aggregate concrete using MicroSilica.; Dr. P. S. Charpe& N. K. Dhapekar; SHODHAYTAN; Volume 6;PP157-160; Rabindranath Tagore University.
- [16]Scope of utilization of recycled aggregate in construction sector.; Dr.P. S. Charpe& N. K. Dhapekar; International Journal of Science and research; Volume 8;PP1580-1581; IJSR.
- [17]Use of RCF software in construction industry.; N. K. Dhapekar &ChetanSonkar.; International Journal of creative journal thoughts; Volume 8; PP1537-1541; IJCRT.
- [18]Experimental Investigation by ETABS software on G+15.; Sandeep Sahu & N. K. Dhapekar.; International journal of advance research and innovative ideas in education.; Volume 6; PP1800-1808; IJARIE.
- [19]Design principles for earthquake resistant buildings and post-earthquake study by structural engineering perspectives.; N. K. Dhapekar.; International journal of advances in management, technology and engineering sciences. (IJAMTES); Volume 1;PP49; Choice college of arts & commerce(CCAC).
- [20]Structural health monitoring of historical monuments by rapid visual screening: Case study of Bhand Deval temple, Arang,Chhattisgarh,India.; N. K. Dhapekar.; International Journal of Civil,Structural,Environmental and infrastructure engineering research and development(IJCSEIERD).;Volume3.;PP131-140; Transstellar Journal Publications and research consultancy pvt.ltd.

