

A Review on Prediction System for Dam Water Level Using ANN

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Abstract:

Reservoir dam is one amongst the process for each flood and drought disasters. throughout flood, the gap of the dam's waste weir gate should be capable make sure that the reservoir capability won't over its limits and therefore the discharges won't cause overflow downstream. While, throughout drought the reservoir must impound water and unharness adequately to fulfil its functions. Modelling of the reservoir water unharness is significant to support the reservoir operator to form quick and correct call once addressing each disasters. during this paper, intelligent call support model supported Artificial Neural Network (ANN) Back Propagation is planned. The planned model consists of state of affairs assessment, statement and call models. state of affairs assessment utilised temporal data processing technique to extract relevant knowledge and attribute from the reservoir operation record. The statement model utilize ANN to perform statement of the reservoir water level, whereas within the call model, ANN is applied to perform classification of the present and changes of reservoir water level.

Keywords: Prediction, Neural Network, data processing

INTRODUCTION

Due to Advanced technology solutions, ton {of knowledge of knowledge of information} may be handled and data analysis become easier and quicker. In water resources it becomes necessary to investigate {the knowledge of the information} and use the analyzed data for optimum use of water resources as there's insufficiency of such resources. From previous couple of decades, statistic statement has achieved tremendous response from researchers. This stream has terribly wide applications. Previous, the normal strategies of your time series analysis were employed by the researchers. ancient strategies of your time series analysis like autoregressive technique of Box - Jenkins (AR), auto-regressive moving average (ARMA), auto-regressive integrated moving average (ARIMA), autoregressive moving average with exogenous inputs (ARMAX), etc. the standard statistic modeling strategies were conjointly economical since while, however they suffer the matter of stationary and one-dimensionality and offers solely affordable accuracy. the necessity for giving a lot of correct forecast for statistic has forced the researchers to develop innovative strategies to model statistic. Artificial Neural Networks (ANNs) were introduced as associate degree economical tools of modeling and statement since twenty years. The artificial neural networks

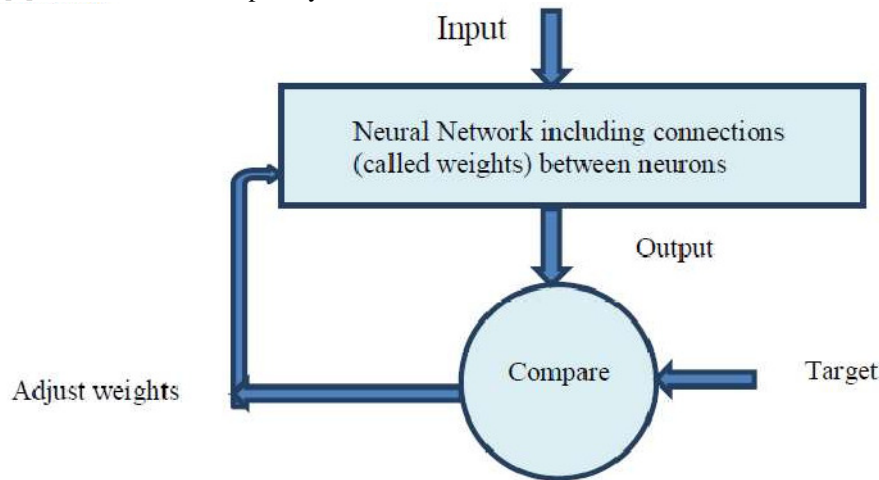
will model, map, and also as will demonstrate the nonlinear relationship of sophisticated phenomena. the bogus neural networks square measure widespread and extremely versatile perform approximates, utilized in the fields of scientific discipline and engineering. the bogus neural networks square measure wide used and became progressively in style in an exceedingly broad vary of fields. The neural networks square measure fewer sensitive to the error term assumptions and may bear noise, feverish parts, and hefty tails higher than most alternative ways. This paper presents a study aimed toward foretelling water level of reservoir victimisation neural network approaches. the event of Artificial Neural Networks began or so fifty years ago, impressed by a need to grasp the human brain and emulate its functioning. inside the last twenty years, it's old an enormous revitalization thanks to the event of a lot of subtle algorithms and therefore the emergence of powerful computation tools. it's been proven that ANN models show higher leads to stream stage-discharge modeling as compared to ancient models. The human brain perpetually stores the knowledge as a pattern. Any capability of the brain is also viewed as a pattern recognition task. The high potency and speed with that the human brain processes the patterns impressed the event of ANN and its application in field of pattern recognition. ANN could be a computing model that tries to mimic the human brain and therefore the system in a {very} terribly primitive

thanks to emulate the capabilities of the person in an exceedingly very restricted sense. ANNs are developed as a generalization of mathematical models of human knowledge or neural biology. Comparison to a standard applied mathematics stage-discharge model shows the prevalence of Associate in Nursing approach victimisation ANN.

RELATEDWORK

Mahmood et al. [7] used seven completely different

mixtures of input variables and trained them for unharness model. The principal inputs that were accustomed calculate monthly unharness were monthly influx, rainfall, evaporation, reservoir storage, monthly total demand and discharged water at previous time. The model that gave the very best constant of determination was hand-picked to form discharged formula. it absolutely was found that ANNs have the flexibility to predict the discharge with accepted accuracy.



The sensitivity analysis for the model indicated that the reservoir storage (t) has the foremost important result on the expected unharness water (t) followed by unharness water (t-1). The result additionally indicated that downfall, monthly total demand have moderate impact, whereas evaporation and influx have the tiniest impact. Okoye and Igboanugo [9] with success developed a sound and statistically sturdy strategies and models and therefore the aim of this study was to develop artificial neural network models for predicting water levels at kanji dam, that provides water to Nigeria’s largest hydropower generation station. It involves taking of a 10 year record of the daily water levels at the dam. The daily water level were accustomed develop 5 neural network models Associate in Nursingd an Autoregressive Integrated Moving Average (ARIMA) model to suit the daily water levels obtained. The results show that the prediction accuracy of the neural network model will increase with increasing input, however once the four – input model the accuracy started declining. The four – input neural network model had very cheap relative error whereas the one input model had the very best relative error. Generally, the models’ predictions were smart, however the neural network models that involve very little arithmetic were a lot of less complicated to make. The developed models were terribly helpful in power coming up with in Nigeria’s hydropower stations for additional economical power provide. OndimuandMurase [10] determined that the neural networks (NN) models developed within the study were able to forecast the water levels of Lake Naivasha for four consecutive months starting once a given month and given information for 6 consecutive months before that month. Thus, NN offer a good

and timely methodology for statement water levels within the lake. this could facilitate in water-use formulation and programing for domestic, municipal and agricultural uses. Timely statement can even facilitate in disaster watching, response and management in areas vulnerable to floods. For power generation, effective and timely reservoir Level statement will facilitate in predicting power masses and management of power generation for potency and optimization. rangeltheamount{the quantity} of feature teams and also the number of components in every feature cluster used as inputs greatly influence the flexibility of NN to forecast reservoir levels accurately. information compression exploitation the Karhunen–Loeve Transform(KLT) provides associate degree best technique of reducing the scale of input vectors and so reduces the scale of NN used. This greatly will increase the statement ability of the NN models. However, information compression introduces undesirable qualities into the info that affects the statement ability of the NN. additionally, over compression of information undermines the potency of NN in statement reservoir levels.

METHODOLOGY

Enlargement of ANN is predicated on the subsequent rules:

1. IP happens at nodes that area unit single components and also are denoted as units, neurons or cells.
2. Signals area unit passed between nodes through association links.
3. every association link has associate degree associated

weight that represents its association strength.

4. every node generally applies a nonlinear transformation known as associate degree activation operate to its internet input to see its output.

ANN is network of parallel, distributed IP system that relates associate degree input and output vectors. it's a amount of data process components like cells or nodes which area unit sorted in layers. The input layer process components receive the input vector and transmit the values to subsequent layer of process components across connections wherever this method is sustained. this kind of network, wherever information flow a way (forward), is thought as a feed forward back propagation network. A feed forward back propagation ANN has primarily input layer, associate degree output layer, and one or additional hidden layers between the input and output layers. every of the neurons during a layer is connected to any or all the neurons of subsequent layer, and also the neurons in one layer area unit connected solely to the neurons of the immediate next layer. The strength of the signal passing from one nerve cell to the opposite depends on the load received from the interconnections. it's initiate that ANNs area unit strong tools for modeling several of the nonlinear hydrologic processes like rainfall-runoff modeling, ground-water administration, water quality recreation, stream flow, and reservoir water levels. The hidden layers enhance the network's ability to model complicated functions. Performance of BPANN (Back Propagation Artificial Neural Network) models is compared with the developed linear transfer operate (LTF) model and was found superior. ANNs will effectively model the stage- discharge relationship.

CONCLUSIONS

The neural networks (NN) models developed during this study were ready to forecast the water levels of Sukhi Reservoir for 10 daily consecutive days starting when a given day and given information for 10 consecutive days before that day. Thus, NN offer an efficient and timely methodology for statement water levels within the reservoir. this may facilitate in water-use formulation and planning for domestic, agricultural and municipal uses. Timely statement can even facilitate in disaster observance, response and management in areas liable to floods. For power generation, effective and timely reservoir level statement will facilitate in predicting power hundreds and management of power generation for potency and improvement. rangeltheamount{the quantity} of feature teams and also the number of components in every feature cluster used as inputs greatly influence the flexibility of NN to forecast reservoir levels accurately.

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