Computerized Paper Evaluation Using Neural Network

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Abstract: In today's world on one hand where the computer has revolutionized the field of education and on other hand there are still some areas where there is a need of use of computers. Traditional ways of checking have various kinds of faults. There are several mistakes that occur on the checking department's side like totaling error, marking mistake and sometimes there can be partiality in evaluation of marks. For any student the evaluation of the exam plays an important role. The students are generally classified on the basics of their performances in the examination. Therefore the assessment of examination should be carried out in a most efficient way. Current evaluation process leaves the future of the student at the mercy of the teachers. The understudies likewise don't motivate chances to express their insight and potential. Rather they are made to take in the stuff they had already learnt in their individual reading material. These variables upset the imagination of the understudies all things considered. Likewise a lot of cash and time is squandered. The practice of current evaluation system is used widely across the world and student s across all the areas have been facing the drawbacks of this current evaluation system. The advance of separation training has likewise been hampered by the non-accessibility of an automated assessment framework. This paper tends to how these striking insufficiencies in the instructive framework can be evacuated.

Keywords: Artificial Neural Network, Computerized evaluation, Neurons, Neural Network

I. INTRODUCTION

The current system for evaluation involves the evaluation of the answers written by the student in their exam sheets. This exam sheet is being collected for all the students and is sent to the assigned staff for the correction. The person who evaluates the exam can be internal or external depending on the significance of the exam. For the evaluation of the answer sheet of the students there is an answer key of question paper and the evaluator cross examines the student's response with the answer key.The evaluation that we are using for a long time has some of the demerits and some of which are:

1. One of the major issues of existing evaluation is the biasness of the evaluator.
   When the person who is evaluating the exam is from the same college or school then there is always a chance of biasness towards students.

2. Another problem faced with the existing evaluation system is the improper evaluation of the paper or the exam. Due to lack of time and interest of the evaluator, the evaluator tries to complete the evaluation of the paper within short period of time and this enforces the students to write essays in the exam instead of required information.

3. The appearance of the paper is also a demerit of the existing evaluation system. The evaluation method by the evaluator is directly related to the appearance of the paper. If the student has a good handwriting but lacks with proper information about a particular topic then also he is awarded with marks as compared to the student who does not have good handwriting but has complete information about the topic in the exam.

4. One of the major issues is the time delay that is involved with the current evaluation system. Usually manual correction by the evaluator takes longer time for evaluation and as a result the students get their results delayed.

II. LITERATURE REVIEW

Several different papers were considered for proposing a work in this field. This different works developed by different researchers suggested different methods.

A neural network is a computational model that is based on the neural network in the human beings. A neural network generally solves problems by learning and training. A neural network ids trained to make the data entered so that it could provide the expected output [3].

Several Neural Network application researches have shown that the neural network can be effectively used to solve problems related to education system. Oladokum, Adebanjo, & Charles-Owaba [4] state that neural network could predict students' academic competence well. In that research, the developed neural network could predict students' competence with the accuracy of more than 70%.

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In technical education, a neural network with back error propagation algorithm could predict education quality up to 90% accuracy [5].

One problem frequently encountered in classification using a neural network is the convergence duration of a neural network to identify patterns trained and the low accuracy of neural network in identifying the patterns tested. Muknahallipatna& Chowdhury [7] state that those problems could be solved by reducing input variable dimensionality of a neural network.

Numerous studies related to dimensionality reduction prove that increase in neural network is successfully achieved by reducing input variable dimensionality of a neural network. Blume et al. [8] finds that dimensionality reduction with neural network could lower pattern identification mistakes by 21%.

Hinton &Salakhutdinov [9] concludes that neural network is very effective for dimension reduction. Compared to other methods such as Principal Component Analysis (PCA), dimensionality reduction with neural network could produce better classification.

Perantonis&Virvilis [10] state that dimensionality reduction could increase neural network classification accuracy from 65% to 92.5%.

Different papers suggested different approaches of analysis of the language by neural network. The computerized evaluation of paper is better technique current evaluation system because there is no biasness and an equal opportunity is given to each and every student.

III. BASICS OF NEURAL NETWORK

An Artificial Neural Network (ANN) is Associate in information science paradigm that's galvanized by the method biologicalnervoussystems, like the brain, method data. The key part of this paradigm is thatthe novelstructureof theknowledge process system. It's composedof anoutsized variety of extremely interconnected processparts (neurons) operating along to unravel specific issues.

The regular assortment of fake neural system comprises of 3 groups, or layers, of units: a layer of "input" units is associated with a layer of "hidden" units that is associated with a layer of "yield" units. The action of the info units speaks to the crude information that is bolstered into the system. The action of each shrouded unit is chosen by the exercises of the information units and furthermore the weights on the associations between the information and furthermore the concealed units. The conduct of the yield units relies upon the movement of the concealed units and furthermore the weights between the covered up and yield units.

Neural networks square measure usually organized in layers. Layers square measure created of variety of interconnected 'nodes' that contain Associate in nursing 'activation function'. In procedure networks, the activation perform of a node defines the output of that node given Associate in Nursing input or set of inputs.

Artificial Neurons square measure the essential unit of Artificial NeuralNetwork that simulates the four basic perform of biological nerve cell. Its function formed as amodel of natural nerve cell. The subsequent figure shows the essential artificial nerve cell.

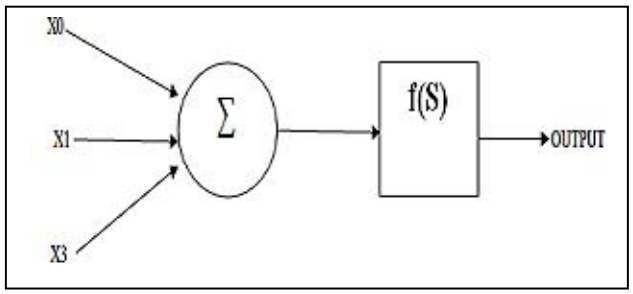

Fig. 1. Basic Artificial Neuron

The neuron is a gadget with many data sources and one yield. The neuron has two methods of operation; the preparation mode and the utilizing mode. In the preparation mode, the neuron can be prepared to flame (or not), for specific info designs. In the utilizing mode, when a showed input design is distinguished at the info, its related yield turns into the present yield. On the off chance that the information design does not have a place in the showed rundown of info designs, the terminating standard is utilized to decide if to flame or not. In the figure above, different sources of info are appeared by the numerical image, x(n). Each of this sources of info are increased by associating weights w (n). For the most part these are basically summed and nourished to the exchange capacity to create the yield comes about.

There are various types of artificial neural network some of which are listed below:

1. Feedforward Network

The first and the easiest type of ANN is the feed forward network. In this network, the data stream flows just in one direction i.e. forward direction from input point by means of concealed points to the yield point. No circles or cycles are present in the system. The data from one layer can only be sent to the other layer if the destination neuron is greater than the source neuron. To train the neurons we have to adjust the free parameters of neural system by a continuous procedure in incrementing by a given condition. Learning with instructor is called as (a) directed preparing; and learning without educator is called as (b) unsupervised preparing.

2. Recurrent Neural Network

A Recurrent Neural Network (RNN) is a time working neural network. It confirms the related input vector and then refreshes its hidden states (if any) through non-direct commands and uses it to shape forecast on output. In the RNN, the outcomeof the physical cell is increased by a weight and handled back to the contributions of substantial cell with latency.

3. Modular Neural Network

A Modular Neural Network (MNN) consists of a number of modules, each module ends up in one sub assigned value of the neural system's reality conditions, and each module isfunctionallyembedded. The reality conditions can be any Neural Network application or embedded memory usages.

4. Kohonen Self Organizing Maps

Kohonen self organizing maps measure a sort of neural system. They require no administration and subsequently known as Self Organizing. They learn individually unsupervised aggressive learning. They are also known as maps.

A portion of the benefits of fake neural system are:

1. ANN has the ability to be advised an approach to do assignment upheld the data given for instructing, learning and beginning skill.

2. ANN will deliver their own association and need no administration as they will learn without anyone else unsupervised focused learning.

3. Computations of ANN are measured in parallel.

4. ANN is utilized in design acknowledgment that might be a capable strategy for saddling the data and summing up with respect to it.

IV. PROPOSED SYSTEM

Having rattled off the bad marks of the present assessment framework, the requirement for another one turns into the need of great importance. This proposition is tied in with mechanizing the assessment framework by applying the idea of Artificial Neural Networks. The product is based over the layers of neural system. This product includes every one of the prerequisites of a customary answer sheet, similar to the uncommon easy routes for use in Chemistry like subjects where subscripts to condition are utilized often and whatever else required by the understudy. Counterfeit Neural Network likewise called as Neural Network depends on the portrayal of human neural framework. It comprises of an interconnected gathering of neurons. In different terms the neural system are non straight information demonstrating devices that can be utilized to show complex connections amongst data sources and yields. The most famous type of neural system design is MLP (Multilayer Perceptron). A MLP has various sources of info and has at least one concealed layers with various inputs.MLP has associations between input layer and the shrouded layer, between shrouded layers and between the last concealed layer and yield layer.MLP prepared alongside back proliferation calculation can be utilized for information mining.

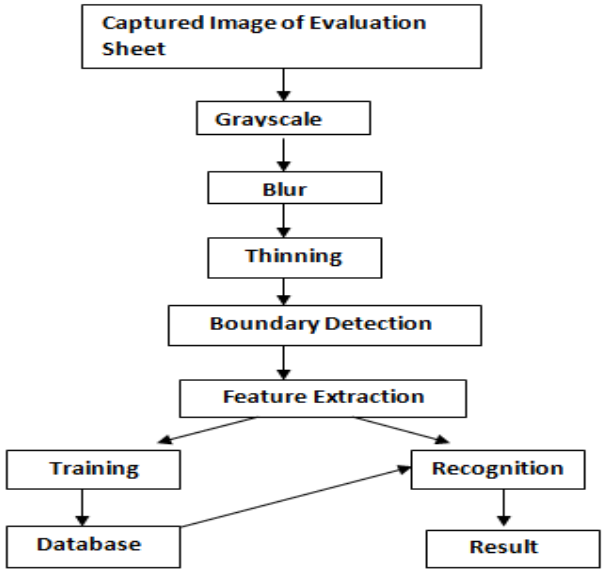

Fig. 2. Proposed System

The proposed system is dependent on the processing and training of the exam sheet of an individual so in order to achieve the evaluation of the answer scripts following steps are performed:

1. Image Processing
2. Training
3. Detection

Image Processing:

In picture preparing the info is a picture, for example, picture or video outline and the yield of picture handling is a picture or an arrangement of attributes or parameters identified with the picture. In our proposed framework we give the picture of the appropriate response contents to the framework and the framework preprocesses the picture through different preprocessing systems which are grayscale, obscure, edge and diminishing of the picture.

Grayscale:

Grayscale picture is a picture in which the estimation of every pixel is a solitary specimen that is it conveys just power data. Grayscale picture is additionally called as high contrast picture which are made out of shades of dim.

Blur:

In this step of the system the image is blurred. Blurring is done so that the image looks sharper and more detailed and all the objects in the image are easily recognizable. In this the edge content is reduced so that the transition from one color to the other is done.

Thinning:

Thinning is morphological operation that is used to remove selected pixels from binary images.

Boundary Detection:

In this step the boundary of the image is detected through various techniques. The boundary detection is done so that each character of the image is easily understandable and can be recognized easily for the evaluation of the result.

Training:

The Training of the proposed framework is completed utilizing the Artificial Neural Network. Preparing is finished with the assistance of simulated neurons. Counterfeit Neuron is a computational model roused in the characteristic neurons. Neurons get motions through neurotransmitters situated on the film of the neurons. At the point when the solid signs are gotten by the neurons the neurons are enacted and discharges as a flag. These signs may be sent to another neurotransmitter and might actuate different neurons. These comprise of information sources and these are then figured by the numerical capacity which decides the actuation of neurons. There is another capacity which figures the yield of the manufactured neuron. The Artificial neural system joins the neurons keeping in mind the end goal to process the data.

Database:

Neural networks represent inherently information by the processing within the nodes. Trained neural networks square measure just like rules within the typical symbolic sense a really promising approach is so the embedment of neural networks directly into the generalized information framework of a knowledge-based information system.

Detection:

The characters identified by the system are matched with the characters in the database and the performance of the student is calculated by each of the correct answer. Ranking of the students are done based on the correct answer and the student with all the correct answer is declared as topper of the class.

Figure 3 represents the whole working of the proposed system where the user inputs the the exam answer sheet and the system uses various techniques like thinning, boundary detection, blur and grayscale to get more accurate results . The result is later stored in the system database.

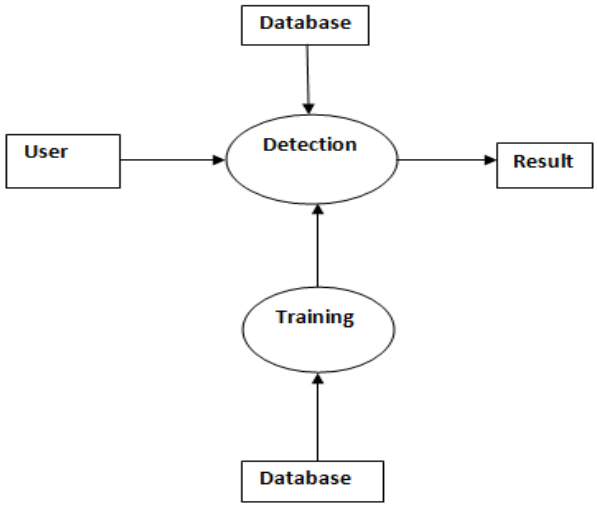

Fig. 3. Data flow Diagram ofProposed System

V. COMPARISON BETWEEN PROPOSED SYSTEM AND TRADITIONAL EVALUATION SYSTEM

TABLE 1: Comparison between Artificial Neural Network and Other Systems

Artificial Neural Network(ANN)	Traditional Evaluation System(TES)
Artificial Neural Network is faster than our Traditional Evaluation System as no human intervention is required in evaluating the students marks thus it completely relies on computational power.	Traditional Evaluation System is solely based on human evaluation of the subject which in turn is obviously more time consuming then the ANN.
ANN is more accurate while evaluating the marks. In case of computers there cannot be any error in evaluation of the score.	TES can result in error in evaluating as it involves human interaction, thus it is not foolproof.
ANN cannot be biased. The deserved score will be provided to the student.	TES can sometimes be biased depending upon the relationship of the student with the faculty.
Updating of marks on the website is much faster than TES.	Updating of marks in slower than the ANN's.
ANN is cost effective as it is just software which requires initial buying price.	TES is not cost effective as it requires the salary to be paid to the respective faculty.

VI. RESULT

To get the results and efficiency of the system the above proposed system was performed in which the students of 10 different schools were being evaluated. In the data set given below for a student of a particular school is to get a pass in a particular test the student has to get particular marks in a particular question.

If there are Q1, Q2 … Qn number of questions in the set, S be the number of students and s1, s2, s3 …. sn be the score of the student in all the subjects. Each student has to score above average score of all the questions in the set. Passing criteria should be:

Average = (s1, s2, s3 …. sn)/Qn

For example, Student S1 with ID 890723 has to score above or equal to the average score of all the questions in the set to meet the passing criteria.

Average = (43+47+40+27+69+32+59+32)/8
= 43 (approx)

Similarly the evaluation of other students of different schools can be done easily and efficiently and the progress of the student can be recorded and stored in the system. Thus the above proposed system can be used for result evaluation and is better than the traditional evaluation system as there are minimum chances of faults.

TABLE 2: Data Set of Students of Different Schools

School ID	Q1 (%)	Q2 (%)	Q3 (%)	Q4 (%)	Q5 (%)	Q6 (%)	Q7 (%)	Q8 (%)
082	43	47	40	27	69	32	59	32
098	60	48	38	46	72	40	66	48
098	60	52	37	38	75	23	65	34
087	46	47	38	39	59	19	68	28
065	54	49	39	36	70	22	72	35
064	62	50	48	47	77	27	72	40
032	51	47	34	38	87	28	69	35
043	69	66	56	53	86	40	81	39
031	40	40	33	65	61	24	57	19
011	49	50	44	33	70	22	66	29

Through this result we can evaluate the score of individuals in any organization and the data is stored in the computer and there will be minimum chances of error as it is evaluated by the system and there would be complete transparency of the result to the students.

VII. CONCLUSION AND FUTURE SCOPE

Counterfeit neural system is one of the developing fields that contains for the future figuring. This paper proposes an arrangement of mechanized paper assessment that would be exceptionally valuable for the assessment of the aftereffects of the understudies. They work more also to human mind than regular PC rationale. A framework is proposed in this paper which can be executed to assess the examination aftereffect of the understudies. This framework is a reasonable method for assessment as it one-sided to the understudies. Programmed assessment of single sentence distinct answer would be valuable for the colleges, schools and universities for scholarly reason by giving simplicity to resources and the examination assessment cell. Expectations this paper draws out the essential comprehension of ANN and rouses the exploration assemble taking a shot at Computerized Paper Evaluation. The fate of this innovation is extremely encouraging and the entire key lies in equipment improvement as ANN require speedier equipment.

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