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Role of ICT In Shaping The Behavior of College Students

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A B S T R A C T

Perhaps the most well-known issues of utilizing Information and Communication Technologies (ICTs) in schooling is to put together decisions with respect to innovative conceivable outcomes as opposed to instructive requirements. In agricultural nations where advanced education is loaded with genuine difficulties at various levels, there is expanding strain to guarantee that mechanical conceivable outcomes are seen with regards to instructive requirements—educating and learning measure. Present another period has advanced in the training area through ICTS. Distinctive ICTs are currently set to get instrumental to assist with extending admittance to schooling, fortify the importance of instruction to the undeniably computerized work environment, and raise instructive quality by, among others, helping make educating and learning into a drawing in, dynamic interaction associated with reality. The application and openness to and sending of ICTs on a very basic level change the manner in which training is imagined and conveyed to understudies. ICTs are empowering influences that improve understudy focused academic techniques. Because of its simple openness this methods for schooling has gotten mainstream everywhere on the Information and Communication Technology (ICT) is a vehicle to upgrade the nature of the training. As the world is moving quickly into advanced media and data, the part of ICT in training is getting more significant in the 21st century. ICT assists with sharing accessibility of best practices and best course material in training. ICT based instruction causes changes in the instructive targets in the origination

Keywords: ICTs, ICT-based Higher education

1. INDRODUCTION

Schooling is the foundation of a country. Regardless of knowing this, countless individuals of least created nations are a long ways past the compass of advanced education. One of the key reasons might be the poor monetary state of those nations. Maybe this is the critical test to be tended to by those countries for generally speaking advancement where training might be on the top rundown. Data, Knowledge, and Communication Technology additionally assume indispensable part in the development just as delivering and offering labor and products at generally decreased expenses.

Keen utilization of ICTs can handle data, make knowledgebase and make them accessible any place and at whatever point essential. However, in spite of having moderately poor financial condition, Information and Communication Technologies (ICTs) as a rule have huge accomplishment in offering types of assistance at decreased expenses for individuals' entryway steps. ICTs have something very similar to accomplish for making the advanced education accessible to all classes of individuals all through the country at a lower cost. Thus, on one hand individuals will have the entrance directly on advanced education and then again will acquire the vital information, abilities, and encounters to serve the country and succeed in like manner.

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2. ICT IN HIGHER EDUCATION

The presentation of ICT in the advanced education has significant ramifications for the entire training measure going from speculation to the utilization of innovations in managing central points of contention of access, value, the executives, productivity, instructional method and quality.

1. Student-focused Learning: ICT gives an innovation that has the ability to advance and support the change of instruction from an instructor coordinated endeavor towards understudy focused models. As an ever increasing number of understudies use PCs as data sources and psychological instruments, the impact of the innovation will increment to help their investigations
2. Supporting Knowledge Construction: Learning approaches utilizing contemporary ICTs give numerous chances to constructivist learning and backing for asset based, understudy focused settings by empowering figuring out how to be identified with setting and to rehearse.
3. Anyplace Learning: With the assistance of ICT, instructive foundations can offer projects a good ways off mode. Today numerous understudies can utilize this office through innovation worked with learning settings.
4. Anytime Learning: Technology-worked with instructive projects eliminate the topographical boundaries. Understudies can embrace schooling anyplace, whenever and at any spot. This adaptability has given learning freedoms to a lot more students who beforehand were compelled by different responsibilities expresses that data framework of Higher Education is ineffectively evolved and unevenly appropriated.

The significant difficulties confronted are absence of mindfulness and outlook, absence of high level responsibility for the advancement in CT joining, a precise technique for ICT execution, cost of transmission capacity and proficient use of ICT. To determine these difficulties, it is important to characterize all around arranged ICT strategy for effective activation of assets. Notwithstanding these challenges, various Higher Education Institutions in have gained huge headway in building an ICT framework and creating software engineering and other ICT disciplines, illuminates factors affecting Integration of ICT in showing practice in Teacher Education Institution in advanced education.

The significant elements for fruitful execution of ICT in instructing acquiring are ICT abilities, certainty to utilize PC, foundation and accessibility in equipment and programming. In such manner the chances and difficulties presented by mix of ICTs in different parts of advanced education in the current situation are talked about. The variables featured are age, sexual orientation, capability, insights, experience and authoritative qualities which has a significant influence in execution of ICT in educating learning reason. Further e learning endeavors are accounted for to be related with issues in the development, use and progress of the eLearning conditions in the foundations for educating, learning and regulatory purposes in the paper creating e learning materials for the product advancement course.

The different components that add to these practical regions were recognized and a hypothetical model is created, convenience of the Internet on understudy's presentation, tosses the light to analyze fulfillment and ease of use of web use on understudies' task consummation undertakings and their exhibition and arranged stretched out task innovation fit model to think about innovation obstruction and innovation utilization factors

3. BENEFITS AND CHALLENGES OF ICT

The presentation of ICT in the advanced education has significant ramifications for the entire training measure going from speculation to the utilization of innovations in managing central points of contention of access, value, the executives, productivity, instructional method and quality.

Student-focused Learning: ICT gives an innovation that has the ability to advance and support the change of instruction from an instructor coordinated endeavor towards understudy focused models. As an ever increasing number of understudies use PCs as data sources and psychological instruments, the impact of the innovation will increment to help their investigations

5. DEFINITION OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTS*)*

Data and Communication Technologies (ICTs) are frequently connected with the most refined and costly PC based advancements. Yet, ICTs likewise include the more regular advances like radio, TV and phone innovation. They incorporate the 'old' ICTs of radio, TV and phone, and the 'new' ICTs of PCs, satellite and remote innovation and the Internet. These various devices are presently ready to cooperate, and consolidate to shape our 'organized world' – a gigantic framework of interconnected telephone utilities, normalized registering equipment, the web, radio and TV, which ventures into each edge of the globe'. At the point when we discuss ICTs, we allude not exclusively to the most recent PC and Internet based advances, yet additionally to straightforward general media helps like the straightforwardness and slides, tape and tape recorders and radio; video tapes and TV; and film. These more seasoned and more recognizable advances are alluded to under the aggregate heading of "simple media" while the fresher PC and Internet based innovations are known as the "computerized media"

6. ICTS AND EDUCATION

At the point when the new innovations of correspondence - from the individualized PC helped learning frameworks to the more mass coordinated radio and TV today offer an unparallel chance to reevaluate customary instructive and learning practices and organizations. The idea that instructing and learning can be removed from the limits of existing schools and universities, that educating can be individualized and unfeeling toward geo climatic distances is one which has arisen out of the broadcast communications Information and correspondence innovation application establishes an outright need, given tremendous scattered populaces in a sub mainland; insufficient assets and amazing requirements. The new innovations offer us the opportunity to telescope many years of foundation building and advancement exercises by giving us the upside of rapid conveyance with no weakening in quality; wide reach; individualization of learning in a whenever, anyplace circumstance; and intelligence, a low for each unit cost. These advancements and offices can be similarly utilized for language instructing, for proficiency and grown-up learning. This brings the job of the instructors or teachers into center. The grown-up teacher is a critical individual in the entire cycle of learning and executing instruction and a passage to the student

7.Using ICTs in Education 1. INDRODUCTION

There are three manners by which ICT in instruction is considered in current reasoning. These are ICT instruction; ICT upheld training, and ICT empowered schooling. ICT Education: This is the most well-known comprehension of the field of ICTs in instruction. Basically, it alludes to the production of human asset to meet the IT needs of the information economy. In fostering every nation is attempting to make a pool of labor to address open positions in PCs—equipment and programming, making and preparing individuals in Higher Education. Frequently, an ICT in Education strategy of an administration depicts the means by which PCs will be set in schools, how educators and understudies will be given the fundamental PC programming abilities to oblige the developing position market in PC based advancements.

8.ICT SUPPORTED EDUCATION 1. INDRODUCTION

Countless distance instruction colleges and projects use ICT to help the print content that they convey to understudies. These incorporate transmission sound and video, for example, radio and TV projects, sound and video tapes conveyed to understudies as a component of a learning pack, and in later occasions, interactive media content, for example, exercises which are conveyed disconnected, for example on CDs. This is likewise at times called sight and sound schooling, where different media are utilized to help learning.

9. ICT ENABLED EDUCATION 1. INDRODUCTION

Any instructive program that is simply conveyed through ICTs, or with ICT conveyed content as the essential spine of the educating learning measure, for example, on line flows through the web, is ICT empowered training. In basic words, this type of schooling requires ICT access and necessitates that the student use ICTs as an essential or fundamental vehicle of guidance.

- Mix, supplement with various media
- Mix and analysis with arrangements and medicines
- Greater accentuation upon substance, less on style
- Use of designs, liveliness
- Summarizing and recap of primary concerns

Work in intuitiveness the fundamental components of ICTs (equipment, programming, network, the Internet) the survey is organized around their applications in the four key operational elements of HEIs, specifically research, local area commitment, instructing, and organization. For each capacity we survey the part of ICTs as far as: 1) the potential advantages; 2) the probable difficulties; 3) the arrangements required; 4) execution procedures.

10 CONCLUSION

Combination of ICT in advanced education is inescapable. In the coming years the push will be on the utilization of ICT to fortify the framework in the method of opens and distance learning. Institutional and area wide advanced education ICT strategy and arranging ought to distinguish the particular job of ICT in improving exploration abilities and accommodate sufficient framework upheld by limit building.

Advanced libraries, admittance to online information bases, organizing and so forth can be improved through between institutional cooperation to guarantee ideal utilization of ICT aptitude and assets.

EDUSAT and DTH will be advanced, any place possible, to improve admittance to data and assets. A transmission Server for advanced capacity, recovery and transmission of transmission quality instructive sound video projects will be conveyed.

Computerized libraries, admittance to online information bases, organizing, and so forth, can be improved through between institutional joint effort to guarantee ideal use of ICT ability and assets. The wide selection of ICT calls for outlooks and ranges of abilities that are versatile to change.

Stock Markets have long remained one of the one avenues on the forefront which is crucial for the operations of most of the top most companies. Several decisions pertaining to investments, shares etc. depend on the behaviour of the stocks of a company. The stock price values are often leveraged by financial and investment firms for gaining profits and investing. However, the volatile nature of the stock markets make it a risky proposition. Therefore, estimating the future trends in stock prices is somewhat mandatory for firms analysing stock prices and aiming to gain leverage. This calls for stock market forecasting or stock market prediction. Stock market prediction is basically a time series prediction problem. Mathematically:

$$P = f(t, v) \quad \textbf{(1)}$$

Here,

P represents stock price f represents a function of t is the time variable

v are other influencing global variables

The dependence of stock process over time makes it somewhat predictable under similar other conditions of global influencing variables. However, even the slightest of changes can derail the prediction completely.

2. NEED FOR ARTIFICIAL INTELLIGENCE BASED TECHNIQUES FOR STOCK MARKET PREDICTION

Primarily, artificial intelligence (AI) based techniques are used where the data to be analyzed is extremely large and complex to be analyzed by conventional computational or statistical techniques. There are various AI based approaches used for time series prediction or fitting applications out of which neural networks and fuzzy logic have gained substantial prominence. With the advent of deep learning, the computational capability of algorithms have also risen allowing us to find trends in highly non-linear and uncorrelated data.

The following section briefly explains the fundamentals of neural networks and fuzzy systems and their application to stock market prediction.

Artificial Neural Networks (ANN)

Artificial Neural Networks try to copy or emulate the thinking process of the human brain to predict data. The fundamental properties are:

1) Parallel data processing capability
2) Learning and Adapting capability
3) Self-Organization

The mathematical model of ANN is shown below:

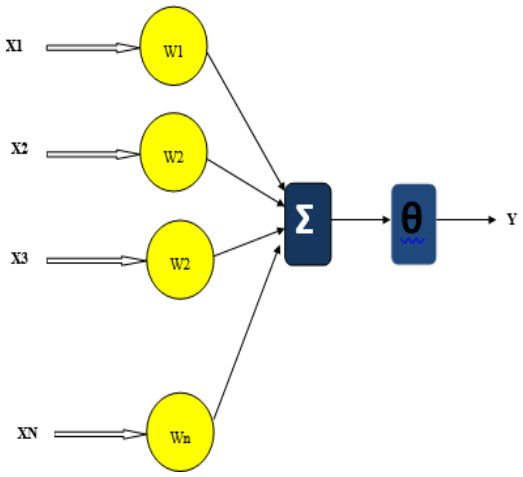

Fig.1 Mathematical Model of Neural Network

The output of the neural network is given by:

$$\sum_{i=1}^{n} XiWi + \theta \qquad (2)$$

here

Xi represents the signals arriving through various paths,

Wi represents the weight corresponding to the various paths and Θ is the bias.

The essence of neural networks lies in the fact that neural networks can find a relation among variables which may seem highly uncorrelated. Moreover, as the data keeps changing, the neural network structure keeps adapting in terms of the weights so as to optimize the model and reduce the errors in the output. Fundamentally, the learning is sub categorized as under:

1) Computational Intelligence
2) Artificial Intelligence
3) Machine Learning
4) Deep Learning

A set theoretic relationship among the above can be seen to be depicted by figure 2

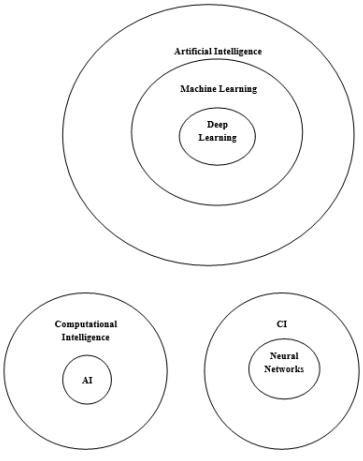

Fig.2 Relationship between machine learning paradigms

Moreover, neural network architectures are also categorized as:
Feedforward Networks: Feed forward networks consist of only the feed forward path for data to travel from input layer towards output layer
Recurrent Networks: Recurrent networks have at least one closed data path loop.
Back Propagation: Back Propagation feeds back the error at the output as an input

The diagrammatic representations are given below:

Fig.3 Single Layer Feed Forward Network

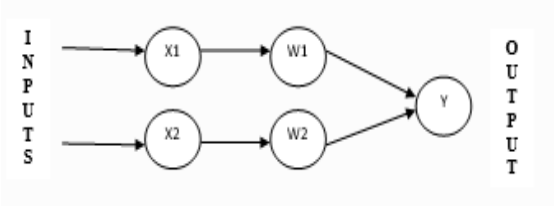

Fig.4 Multi-Layer Feed Forward Network

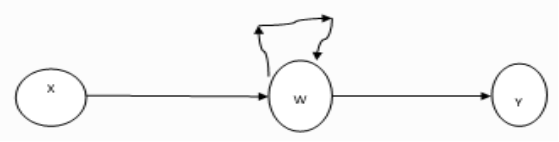

Fig.5 Recurrent Network

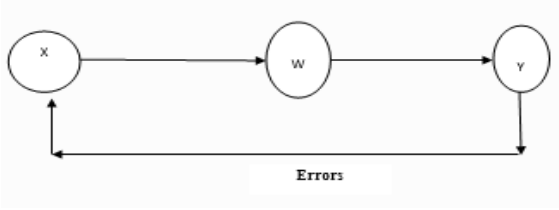

Fig.6 Network with back propagation

Out of the empirical neural network architectures, back propagation has gained significance due to its accuracy in prediction of time series applications. However the performance for different training algorithms vary considerably in terms of errors and number of iterations.

Fuzzy Logic

Another tool that proves to be effective in several prediction problems is fuzzy logic. It is often termed as expert view systems. It is useful for systems where there is no clear boundary among multiple variable groups. The relationship among the inputs and outputs are often expressed as membership functions expressed as:

A membership function for a fuzzy set A on the universe of discourse (Input) X is defined as:

$$\mu A: X \rightarrow [0,1] \qquad (3)$$

Here,

each element of X is mapped to a value between 0 and 1. It quantifies the degree of membership of the element in X to the fuzzy set A.

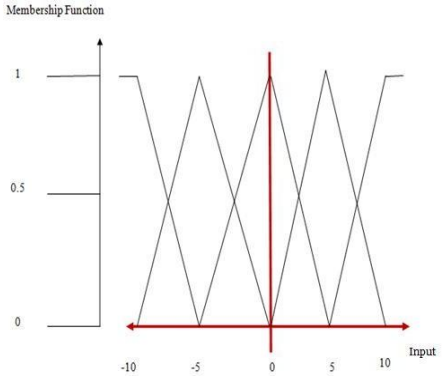

Fig.7 Graphical Representation of Membership Functions

Here,

x axis represents the universe of discourse (Input).

y axis represents the degrees of membership in the [0, 1] interval.

The final category is neuro fuzzy expert systems which governs the defining range of the membership functions.

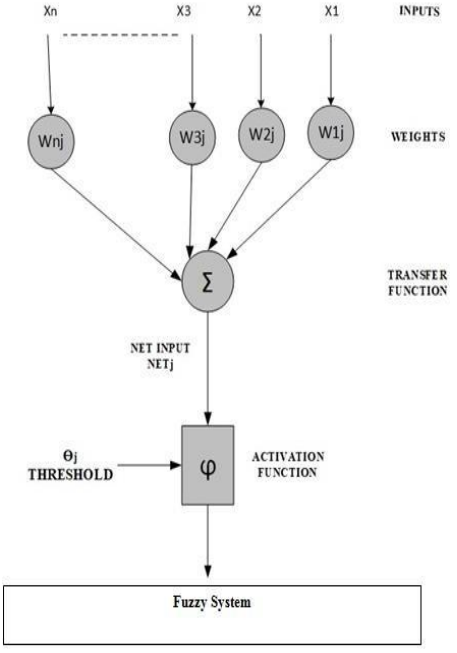

Fig.8 Block Diagram of Neuro-Fuzzy Expert Systems

3. PREVIOUS WORK

Different approaches have been devised so far for accurate time series prediction for stock process. The previous work is summarized in table1 along with their salient points.

Table.1 Summary of Previous Work

Title	Authors	Approach Used	Performance Metrics
Predicting the Direction of US Stock Prices Using Effective Transfer Entropy and Machine Learning Techniques **IEEE 2020**	S Kim, S Ku, W Chang, JW Song	Effective transfer entropy (ETE) used in conjugation with existing ML algorithms such as LR, MLP and LSTM.	Mean Absolute Percentage Error (MAPE)
Augmented Textual Features-Based Stock Market Prediction **IEEE 2019**	S Bouktif, A Fiaz, M Awad, Amir Mosavi	Opinion Mining and Sentiment Analysis was used along with historical stock prices for market prediction.	Mean Square Error, Accuracy.

Incorporating stock prices and news sentiments for stock market prediction: A case of Hong Kong", Information Processing & Management **Elsevier 2018**	X Li, P Wu, W Wang	Textual normalization and opinion mining techniques were incorporated as features to gauge the sentiments of the common public regarding reputations of the firms since previous prices .	Precision, Accuracy.
Deep Learning with long short term memory networks for financial market predictions **Elsevier 2017**	Thomas Fischer, Christopher Krauss	The authors have proposed the use of long short term memory (LSTM) neural networks for stock market prediction	Root Mean Square Error (RMSE)
Financial news predicts stock market volatility better than close price", **The Journal of Finance and Data Science 2016**	Adam Atkins, Mahesan Niranjan, Enrico Gerding	Authors incorporate the Financial News data for stock market forecasting. The Bayesian approach is used.	Accuracy.
Stock market trend prediction using dynamical Bayesian factor graph **Elsevier 2015**	Lili Wang, Zitian Wang, Shuai Zhao, Shaohua Tan	A dynamical Bayesian factor graph used for prediction of Chinese Stock Exchange.	Accuracy
Sentiment Analysis for Indian Stock Market Prediction Using Sensex and Nifty **Elsevier 2015**	Aditya Bhardwaj, Yogendra Narayan, Vanraj, Pawan, Maitreyee Dutta	The authors incorporated sentiment analysis data from social media as a feature and found increase in accuracy of prediction	Mean Absolute Percentage Error, Accuracy.
Stock market prediction using artificial neural networks **Citeseer 2014**	B Chauhan, U Bidave, A Gangathade, S Kale	The authors have proposed the knowledge discovery process (KDD) technique and discovery mining along with neural networks for stock market prediction	Accuracy

The analysis of previously existing techniques renders an insight into the different approaches that have been prevalent thus far and hence allows us to propose a particular approach.

4. LIMITATIONS OF PREVIOUSLY EXISTING SYSTEMS AND POSSIBLE SOLUTIONS

The major challenges and limitations seen so far are:

1) Several approaches ignore the local disturbances in the mined data which can render inaccuracies in prediction.
2) Employing deep learning and back propagation simultaneously has not been explored in detail.
3) Dimensional reduction and optimization techniques such as principal component analysis (PCA) has not been coupled with the training algorithms.

Thus the proposed approach can explore using pre-processing tools like the wavelet transform defined as:

The mathematical formulation for the wavelet transform is given by the scaling and shifting approach of the wavelet function.

The scaling, shifting dependence can be defined as:

$W\varphi(Sc,Sh)=\text{₩}[\mathbf{x},\mathbf{t}]$ (4)

Here,
x is the space variable
t is the time variable
Ψ is the transform
s_c is the scaling factor
s_h is the shifting factor

Moreover probabilistic back propagation approaches such as the Bayesian Regularization (BR) algorithm can be used to enhance accuracy. The Bayesian Regularization (BR) algorithm is a modified version of the LM weight updating rule with an additional advantage of usingthe Baye's

theorem of conditional probability for a final classification [32].
The weight updating rule for the Bayesian Regularizationis given by:

$$w_{k+1} = w_k - (J_k J_k^T + \mu I)\text{^} - 1(J_k^T e_k) \quad (5)$$

Here,
w_{k+1} is weight of next iteration,
w_k is weight of present iteration
J_k is the Jacobian Matrix
J_k^T is Transpose of Jacobian Matrix
e_k is error of Present Iteration
μ is step size
I is an identity matrix.

Moreover for the predictive modelling using a data set, the Baye's Rule is followed, which is given by:

$$P\frac{A}{B} = \frac{P(A).P\frac{B}{A}}{P(B)} \quad (7)$$

Here,
$P^{A/B}$ is the probability of occurrence of A given B is true.
$P^{B/A}$ is the probability of occurrence of B givenA is true.
$P(B)$ is the probability of occurrence of B
$P(A)$ is the probability of occurrence of A

5. PERFORMACNE METRICS

The performance metrics typically computed in time series applications are:
Mean Square Error:
It is mathematically defined as:

$$mse = \frac{1}{n}\sum_{I=1}^{N}(X - X')^2 \quad (8)$$

Here,
X is the predicted value and
X' is the actual value and
n is the number of samples.
Mean Absolute Percentage Error (MAPE)

It is mathematically defined as:

$$MAPE = \frac{100}{M}\sum_{t=1}^{N}\frac{E - E_t|}{E_t} \quad (9)$$

Here,
E_t and $E_{t\sim}$ stand for the predicted and actual values respectively.

The number of predicted samples is indicated by M. It is expected that an approach comprising of a deep learning based on the aforesaid parameters would attain lesser error and higher accuracy compared to previously existing techniques.

6. CONCLUSION

It can be concluded from previous discussions that stock market prediction is a category of time series prediction with high sensitivity and dependence on external factors. Hence it is often challenging to attain high levels of accuracy in prediction. This paper presents a comprehensive survey on the prevailing techniques employed for stock market prediction. A comparative analysis of the proposed approaches has been done. Moreover, the limitations in previously existing systems have been clearly cited. Possible solutions towards improvement of existing systems has also been proposed.

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