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# Role Of Deep Learing in Health Care Systems Using Mesh Neworks

**N. Legapriyadharshini[1], Dr. D. Sivakumar [2]**

[1]Adhiparasakthi Engineering College ,Melmaruvathur, Chennai-603319, Tamilnadu, India
[2]Easwari Engineering College, Chennai-60089,Tamilnadu

**Abstract**

Day to Day life users are facing more difficulties in their work so physical body condition becomes weak due to their emotional feelings .In order to solve this situation .Computers are playing important role to solve this problem with help many computer devices like sensors as well as using many applications with help of various algorithm using mesh networks. Artificial Intelligence exists when a machine can have human based skills such as learning, reasoning, and solving problems.Evoluation of AI leads to Machine learning as well as Deep Learning algorithms are developed to predict the users activities in daily life more accurately .Users emotions like heartbeat,energy ,movement can be detected using body sensors is considered as Physical data .Various datas like typing speed and typing errors are considered as neurophysical data.Using various Deep Learning algorithms such as FFNN,CNN as well as Machine Learning algorithms like DT,RF algorithms are used to analyze the emotional feelings of the users with various literature survey to enhance the classification success of the system by interpreting the users emotions. In this paper various survey has been taken in the current status of AI applications in healthcare and discuss its future.

**Keyword**: Artificial Intelligence, Deep Learning, Decision Tree, Conventional Neural Networks

## 1.Introduction:

Artificial Intelligence (AI) is a scientific technology in the computer devoted to making machines think and behave like humans. AI is an intangible part of human brain with the combination of Learning, Reasoning, Problem solving perception and language understanding to solve complex problems. Many of the Artificial Intelligence with the help of mesh networking technology solves complex problems in the field of healthcare,finance,education etc.AI makes day day to life more comfort and fast.Machine learning is a subset of AI which is making specific goal to success without explicit programming.As Machine learning applications grows strong demand for computers to handle unstructured data like video and images.So deep learning enters makes machine learning more sophisticated to tackle challenges because it is modeled like human brain.Deep neural network is build between nodes(like neurons )is highly connected ways.

Big data analytic methods has been arrived due to increasing availability of healthcare data in the medical field more success in the AI.Clinical relevant questions can be solved by AI methods which in turn can assist in clinical decision making accurate[1].

In this paper survey has been made in AI in healthcare by motivating AI to use in healthcare systems,data types have been analysed and mechanisms that make AI to generate clinical optimal results.Below Fig 1 shows the role of deep learning and machine learning in the artificial intelligence.

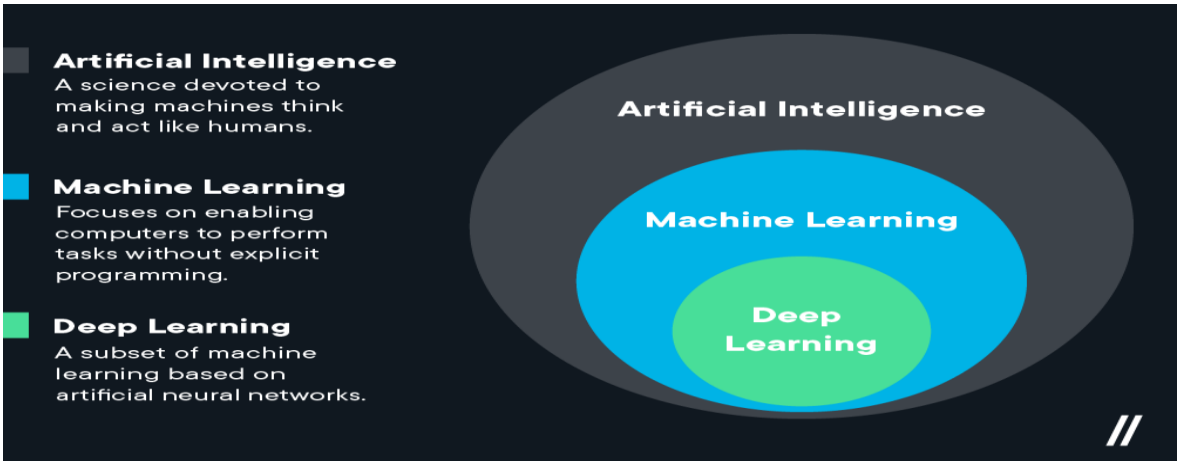


Fig 1. Shows the DL and ML part in AI

**2.Role of Artificial Intelligence in Health Care systems:**

The Artificial Intelligence devices that have been found useful in the medial applications. Machine Learning algorithms can has major two categories which are unsupervised learning and supervised learning. Unsupervised learning is well known for feature extraction as well as analytical datas, while supervised learning is suitable for predictive modeling via building some relationships between the patient as input and the outcome of interest as output[2]. In Artificial Intelligence Supervised and Unsupervised learning provides clinically relevant results. For detecting healthcare conditions supervised learning method is used for optimal results. So relevant techniques include linear regression,decision tree,support vector machine(SVM), and neural network [5].

In this paper more details survey report has been analyzed in the clinical field using supervised and unsupervised techniques .Clinical reports have been prepared for detecting actual data in sensor smart watched attached with the patients and measured datas are sent to the mobilephones.Mobile phones store all the measurements in their local database and these data is send to another location for processing. All physical and emotional statuses are varying depending upon the heartbeat frequency[9].Heartbeat frequency lowers when the user is in relaxing conditions. Heartbeat values are collected with their emotional feelings as normal and abnormal values. Average of the values is calculated and recorded as heartbeat value of the corresponding hour.Total time spent to complete typing, average time of typing (Total time/number of characters), and typing errors are recorded as neurophysical parameters[9]. After collecting the clinical datas machine learning algorithms like SVM,DT and CNN are applied to the dataset.Experiments are carried out system having Intel® Xeon machine in Python language and with AppleiWatch ,Vestel smart watch devices for collecting datas[12]. Dataset is divided into two halves randomly. Nearly 67% of the dataset is employed for the training process, and the remaining part is kept as the test data. Then Support Vector Regression, Decision Tree, and Deep Learning algorithms are performed. After the training step using clinical datas each of the algorithm is executed and their classification performance is recorded for analytical performance. Total Time, Average Time, and Error Count and Error Count Measurement such as typing errors are recorded when users are typing given text is calculated[9].


**Figure 2** The machine learning algorithms used in the medical literature. The data are generated through searching themachine learning algorithms within healthcare on PubMed

**3.Various kinds of Conventional Machine Learning Algorithms:**

In the AI many algorithms are designed to analyze and predict the disease ranges in the medical area to give accurate results. But here we have discussed the survey made in the major three important machine learning algorithms they are Support Vector Machine Algorithm,Decision Tree Algorithm and Conventional Neural Networks.

3.1 Support Vector Machine Algorithm(SV):

One of the important regression algorithm is Support Vector Regression.In this algorithm the extreme points are selected to form hyperplane to get the best decision points. In SVM is classified into two groups outcome as $Y_i$ as Classifier which represents −1 or 1 where *i*th patient is in group 1 or 2 respectively. $X_{ij}$ is written as

$$a_i = p\ j{=}1 w_j X_{ij} + b$$

where $w_j$ is the weight putting on the *j*th trait .According to decision rule if $a_i$ >0,the *i*th patient is classified to group 1, $Y_i$= −1; if $a_i$ <0, the patient is classified to group 2,$Y_i$=1[14].Furthermore, assuming that the new patients come from the same population, the resulting $w_j$s can be applied to classify these new patients based on their traits.SVM has beenextensively used in medical research field to predict the optimal results. Orrù *et al* applied this SVM algorithm to identify imaging biomarkers of neurological and psychiatric disease[30]. Sweilam *et al in his research* reviewed the useof SVM algorithm in the diagnosis of cancer[15]. The figure 3 shows the SVM algorithm diagrammatic representation.

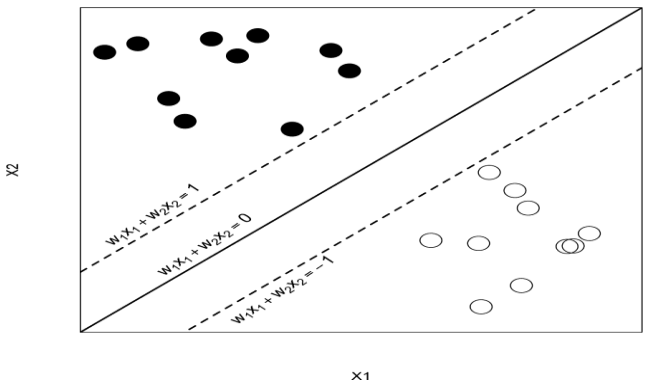


Figure 3 An illustration of the support vector machine

### 3.2 Decision Tree Algorithm(DT):

Decision Tree algorithm is one of the best machine learning algorithm. It is best known for dynamic learning algorithm and falls under supervised learning algorithm.This algorithm is used in solve both classification and regression problems.DT uses tree representation to solve the problem In each level information gained is calculated for remaining data recursively. This algorithm handle missing attribute value and continuous value .In this algorithm where the same or different multiple types of classifiers are trained to solve a problem. Among several machine learning algorithm each machine learing algorithm creates their own hypotheses and decision integration model has been generated for only one final decision making. Combination of majority voting and Artificial Neural Network models are robust and efficient for classification [6]. In this work, the decision of each classifier is voted according to majority. Decision tree algorithm gives superior and majority accurate results when compared with other algorithm.

### 3.3 Conventional Neural Network (CNN):

CNN one of the best and special type of deep learning networks [11] which provide a better performance compared with many other machine learning algorithms. CNN is also known as a FeedForward Neural Network and it has more hidden layers. The hidden layers has convolutional layers mixed with pooling layers. In the CNN algorithm the input data pass through a series of layers in this algorithm is convolution layers with filters (Kernels). The convolution of data with filters generates a feature map that associates information with data on the filter. Multiple filters are applied to input data toget a stack of feature maps that becomes the final output of the convolutional layer[6]. During training process the values of filters are learned more quickly. Convolution operation captures information about local dependencies or semantics in the regions of original data. CNN architectures contain a sequence of conventional layers interleaved with pooling layers, followed by a number of fullyconnected layer[16-20].

The CNN recently has been successfully implemented in the medical area to analyze disease diagnosis. This algorithm yields 90% accuracy on diagnosis and treatment suggestion [16-10].Esteva et al performed the CNN to identify the skin cancer disease from clinical reports.The proportions of predicted malignant lesions and benign lesions are 90% shows accurate results [15-20].The performance of CNN algorithm is really very competitive for the experienced physician to give the accurate results in classifying normal and disease cases.The below table 1 shows comparison clinical results in various AI algorithms and CNN is most preferred algorithm for detecting clinical reports.Figure 4 shows the measurements made with several algorithms in AI among all CNN gives best and accurate results.

| Study | Collection method | Algorithm | Accuracy |
|---|---|---|---|
| [23] | Electrocardiogram sensors | Statistical Analysis | 75.58 |
| [29] | Electrocardiogram sensors | Support vector machines | 76.21 |
| [11] | Sensor | Decision Tree | 82.03 |
| Our study | Sensor | CNN | 84.31 |

Table 1.shows the comparison results of various AI algorithms

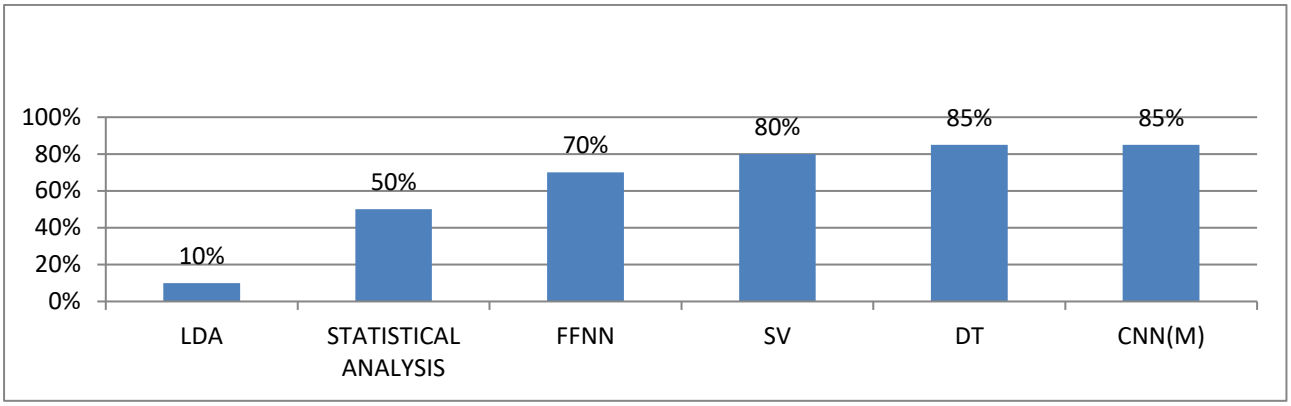


Fig 4 shows the results of various algorithms in AI

**Conclusion**:

In this article several survey has been taken in the AI machine learning algorithms such as DT,SV and CNN in the medical area.Compared and analyzed with several reports in the clinical field that CNN algorithm is giving accurate results compared with other algorithms.So CNN algorithm is best suited for future eras in the medical field.

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