MACHINE LEARNING IS AN EMERGING TECHNIQUE FOR ORTHOPEDICS APPLICATION

Dr.S.B.Dhoble[1] , Dr.K.D.Ganvir[2]
[1]Asst.Professor,Department of Electronics & Communication Engineering,
Priyadarshini Bhagwati College of Engineering,Nagpur-34

[2]Asst.Professor, Department of Mechanical Engineering,
Priyadarshini Bhagwati College of Engineering,Nagpur-34

Abstract: The objective of the present work is to introduce different machine learning algorithms for predicting condition and stiffness in bone joints/parts. Different machine-learning models were compared with the standard database of orthopedics applications.By using machine learning models, it is possible to predict condition and remedies during bonetreatment. The main ML techniques will be introduced and qualitatively explored, by considering the indexes that better identify the performance of the models; then, the main two applications will be addressed: diagnosis and prediction. Finally, a discussion about the limitations of the studies and technologies will be proposed.

Keywords: **artificial intelligence**; **machine learning**; **diagnosis**; orthopedics,treatment

1. INTRODUCTION

Machine learning is a one of the most functionalbranch of artificial intelligence (AI) which mainly focuses on application of data and its algorithms to imitate the way that humans learn, gradually improving its accuracy for thier need of application. The algorithms of Machine Learning are generally created by using desired frameworks that accelerate the evelopment solution.Orthopedics typically focuses on treating the musculoskeletal system of a patient. This system used to comprises muscles, bones, joints, ligaments, and tendons depends on person to person.Mainly it outlines the different conditions that orthopedists treatment needed.

The purpose of this paper is to serve as a usful guideline by presenting the most relevant studies and concern prediction in orthopedics concerning modelsby machine learning, and by exposing the main concepts and limitations of such type of technology by tackling the main problems concerning both the field and the technology itself. Algoritham planned byMachine learning is played an important role of the growing field of artificial intelligence and data science. Through the use of statistical methods, algorithms are trained to make classifications or predictions.Now a days, machine-learning tools,its algoritham and statistical methods have been extensively used to study and analyze various relative parameters and prediction that influences bone treatment. It is a growing field and application oriented technique in the modern industry 4.0 for predicting uncertainty in orthopedics application .

2. Methodology

In this research, four different supervised machine learning techniques were studies. The forthcoming section give review of this working machine learning models.

2.1 k-nearest neighbors regression (k-NN)

k-NN is widely used for regression and identification in defiened problems.. It is a non-parametric learning technique used to classify the available data.It is defined as a classification model to detemine new study points for medical analysis in field of orthopedics application. It is a very simple and intuitive algorithm that used to predict

the desired points by finding the K nearest data points to a given input values by using Euclidean distance criteria.

Figure 1. k-NN Model

2.2. Decision trees (DT)

To perform the regression,anather supervised learning technique is used to perform classification to given data and analysis.D. The node of classification trees trained for given dataand train the tree with predicted characteistics.In bone analysis,this decision tree is used to predict the target value at considered joint points.

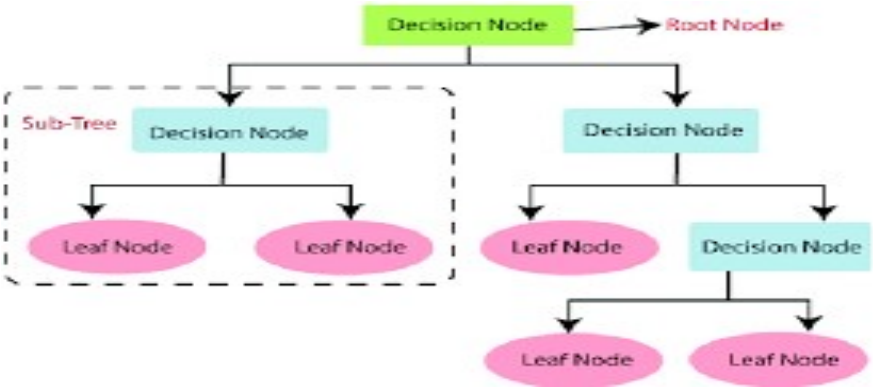

Figure 2. Decision Tree

2.3.Random forest (RF)

By using supervised learning and bagging technique,the tree is designeg known as Random forest.To incorporates several classifiers,RF learning model detect nonlinear ansemble approach between available and predicted data that is used to avoid overfitting.RF trees run simulaneously in parallel to classify the applications of orthopedics.

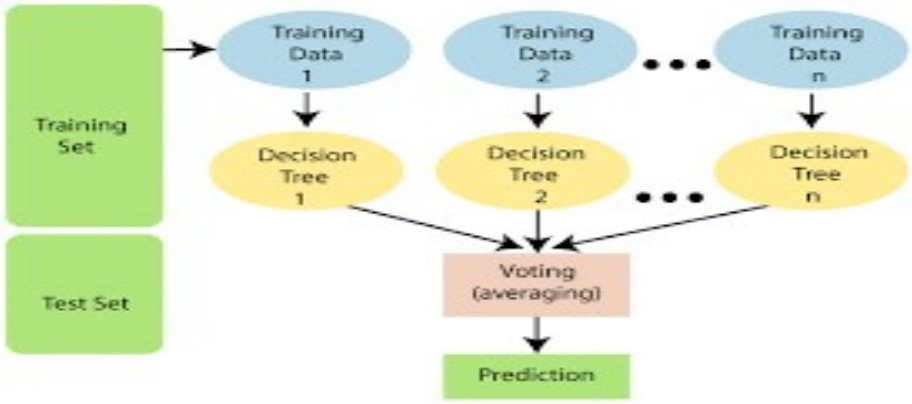

Figure 3. Random Forest

3. Conclusion and Discussion

The different learning model are tested on availble data set. The response of all regression model and its performance were successfully evaluated and compared for application oriented data analysis.

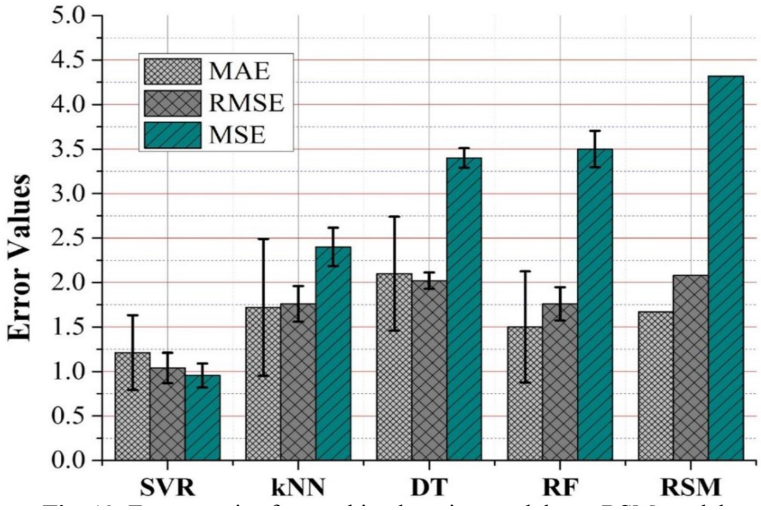

Figure 4. Error Metrics for Machine Learning

The above machine learning regression model are defined by its accuracy and performance.the matrix of training and testing data were used to define error matrix between RMSE, MAE and MSE as presented in Fig. 9. It was conclude thatthe resultant data for the SVR model were found comparativelymost near to predicted value of application.

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