CLASSIFICATION AND PREDICTION OF ORTHOPEDIC DISEASE

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ABSTRACT_ Machine learning is becoming more and more popular in the medical field as a way to predict and treat diseases early on. People are getting hurt at a younger age because the number of orthopaedic diseases is going up. This can be stopped by getting a diagnosis early. So, the goal of this study is to help orthopaedic specialists predict diseases early and classify them in the right way. In order to do this, three machine learning algorithms, such as Logistic Regression, Random Forest Classifier, and k-Nearest Neighbor, were used on a dataset of 310 patients. Each patient's pelvic and lumber were described by six biomechanical features. The results of the algorithms are then compared, and Random Forest is found to be the best, with an accuracy of 89 percent. The accuracy of the other algorithms ranges from 80 to 90 percent.

1.INTRODUCTION

Machine learning is becoming more and more popular in the medical field as a way to predict and treat diseases early on. The most common orthopaedic diseases that affect people of all ages are hernia and spondylolisthesis. A hernia is when an organ or fatty tissue pushes through a weak spot in a muscle or connective tissue that is around it. It hurts the lower part of the body and makes the person feel very bad for a few days. Hernias happen when an unwanted organ pushes against an open or weak spot in a muscle or tissue. A hernia can also be caused by not getting enough food. In spondylolisthesis, the bones in the spine are affected, which can cause severe pain when moving. People who are older are more likely to have spondylolisthesis, which can also be passed down or caused by how you live your life. Mild spondylolisthesis can be treated fairly well, but severe cases need surgery that is done with the utmost care. Orthopedic disease has been put into three groups: normal, hernia, and spondylolisthesis. These groups are based on six characteristics of 310 patients' pelvic and lumber areas. The pelvic incidence, pelvic tilt number, lumber lordosis angle, sacral slope, pelvic radius, and degree of spondylolisthesis are the six features. The results are then tested and trained using three machine learning algorithms. The accuracy of the prediction models is used to judge how well the results were tested and trained. The main goal of

this study is to find the best algorithm that can correctly classify and predict diseases. This will help doctors make early diagnoses and take steps to prevent them.

2.LITERATURE SURVEY

[1] P. Srimani and M. Koti said that in this study, experiments are done on five medical datasets, and the results show that there is a dramatic improvement in the performance of the base classifiers. This would make it easier for doctors to make accurate diagnoses, which would improve patients' health indices. Also, it is decided that only certain classifiers should be used for each data set, and that ensemble classifiers don't need to be proposed in some cases. To get the most accurate results for a certain set of medical data, it is best to choose the classifier correctly.

[2] The Nearest Neighbor (KNN) algorithm for recognising patterns is very simple, very popular, very efficient, and very effective.

KNN is a simple classifier. Samples are put into groups based on the group of their closest neighbour. There are a lot of records in medical data bases. If the data set has attributes that are duplicated or don't matter, classification may give less accurate results. In INDIA, heart disease is the main cause of death. In Andhra Pradesh, heart disease was the leading cause of death. It was responsible for 32% of all deaths, which is as high as the rates in Canada (35%) and the USA (35%). So, a decision support system needs to be set up to help clinicians decide what precautions to take.

[3] To figure out what would happen, an ANN model and a logistic regression (LR) model were used. The age, gender, length of symptoms, smoking status, surgical level, visual analogue scale (VAS) of leg/back pain, the Zung Depression Scale (ZDS), and the Japanese Orthopaedic Association (JOA) Score were chosen as the input variables for the established ANN model. For figuring out how things turned out, the Macnab classification was used. ANNs were trained using data from LDH patients who had surgery to predict whether or not a discectomy would be successful after two years. To find the important variables, a sensitivity analysis was done on the established ANN model.

[4] ML was described as a powerful set of computing tools, which is the most common way that this term is used in the medical field. Also, we pushed for the evaluation of these tools to be closely tied to the main reason researchers make and use them in medical fields: to help doctors do their main jobs, which are to make decisions "in the absence of certainty" and

turn those decisions into care choices that will help patients. This is a practical point of view, and it can help deflate the current hype about the arrival of "artificial intelligence" in medicine, where ML "rides on the peak of inflated expectations."

[5] The pelvic vertebra has been a key part of this change by gradually getting wider and turning backwards [1]. To keep a straight posture, the body's centre of gravity needs to be in a small area between the feet while keeping a horizontal gaze and using little energy. In 1992, Duval-Beaupere et al. used a Barycentermeter [3] to look at the pelvic shape and sagittal profile of healthy volunteers. They wrote about a morphological parameter called "Pelvic Incidence" to make it possible to analyse the pelvis's anatomy in the sagittal plane in the same way more than once.

[6] This study shows how muscle fatigue information can be used to classify patients with cervical disc herniation and healthy people. Patients with a herniated cervical disc have neck pain, which gets worse when the muscles in the neck get tired. After back pain, neck pain is the most common type of pain. Because neck pain affects daily life, more and more research is being done in this area.

3.PROPOSED SYSTEM

In this proposed system, orthopaedic diseases have been put into three groups: normal, hernia, and spondylolisthesis. These groups are based on six characteristics of 310 patients' pelvic and lumber regions. The pelvic incidence, pelvic tilt number, lumber lordisis angle, sacral slope, pelvic radius, and degree of spondylolisthesis are the six features. The results are then tested and trained using three machine learning algorithms. The accuracy of the prediction models is used to judge how well the results were tested and trained. The main goal of this study is to find the best algorithm that can correctly classify and predict diseases to help doctors make early diagnoses and stop them from happening.

3.1 WORKING MODULES

We have divided our project into 2 modules. They are:

1. Disease Prediction Module
2. Application Modulee2WE

Disease Prediction Module: We take data and values from data sets and applying three algorithms and from that algorithm we take highest accuracy model to predict.

Application Model: After testing patient will get the report of their therapeutic values. These values are given to application model and it will predict the disease.

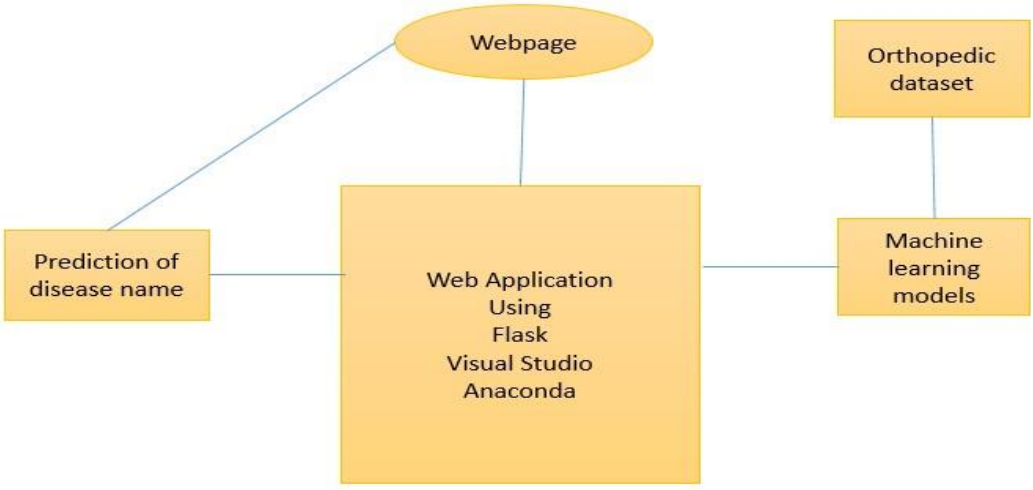
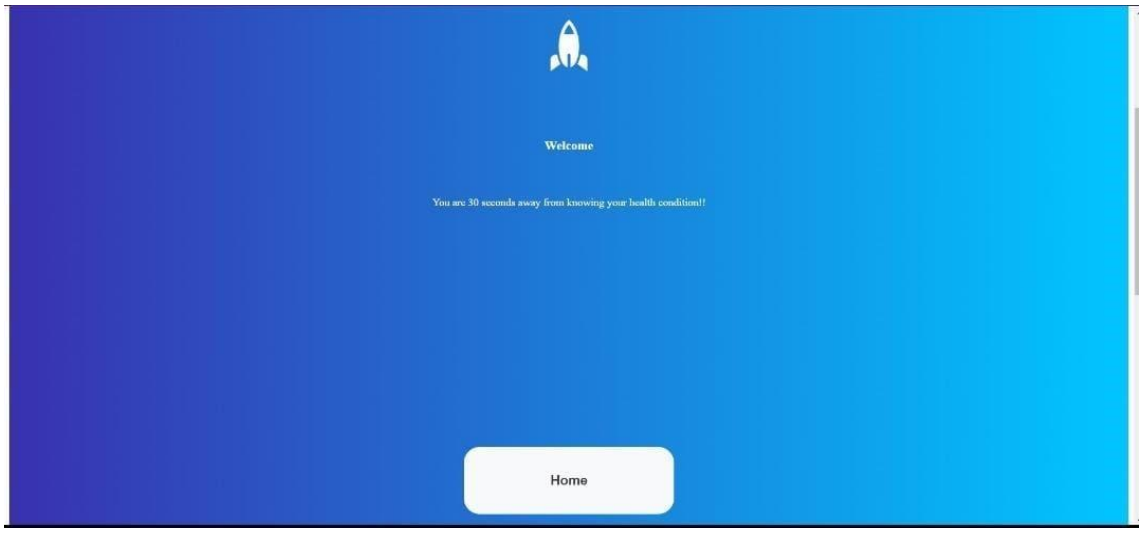
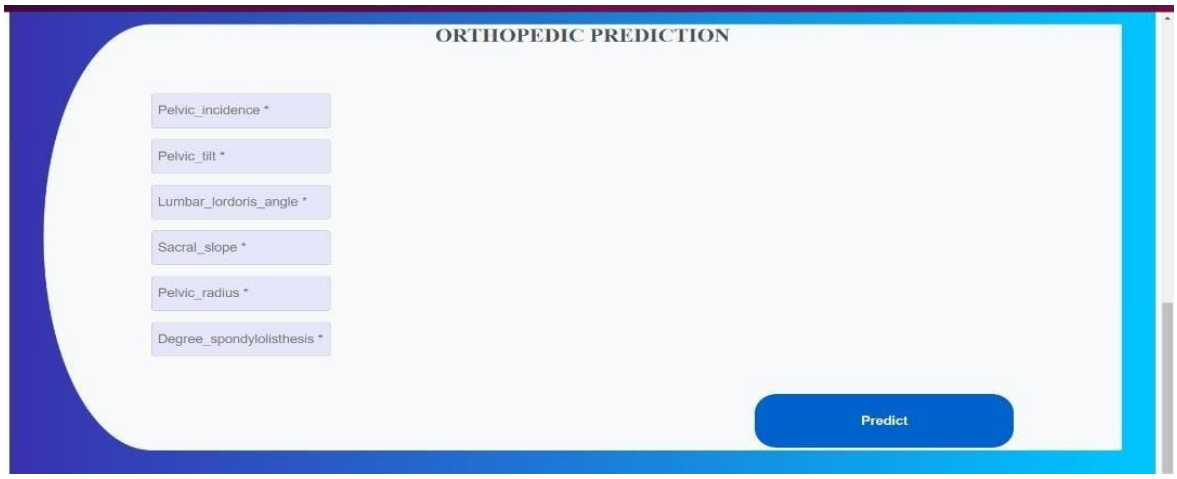
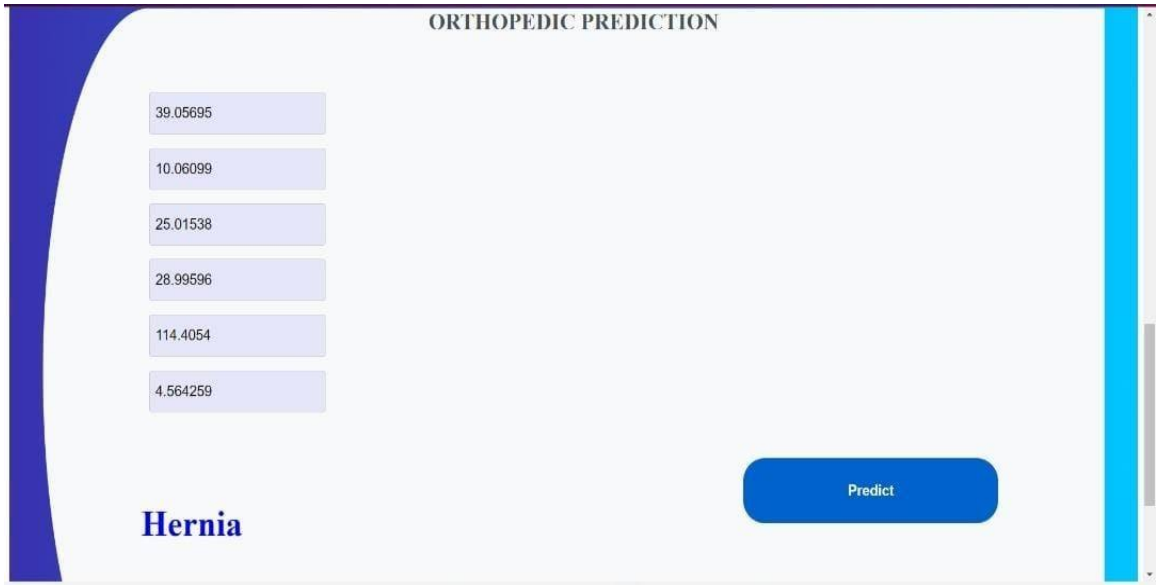


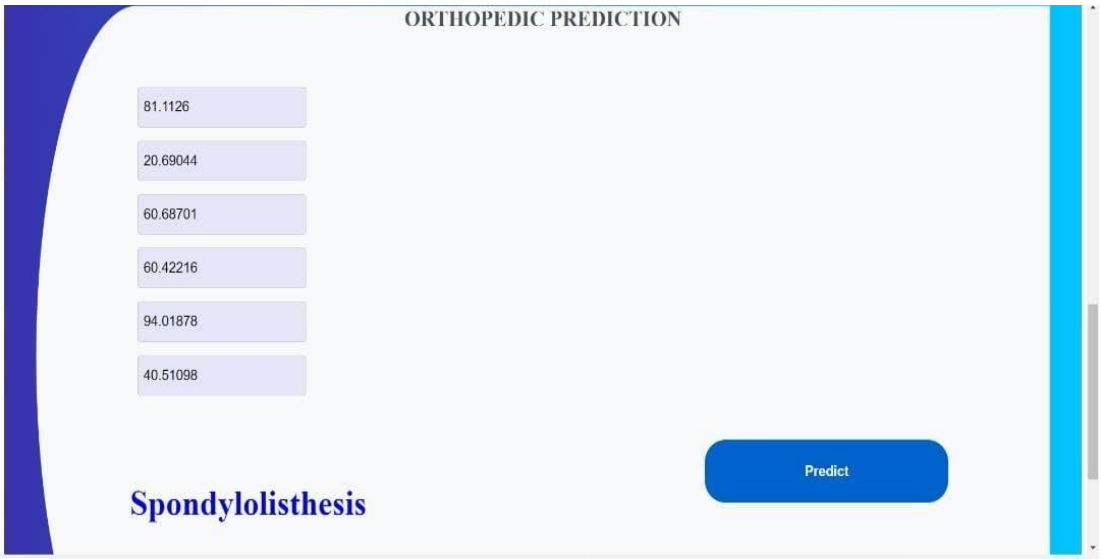
Fig 1:Architecture

4.RESULTS AND DISCUSSION




ORTHOPEDIC PREDICTION
Pelvic_incidence *
Pelvic_tilt *
Lumbar_lordoris_angle *
Sacral_slope *
Pelvic_radius *
Degree_spondylolisthesis *
Predict


ORTHOPEDIC PREDICTION
39.05695
10.06099
25.01538
28.99596
114.4054
4.564259
Predict
Hernia


ORTHOPEDIC PREDICTION
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60.42216
94.01878
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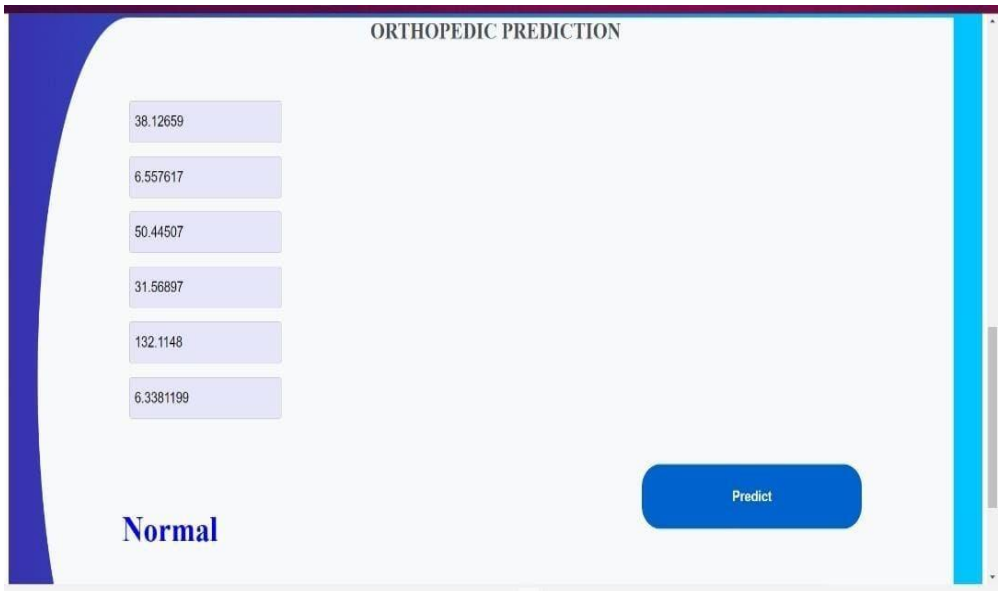
Predict
Spondylolisthesis



5.CONCLUSION

Orthopedic diseases make people's daily lives hard because they can't do normal things like getting dressed and cooking like a healthy person would. Early diagnosis and treatment can stop orthopaedic diseases from getting worse and help people get better faster. It is possible to do this with machine learning, and researchers are always trying to improve their results. This research aims to give more information about the subject and shows that among Random Forest, Logistic regression, and KNearest Neighbor, KNearest Neighbor is the most accurate, with an accuracy of 89, and can be used in the medical fields as a web page.

FUTURE ENHANCEMENT:

With the system we've suggested, we're trying to make this last as long as possible. There are many ways to make the project's scope even better. As a first step, we want to make a mobile app that can track a patient's condition based on the theoretical values of orthopaedics and take the right steps to cure the disease.

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