

MES COLLEGE OF ENGINEERING, KUTTIPPURAM  
DEPARTMENT OF COMPUTER APPLICATIONS  
20MCA245 – MINI PROJECT

PRO FORMA FOR THE APPROVAL OF THE THIRD SEMESTER MINI PROJECT

*(Note: All entries of the pro forma for approval should be filled up with appropriate and complete information. Incomplete Pro forma of approval in any respect will be rejected.)*

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(Filled by the Department)

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1. Title of the Project : Bone deformity identification using machine learning

2. Name of the Guide : MR NOWSHAD CV

3. Number of the Student: MES20MCA-2059

4. Student Details (in BLOCK LETTERS)

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Date:01/12/2021

**Approval Status** : Approved / Not Approved

Signature of  
Committee Members

**Comments of The Mini Project Guide** Dated Signature Initial Submission :

First Review :

Second Review :

**Comments of The Project Coordinator** Dated Signature Initial Submission:

First Review

Second Review

Final Comments :

Dated Signature of HOD

# Bone Deformity Identification Using Machine Learning

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## Introduction And Objectives:

The success of machine learning algorithms in medical imaging has increased the need for artificially trained models to make them work in the medical field more quickly and efficiently. This paper gives a technique to identify bone fracture using machine learning algorithms, by which workload for orthopedics can be reduced. The significant use of machine learning in this era of big medical data would help gather information from the available x-ray images rather than spending hours in the radiology departments. This Project presents imaging technologies used to identify bone fracture in the human body and give quick results once the x-ray has been taken.

Bone fracture is quite a familiar problem in humans which is caused by falls, accidents, disease as pathological fractures, injury to the overlying skin, hairline fracture, etc. To identify the fracture x-rays and CT scans are used but these cannot always detect the exact location of the fracture. Hence the involvement of machine learning and artificial intelligence would have a great impact on the outcomes and the fracture can be accurately diagnosed. X-Ray imaging technique is often used by orthopedic doctors for fracture detection. Using machine learning tools, we can inventively extract information about the human body conveniently and economically. It is possible because of both hardware and software advancements and the development of existing technology. We know that a single method cannot be applied to all parts of the body, but experimenting with new technology that would be capable of identifying the fractures in our body using one method. The proposed Computer-Aided Diagnosis (CAD) system is a different method to tackle this problem. Artificial intelligence (AI) and machine learning (ML) techniques are revolutionizing several industrial and research fields so it can be applied to the medical sector as well. This system is an AI and Machine Learning based analysis system. It is applicable to all age groups of men, women and children. It provides a summarized and evaluated results of any detected deformity or fracture based on the x-ray images. Implementation of an image processing based efficient system to accurately detect the fractures in the whole human body is the aim of this project.

- To identify bone fracture using machine learning algorithms, by which workload for orthopedics can be reduced.
- It is applicable to all age groups of men, women and children. It provides a summarized and evaluated results of any detected deformity or fracture based on the x-ray images.

## Problem Definition:

### EXISTING SYSTEM

It is necessary to study the existing system before the attempt is made enlarge it.

Bone fracture is quite a familiar problem in humans which is caused by falls, accidents, disease as pathological fractures, injury to the overlying skin, hairline fracture, etc. Doctors can diagnose bone fractures with **x-rays**. They may also use CT scans (computed tomography) and MRI scans (magnetic resonance imaging). Nevertheless, sometimes the size of fractures is not significant and could not be detected easily. It Requires more manpower. The system is not efficient and it have more Time consuming.

### PROPOSED SYSTEM

The entire process of detection of fracture mainly deploys the ridge regression model and the method of edge detection. The main advantage of using a ridge regression model is that despite being almost similar to linear regression it introduces a small bias which can prove to give better predictions in long term applications. Another important concept used in the procedure of detection is edge detection which involves automatic identification of the boundaries present between objects. This segregation of boundaries benefits in breaking up the image into separately examinable areas. Also, ridge regression gives better performance against data which does not have a pattern similar to the data used for training the model due to the diversity present in the images of the dataset. Thus, a ridge regression model coupled

with edge detection gives us the desired outcome. The libraries used in the model of the given work are numpy, pickle, opencv2, tensorflow, sklearn and similar libraries. Different regressors imported are KNeighbour, DecisionTree, RandomForestClassifier and similar. The python pickle module is useful in performing the function of converting the data into a byte stream and vice versa. In other words the python object structure is serialized and deserialized so as to save it to the disk. For the model in this work two lists were created, one for training and another for testing respectively. For the first set of labels, the corresponding model returns a numpy array used for training. This is followed by usage of pickle library which performs its functions as mentioned above and stores the images to the file or database. These lists are then converted into input and output arrays for both training and testing arrays. An x-ray image is taken as input for detection of fractures. Manual edge detection and median filter smoothing are performed on the images multiple fractures in the bone structure as well. One more important factor to be taken into consideration is the size of the 1D array created from the flattening of the feature vectors of the images present in the dataset. Image thresholding is performed and an optimum value of pixel size is fixed. So, an optimal size was chosen for the images of the dataset and the dataset was customized accordingly.

## **Basic functionalities:**

### **FUNCTIONAL MODULE**

#### **• CNN ALGORITHM**

CNN is used for bone fracture identification. The system proposed here is a CAD system with very specific and sensitive. A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. CNNs are used for image classification and recognition because of its high accuracy.

### **MODULE DESCRIPTION**

- ADMIN
- USER

#### **Admin**

- Login
- Data set management
- View users
- Feedbacks
- View prediction results

#### **User**

- Register
- Login
- Upload Image
- View Prediction
- Feedback

## **Tools / Platform, Hardware and Software Requirements:**

### **HARDWARE REQUIREMENTS**

The selection of hardware is very important in the existence and proper working of any software. Then selection hardware, the size and capacity requirements are also important.

- Processor : Intel Pentium Core i3 and above, 64 bits
- RAM : Min3GB RAM
- HARD DISK: 10 GB

### **SOFTWARE REQUIREMENTS**

One of the most difficult task is selecting software for the system, once the system requirements is found out then we have to determine whether a particular software package fits for those system requirements. The application requirement:

- OPERATING SYSTEM: WINDOWS 10
  - FRONT END: HTML, CSS, JAVASCRIPT
  - BACK END: Mysql
  - IDE USED: JetBrainsPycharm, Android studio
  - TECHNOLOGY USED: PYTHON JAVA
- FRAME WORK USED: Flask

