CHAPTER 1

INTRODUCTION

There are 700,000 rheumatoid arthritis (RA) sufferers in India, and this number rises by 30,000 per year. RA-related joint deterioration causes discomfort, decreased joint function, joint degeneration, and joint deformity. Early intervention enhances the prognosis, however it is crucial to accurately gauge the rate of RA progression and recommend the best course of action.X-rays of the hand or foot are used in the diagnosis of RA. The modified Total Sharp (mTS) score is utilized to assess joint space narrowing (JSN) and erosion in the 32 hand joints and 12 foot joints. The 4 grades of the JSN score and the 5 grades of the abrasion score are personally assigned to each joint by orthopedic doctors.

1.1 Project overview

However, X-ray images must be taken multiple times year to enable accurate assessment numerous because there are different evaluation points for the MTS score and it might be challenging to communicate the results. Because it determined by orthopedicians, score is likewise subjective. It is consequently necessary to implement an automated MTS score calculation method supported by X-ray image analysis. Technology for automatically recognizing finger joints is necessary for the fully automated score computation method. Reference [2] suggests a finger joint detection system based on deep learning. It can only applied to growing children's finger joints; it cannot be use on RA patients directly. Becausethe compressed finger joints of patients with severe RA are too tiny for joint examination, TheMTS score examines the erosion score and JSN score for each finger joint. For a patient with mild RA, Reference [3] automatically determines the JSN score.

1.2 Aim

The effectiveness of a fully automated joint detection and mTS score calculation method is assessed in this study. Additionally, we see a specific stage of performance increase by artificially rotating and gamma correcting the training image. For clinical application, we additionally evaluate total MtS and information about estimated scores.

1.3 Objective

- The study objective of this is to evaluate a fully automated finger jointidentification and MTs score estimate method.

- In addition, by artificially rotating and gamma-correcting the training image, we observe an increase in performance at a particular level.

- In addition, we assess total mTS and information on anticipated scores for clinical application.

1.4 Motivation

In way to create a learning management system (LMS) that enhances the educationalexperience, promotes individualized learning, and provides both students and teachers with the tools they want to improve their academic performance, this endeavor will utilize the opportunities provided by machine learning and educational technology.

1.5 Scope

The workload for orthopedics is decreased by this project's strategy for identifying bone fractures using machine learning techniques. The extensive use of machine learning in this eraof massive medical data will make it possible to extract information from the available x-ray images rather than spending hours in radiology departments. After taking an x-ray, the imaging methods reported in this study can swiftly assess whether a bone fracture has occurred in a human body.

CHAPTER 2

LITERATURE SURVEY

2.1 Review

By conducting searches in both the Scopus and the Medline databases, we have looked at andlearned about the various techniques used by researchers. Fractures can be found using a varietyof techniques, such as classification, regression, clustering, K-means clustering, CNNs (Convolutional Neural Networks), ANNs (Artificial Neural Networks), and others. In a [01] study report, CNN is used to pinpoint bone fractures. Here, the technology is an extremely fine-tuned and exact CAD system. [2] This uses an x-ray image as the input and employs a contour- based technique to find discontinuities for identification [3]. The effectiveness of each tacticand the level of accuracy reached gave us ideas for the ideal method to employ for the paper. The poll also uncovered data regarding the target aspects that should be weighed. We made a sincere effort to leverage the study's conclusions and limitationsto create novel, practical approach it may be utilized in the radiology and muscular health clinics. The recommended examination by Doukas et al[4] includes two stages: first, morphological chiefs refine their initial identifications of bright and dull hairs and ruler utilizing a flexible shrewd edge identifier. In addition, the hairs are connected and kept in place using a vehicle for a variety of painting goals.

2.2 Existing System

In the current setup to distinguish between healthy and damaged bone, a deep the network of neurons developed. The sparse data volume results in the deep learning model to be over fit. That’s y this method for improving data have been used to increasing the data gathering. To assess the effectiveness of the model while utilizing the Soft max and Adam Optimizer, three experiments have been conducted.

Disadvantages

- Longer processing time
- Less precise outcome

2.3 Proposed System

A neural network in depth is developed in the present work to difference between healthy and fractured bones. The collection of data consists of 100 images of various human bones. A little data set causes a deep neural network to overfit. In way to obtain the data, an image augmentation approach was applied. The proposed model's classification accuracy for both healthy and damaged bones, using fivefold cross validation, is 92.44%. When it comes to the classification of the 10% and 20% test data was over 95% and 93%, respectively. The current model greatly outperforms the 84.7% and the 86%.

2.4 Feasibility Study

Using the plausibility investigation, the undertaking related issues are fixed. An imaginative framework's plan is shown by the recommended cure.

2.4.1 Technical Feasibility

Users in hybrid networks were successful transfer data thanks to software. The information cannot be transmitted from the source to the goal without consideration any restrictions, problems, or incorrect reservations. To avoid channel changes and transmission capacity restrictions while sending information to the typical zone quickly.Technically speaking, the Scalability Applications beneficial since it promotes widespread use. use PHP to authorize data.

2.4.2 Economic Feasibility

Because open-source software is used, the project cost is very justifiable. This idea is really in expensive and not require any extra gear. The discovery assisted the company in reducing costs that would have expended before a project granted the go-ahead. The organization had the option to embrace the most worthwhile venture possible the outcome of savy asset the executives. The Versatility application's turn of events and support costs complete under $14,000 per year, which is a sensible cost.

2.4.3 Operational Feasibility

Since any modernizations made suggest that they would be widely and easily accessible, i.e. inside the PHP application and inside the system, Operationally speaking, the project is viable.

The operational scalability of program is advantageous since it gives servers access to straightforward data segmentation routing.

2.5 Tools/Technology Survey

2.5.1 PYTHON

Python is an interpreted, general-purpose programming language. Its aesthetic concept effectively uses plenty of empty space and prioritizes the readability of the code. With its object-oriented approach and clean coding, it helps programmers create clear code that works for both little and big applications.

Python uses gathering of trash and has dynamic timing. There is support for the legal, object-focused, functional, and programming paradigms. The name "Python" comes from the enormous standard library it contains. "batteries included" language. Despite being published in 2008, Python.

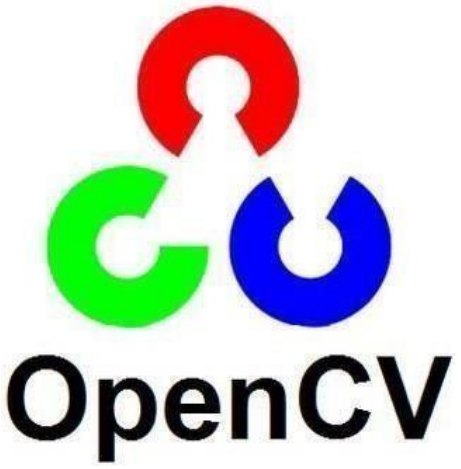
3.0 was a substantial advancement for the language. Though some Python 2.x code does not run on Python 3. On January 1, 2020 (as originally planned), the Python 2.7.x and Python 2.2 programming languages will be formally retired.

Entered into force in December 1989. Van Rossum, the project's principal developer, remained alone in charge of it. The Python community lent him the moniker "Python's Benevolent Dictator For Life" to emphasize his commitment to serving being the undertaking's key decision-maker over the long run and his "permanent vacation" from those duties. He presently shares leadership with a five-person steering council.

The Python 3.0 release from December 12, 2008. Significant language changes been made, even if some are not entirely backward viable. The Python program, which is included with the Python 3 releases, automates (at least in part) the conversion of Python 2 code to Python 3. Large numbers of Python's most urgent highlights retroactively added to the 2.6.x and 2.7.x arrivals of the programming language

The end-of-life date for Python 2.7 was initially set for 2015 and then postponed to 2020 due to concerns that a significant percentage of the work would be difficult to forward port to Python 3.

2.5.2 Open CV



Real-time computer vision is the major focus of the Open CV. (Open-Source Computer Vision) set of programming skills. While Willow Garage supplied the financing.

It first created by Intel for it. The library is cross-stage and open-source under the BSD license. The project which was once an Intel Research project, formally introduced in 1999 together and several other technologies, including constant beam following and 3D presentation walls. The subsequent objectives were established when Open CV was still in its infancy:

By offering Open source code that been optimized for the necessary division infrastructure, you may advance division research. Give your all while attempting to come with somethingfresh. A standard architecture created so that programmers use to share visual information in order to enhance the readability and transferability of code.

By writing flexible, performance-enhancing code freely accessible with a license that do not demand the actual code be open source or free, we improve commercial software-based goods.

The second major update to OpenCV was released in October 2009. An update to the C++ interface considerable changes in OpenCV with the aim of creating new, more type-safe, user-friendly features, as well as improving the user experience.

2.5.3 Tensor flow

TensorFlow, it makes use of an open-source software platform in a various tasks for dataflow and programming that is adaptable. It consists a number of mathematical symbols who is also employed by neural network-based ML systems. Google use it both manufacturing and market analysis.
In way to used only within Google, The GoogleBrain team is the one that developed Tensor Flow. On November 9th, 2015, it was released under the terms of the Apache License, Version 2.0.second iteration is called TensorFlow. On February 11, 2017, the 1.0.0 version became accessible. 2[10] Tensor Flow has the capacity for run on many CPUs and GPUs, in contrast to the model execution, that only uses one (with optional computation and graphics processing). Tensorflow computing framework that used without difficulty over a wide range of platforms, such as desktop PCs, server farms, smartphones, and edge devices (CPUs, GPUs, and TPUs). Its modular architecture is to blame for this.

State-full Graphs of dataflow used to display TensorFlow calculations. The actions carried out by Tensors, also referred to as artificial neural networks, are what give TensorFlow its nameOnly five of the 1,500 GitHub projects that used Tensor Flow had contributions from Google. At the conference in 10- 2017, programmers from almost all MNC for the first time, corporations. Kube flow makes it possible to use implement Tensor Flow on Kubernetes.

The following figure show the hierarchyof Tensor Flow toolkits:

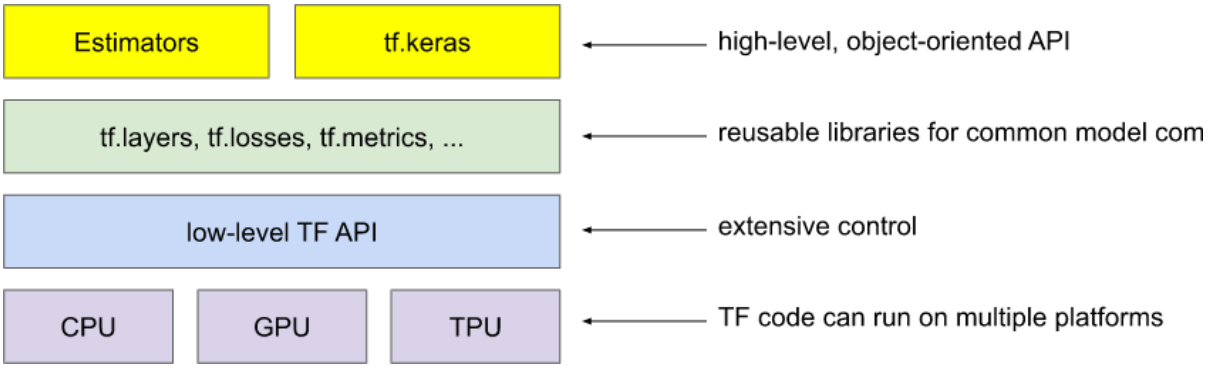


Fig 2.5.3 tensorflow toolkit

2.6 NUMPY

In the hierarchical organization of the TensorFlow APIs, lower-level APIs serve as building blocks for higher-level APIs.Researchers studying machine learning develop and assess new ML algorithms by utilizing low-level APIs.In in this course, you refine, train,and use ML to models create With the high-level API, make predictions it.keras. In TensorFlow, keras. The important Python module while computing scientifically by the moniker "NumPy". Its other contentsinclude the following: N-dimensional array with high power objects, intricate broadcasting operations, tools for integrating C and C++ code, and useful the Fourier transform, and a random number, and linear algebra capabilities. Then there is its apparent applications iniscience, Numpi also functions well as a multi- dimensional data container. Data type definitions are supple. NumberPy can quickly link to a broad variety of databases.

2.7 PANDA

Pandas, an open-source Python toolkit, provides high-performance data manipulation and analysis tools using its potent data structures.Pandas derives its name from Panel Data,anecono metrics from multidimensional data.Wes McKinney started creating pandas in 2008 inresponse to his need for a high-performance, adaptable tool for data processing.

Before Pandas, Python was mostly for data preparation and munging. It did not extensively utilize of impact data analysis.Pandas came up with the answer. Pandas allows us to complete thefive basic processes of data processing and analysis, regardless of where the data originated: load, prepare, edit, model, and analyse.

Python and Pandas are use in a broad variety of academic and professional financial, economic, statistical, and analytical modeling, and others.A DataFrame object with both default and custom indexing that is swift and efficient.

- The synchronization of data and the smooth handling of missing data.
- Turning and rearrangement of data sets.
- Indexing, and subsetting large data sets with labels.
- The columns of the adatastructure can be added or removed.
- Group data byitself to ease aggregation and processing.
- The combining and merging of data with great performance.
- Features of the Time Series.

- **Tkinter**

The default Python library Tkinter.Python and Tkinter together make it quick and easy to develop GUI applications. Tkinter offers the powerful object-oriented interface of the TkiGUI toolkit.

Requirements for Hardware and Software

Minimum-Hardware Requirements:

Central-Processor	Intel i5 2.4GHz
Hard-Disk	4OGB
Ram	2GB or higher

System Requirements:

Operating System	Windows 7 or higher
Coding Language	Python
Version	3.7 and above

CHAPTER 3

SYSTEM REQUIREMENTS SPECIFICATION

The foundation for software development includes the basic document called as the (SRS).SRS provides a diagram that highlights the key components of the system and how they relate to the needs of the system.

The meaning one of the components essential stages in the building process.After the supply analysis process, the error of explaining what a perfect the system product works arises.This point emphasizes the system's uses as opposed to the system's fixes.The outcome of the this specification document outlines the features, functionalities, and iconoclastic limitations of the software.

3.1 Overview

The SRS demonstrates how effectively engineers can decide on the forthcoming speech's subject programming object. The structural necessities should be clearly and accurately described in the SRS since they are essential to the overall endeavor strategy. It's possible that the source code now being created is a free structure or the basis of a larger system. The SRS ought to demonstrate how a system communicates with the parts that make up its structure.

3.2 Methodology

The perspective of involving recreated knowledge for bone bending affirmation consolidates several key stages. Immediately, a shifting and even dataset of clinical pictures, for example, X-shafts or CT channels, portraying different bone mutilations of various sorts and severities, is gathered. These photographs are then pre-processed to take out disturbance, trinkets, and immaterial data, trailed by consolidate extraction to zero in on essential models and qualities of bone mutilations.

The dataset is fastidiously separate with relating bending types and reality levels for oversaw learning. A reasonable man-made insight calculation, a large part of the time Convolutional Frontal cortex Affiliations (CNNs) for picture based tries, is picked and prepared on the stepped dataset. Hyperparameter tuning and underwriting on a substitute test dataset are performed to chip away at the model's show and review its accuracy.

Clinical specialists are involved during the relationship to guarantee the model's consistent quality and thriving. Exactly when the model shows alright execution, it very well may be conveyed in veritable applications, made into clinical imaging structures, or clinical thought stages for rational use by clinical trained professionals.

Unsurprising improvement and updates are sought after as new information opens up, guaranteeing the model's precision and importance after some time, while moral contemplations and security rules are

completely concurred with in managing clinical information.

3.3 Functional Requirements

A functionalrequirements specifies the user who will be working on the performance as the tools and knowledge required to do it. Functional requirements explain the way a system behaves.The behaviors possibly interpreted as the organism's response to a request or a task for evaluation. What a system should achieve is described in the material that follows. Application loading these massive datasets that are written online must have a bondage with all the data sets to be able to identify the link between variables and large datasets. The lift, push, and confidence rules to locate the variables in this association rule.

In way to success the desired classification, these variables must be categorized using the CNN/KNN algorithms.This forecast will be made using a graphic illustration. Data gathering is the procedure an application goes collects and stores data from outsidesources for use.

Data Preparation: The acquired data is analyzed to distinguish between the acceptable and unacceptable characteristics needed for segmentation.

DataSegmentation: To isolate the information as indicated by the enquiry, pre-handled information are utilized. The Ml calculation is utilized to arrange the information while considering the dataset's properties.

Data comparison: Data was displayed after being contrasted with other parameters.The data uses the input data to forecast a heart attack.

Pre-processing: Preprocessing aims to produce picture data that avoids undesirable changes or pulls that are essential for future development. Pre-processing techniques, such as rotation, measurement, and translation, are utilized here as an alternative to the altering of geometric images.

Feature extraction: Included in the size reduction procedure, which also involves feature extraction, the initial collection of raw data is further separated and analyzed by the SVM algorithm. Consequently, it will be simpler for you to digest it when you're ready. What's most important feature of these extensive data sets is the substantial number of various variables they contain.

Classification: The suggested method uses a convolutional neural network to recognize human action based on yoga position classification by using image processing and deep learning.

Interface for communication requirements

- Programming interface: Windows should have the working framework.

- Hardware interface: A 32- or 64-bit operating system is required for this project's execution.

3.4 Non-functional Requirements

- **Performance**

The application validates data by proving each from being uploaded data to server and so lowering server load. This improves the accuracy of the request as well. The software not crash because of how input/output errors and network exceptions are handled.

- **Reliability**

This application handles particular information, like a user profile data and depositinformation, in a method to anticipate that its performance is more trustworthy and that database modifications are done without authorization.

- **Availability**

People may purchase this item at a discount on the Google Play Store, and both itsintroduction and use are simple.

- **Maintainability**

Since it uses open source programming languages, environments integrated development (IDEs), and well-maintained data, This endeavor is reasonably inexpensive to maintain.

- **Security**

The only individuals who are ok to use this program the other members of thecooperative group. You require a functional credential so as to make advantage of this program.

CHAPTER 4

SYSTEM DESIGN

4.1 System Architecture

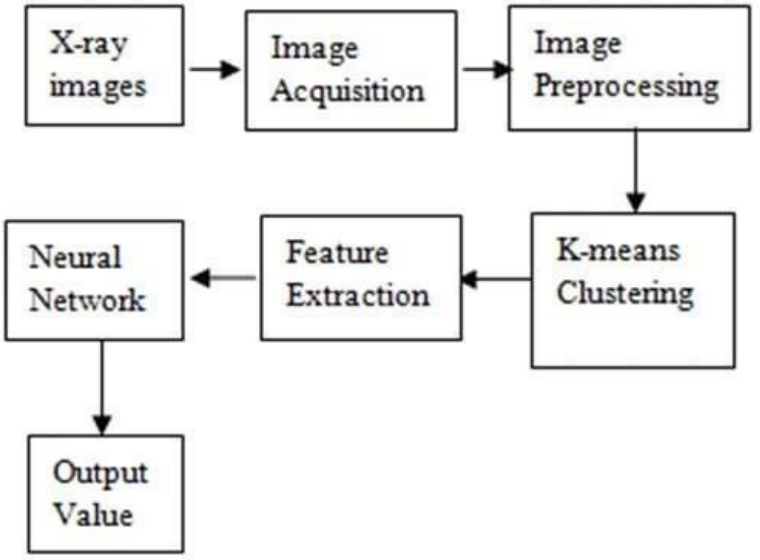


Fig 4.1: system architecture

The building strategy for employing PC-based understanding to detect bone misshapenings consolidates a number of essential elements. Along the way, a distinct and sizable collection of bone-bending cases, including diverse kinds and intensities of misshapenings, were gathered. To manage missing attributes, reduce disturbance, and standardize the data construction, this set of data is then preprocessed.

Large highlights that include evaluations from CT scans, X-rays, or other diagnostic imaging modalities are produced using the generated data.Then, a useful replicable insight framework is selected, such as convolutional frontal cortex associations (CNNs) for image-based activities or alternative assessments like support vector machines (SVMs) or decision trees for other types of curves.

4.2 DataFlow Diagram

The techniques and procedures required to store, run, distribute, and manage data between machine parts graphs that show the relationship between a gadget and its environmental elements the Dataflow Graph. It includes reputation of a potent fashion statement of all systems and users as a result of its observed representation. One may build an assessment using the DFD framework by beginning with a hierarchy of specific graphs.

Fig 4.2: dataflow diagram

Basic Notation:

Process: the action that modifies output.It is capable of doing calculations, sorting data based on logic, directing data flow based on business principles, and computing data.A brief label usedto clarify processes like "Submitpayment."

Data store: refers to files or data sets that save information for sometime later, such a membership type database. Every data storage gets a simple a label with the following text "Orders."

External system: An outside system that transmits and obtains data and interacts with the system being analyzed.They serve as both sources and final points for data who arrives or departs the system.They could be an outside organization or individual, a computer system, ora business system.They are also referred to as "terminators," "sources," and "the sinks."

Data flow: refers to as it moves between external entities, processing units, and data storage

units.It depicts the interface with the other mechanism and is labeled with arrows, generally accompanied by a small piece of data, such as "Billing Details."

User DFD

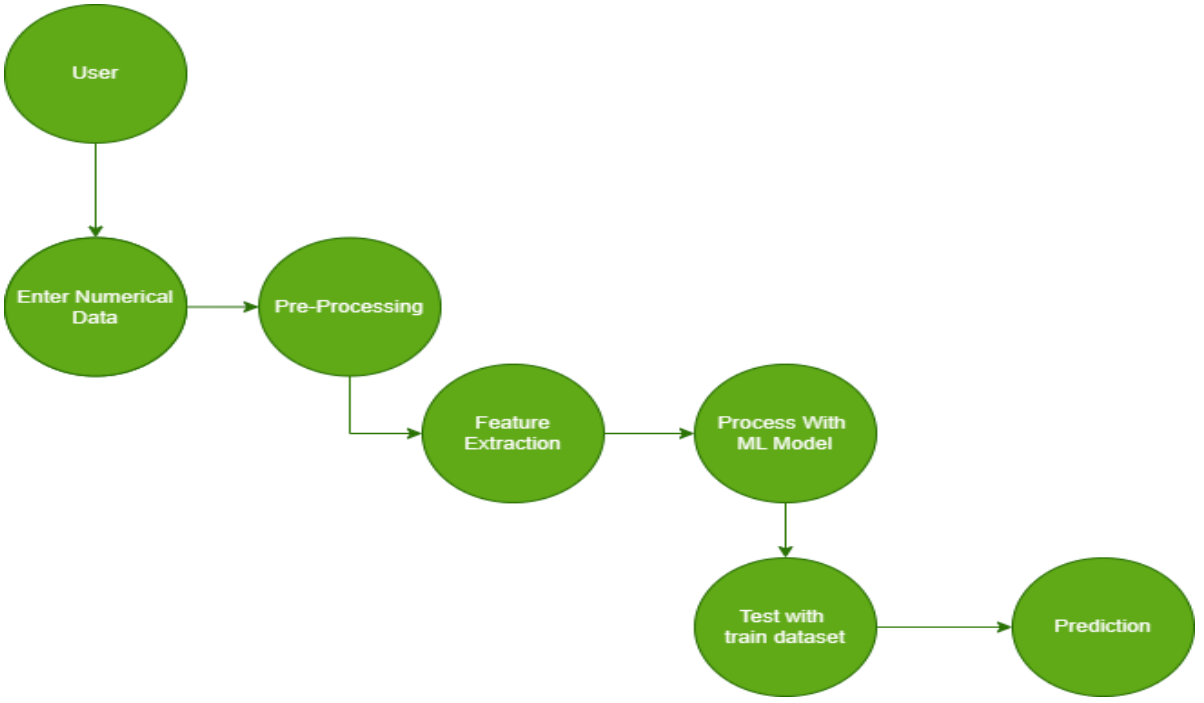


Fig 4.3 User DFD

The client supplies clinical images, such as X-rays or CT scans, in the Client Data Stream Diagram (DFD) for the bone contortion end of the framework's computational reasoning-based design. To get ready for the computer-based intelligence model's evaluation, these photos have undergone preprocessing. Scaling, component extraction, and noise reduction are all included.

The simulated intelligence model, created specifically for bone distortion ID, works with the preprocessed images and makes assumptions about the existence, nature, and severity of any bone anomalies. The system displays to the client the disclosures together with any discovered anomalies and important data.

It is usually necessary to memorize point-by-point information for the framework design and information about pipelines in order to create a complete dataflow chart for a particular application. Nevertheless, I can provide you with a vital level dataflow plan for a psyche-bendingly innovative affirmation structure utilising replicated information. Keep in mind that this is a handled categorization, and the actual implementation may vary depending on the particular use case and developments combined.Here's a basic dataflow diagram for the bone deformity identification system:

Data collection: Hospitals or other healthcare organizations provide patients with bone problems with raw medical data (X-rays, CT scans, etc.).

Data preparation: The gathered data are cleaned and normalized during preprocessing. The steps

in this process guarantee data quality, uniformize image size, and eliminate noise.

Feature Extraction: Machine learning models must be trained using relevant attributes. This stage involves extracting features from the preprocessed data. Edge detection, texture, and form descriptors are a few examples of features that is an image-based analysis.

Data Labeling: The different names for bone irregularities are applied to the information by specialists or clinical experts. The AI model will be prepared utilizing this named information.

Model Training: For planning and endorsement, sets of the named and preprocessed data are created. Artificial intelligence models (such as convolutional mind associations, or CNNs) are prepared to learn the models and components typical of bone twisting on the planning set.

Model Evaluation: The trained model's performance is evaluated using the validation set in terms of accuracy, precision, recall, and F1-score.

Deployment: On the off chance that the model is fruitful at distinguishing bone irregularities from new and neglected information, it very well may be operated to creation conditions, like a site or a clinical hardware.

Client Connection: When using the system, end users interact with it in a way similar to how radiologists or other experts might. They do recent X-shaft or CT scans to look for blatant signs of bone bending.

Expectation and Translation: The model presented here looks into the fresh information and generates predictions for skeletal mutations. It might also provide some interpretability by showing what factors the previous supposition benefited from in terms of locations or characteristics.

Reporting and Archiving: The system produces reports or alerts informing users of any discovered bone abnormalities. The information and outcomes may also be saved for subsequent study or storage.

Please remember that this is only a visual illustration of how data might flow in a framework for finding bone anomalies.

CHAPTER 5

DETAILED DESIGN

5.1 Use Case Diagram

The worth of useCase diagram is composed of their characters, their organization of the UseCase within an established framework, and their visual view of the connection between the performing artists. The relationship between framework, external entity is shown in the use-case diagram. Every user expresses satisfaction with the benefits that framework provides to its users. The exam procedure, the case use, and the framework of the amid are all split and differentiated quite a little. The structure of work as it is given is broken down into people and according to their functions. In this case, the character alludes to the ways which the user engages with building. Here, users can adoptthe persona of any processor, individual, software program or hardware component.

Use-Case for user

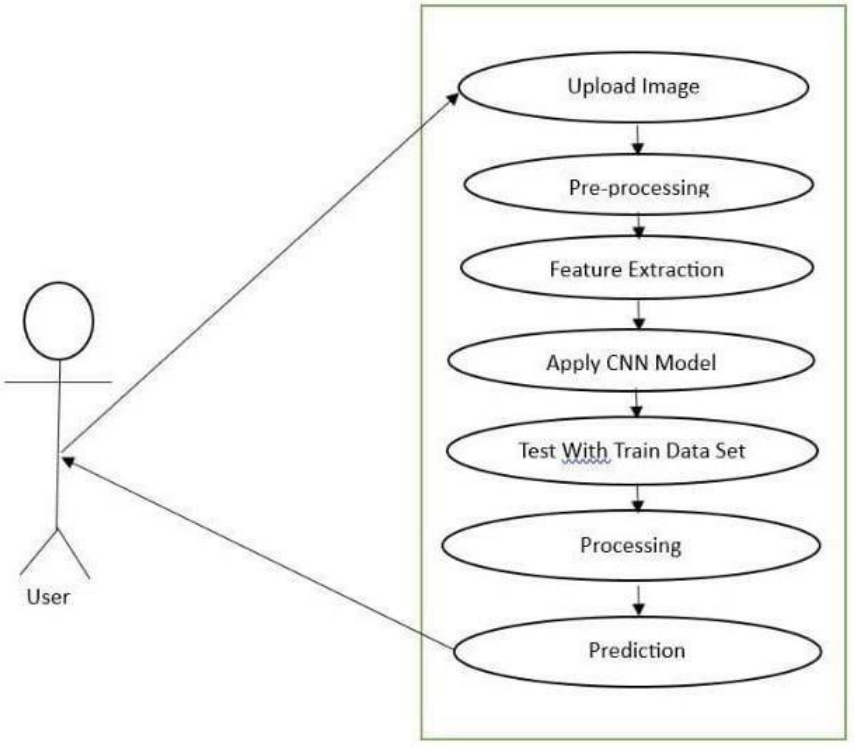


Fig 5.1 User Use Case

The role of user

- Upload image

- Pre-Processing
- Feature Extraction
- Apply ML Code
- Test With Train Dataset
- Processing
- Prediction

5.2 Sequence Diagram

The interaction of module in the application are represented in sequence diagram. Additionally, they are arranged as instances in an diagram. Sequence diagrams often refer to an event, scenario, or seven-graph diagrams. The interchange of data, activations is displayed in an orderly graphic.Unified Modeling Language (UML) making graphs are extremely helping in the framework's perspective since they provide active view point.

SequenceDiagram For Admin:

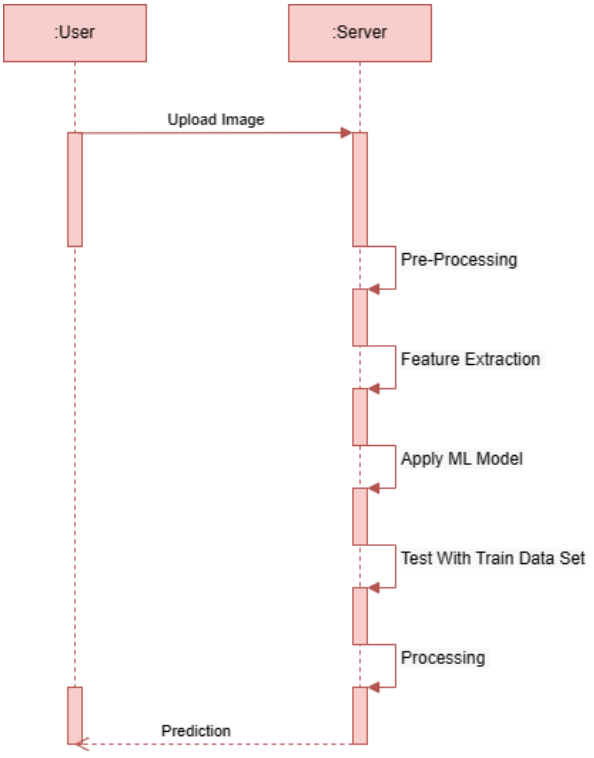


Fig 5.2 Sequence diagram for Admin

The above graphic depicts the order to interact with the model. The client should initially transfer an image before the application can begin pre-processing, extracting features, and testing the data against a training dataset before displaying a forecast.

5.3 Activity Diagram

The diagrams in project's developed version. This graphic represents the activities that are occurring are in the project. There are various things can happen to a user. First, it starts with user who registers by giving proper qualification, for example, a username, password, and login information. The user can register, upload data, and utilize an application to process information utilizing the calculation and predict the outcome.

Basic Notations:

Initial Activity:

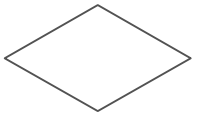
This exhibits the point or first action of stream. The phrase is indicated bya rock-solid circle.

Final Activity:

The last activity also known as the final. Is meant by the bulls eye sign toward the finish of the movement chart.

Activity:

A rectangle with rounded edges use to represent it.



Decisions:

A logical situation where decision should be taken and illustrated bydiamond.

Work flow:

Workflow is represented as an arrow. It demonstrates the direction of the work flow in diagram.

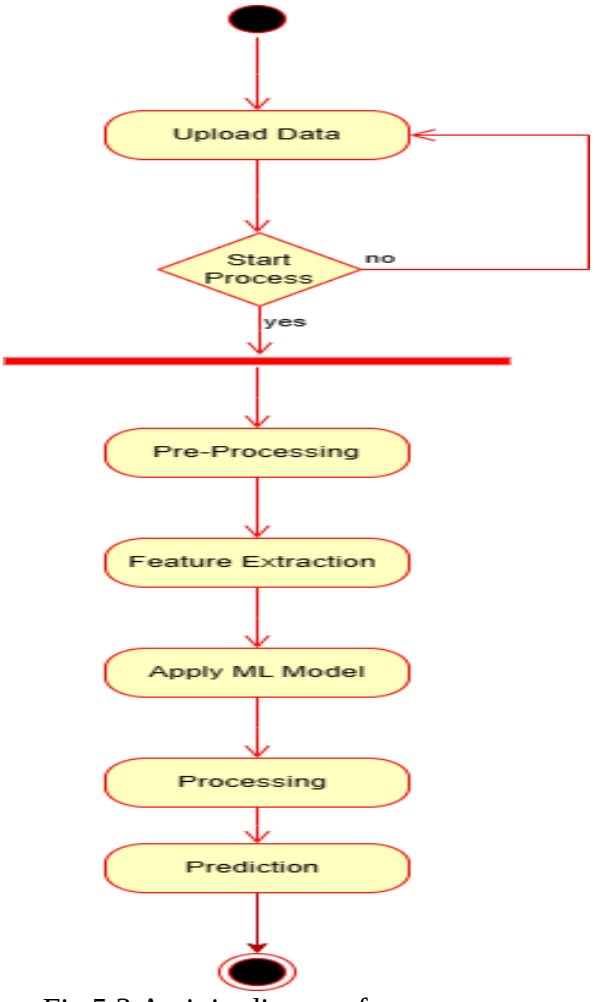


Fig 5.3 Activitydiagram for user

Upload data: Clinics or other medical services offices are reached to get crude clinical information (X-beams, CT examines, and so on) of patients with bone irregularities.

Start: The procedure starts.

Pre-processing and Feature Extraction: To separate the highlights, preprocessed data are used. Extraction of pertinent highlights from images or data that as inputs for the AI model is the aim of this step.

Apply ML Model: The marked and preprocessed information to prepare an AI calculation, for example, a convolutional brain organization (CNN). The model acquires the capacity to perceive examples and characteristics that highlight bone irregularities.

Process Data with ML Model: The computer-based intelligence model that was passed down cycles through new data and makes predictions about how bones will flex using learned models as a guide.

Decipher and Result Results. The framework offers the bone distortion ID consequences, perhaps with some interpretability, enabling one to comprehend what regions or components were added to the prior forecast.

5.4 Entity Relationship Diagram

E-r Diagram II is representation of numerous connections between the substances, as their objectives and convictions toward one another. It also includes reporting on the relationships between the entities' datastores.

These parts are consolidated by the relationship in the ERD. The Removes relationship interfaces patients to their turned bones in their records, showing which bending a patient is displayed to have.The Upheld Assessment relationship joins clinical pictures to information on bone deformity, expandingthe association between the bends displayed in the photos utilized for revelation.

The idea combines extraction from clinical pictures as a feature of the preparation of man-made information parts to deliver huge models. In a get-together model, the bone turns are arranged into express sorts utilizing these highlights that have been eradicated. Moreover, an assumption model may be utilized to gauge the drawn out earnestness or improvement of bone mutilations. To givea reasonable plan, medical care informed authorities and data scientists should team up.

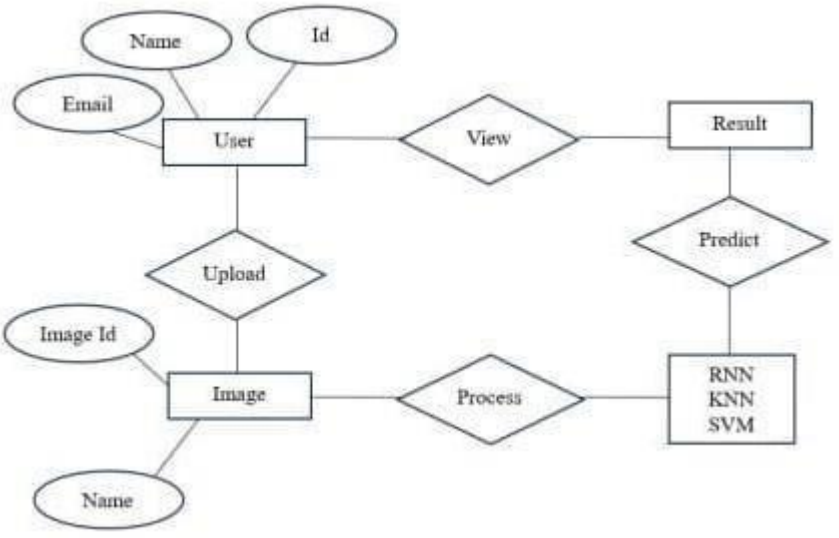


Fig 5.4 entity relationship diagram

Entity: An entity is an actual object in the real world with a survival instinct.It is a really simple and uncomplicated way to build a store or any type of commercial activity.

Relationship: A relationship in entity-r diagram is a specified or associated relationship between entities used to bind together more entities.

Key attribute: An entity typically has an attribute whose values vary depending on which particular entity in the collection it belongs to. Associations are the essence of metaphors. Attributes are properties of the entities.

CHAPTER 6

SYSTEM IMPLEMENTATION

6.1 Implementation

Illustrates the method's phases in straightforward terms. An x-ray picture is provided as contribution to the main stage. This X-ray picture is grayscaled, and the PSNR value is calculated. is tested, andit is shown that conservative filtering performs best when compare to others filtering strategies, as seen by greater PSNR value it achieves across all photos. Then, the filtered picture is put into the segmentation process, where clever edge detection is used and produces the best results when compared to Sobel and Perwitt. Features like mean and median are taken from the segmented image's texture. These textural characteristics are fed into several neural networks, including CNN.

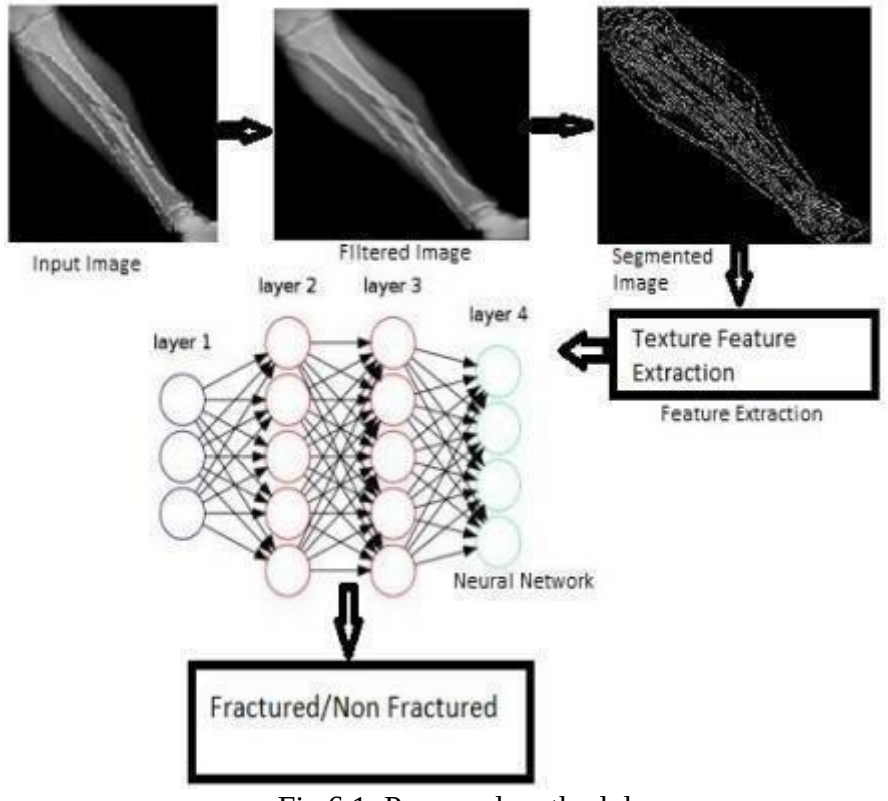


Fig 6.1: Proposed methodology

Image Resize: When graphic image are scaling as vector, the graphic primitives that conjure the image runs by a transformations scaled using geometric, with no loss of image quality.

When scaling a raster graphics image, a replacement image with the next or lower number of pixels generated. Within the case of decreasing the pixel number (scaling down) this usually

ends up in a visual quality loss. From the standpoint of digital signal processing, the scaling of raster graphics may be a two dimensional example of sample rate conversion, the conversion of

a discrete signal from a rate (in this case the local sampling rate) to a different.

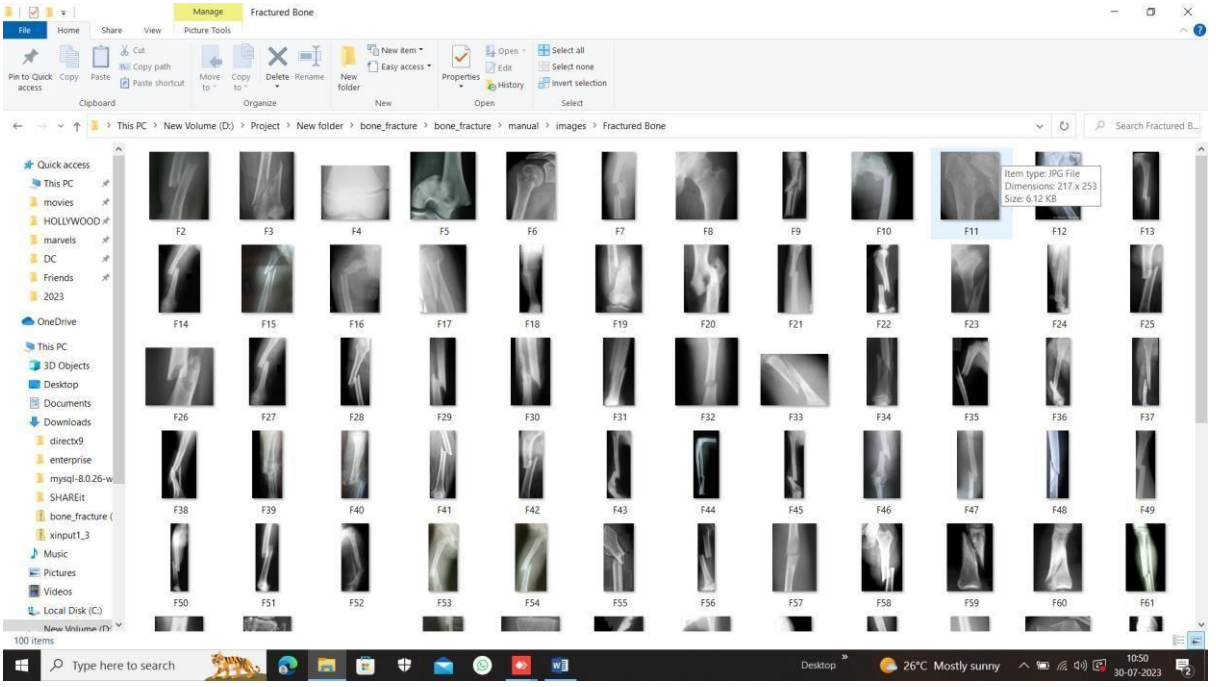
Segmentation: This paper deals with a replacement anisotropic discrete dual-tree wavelet transform (ADDTWT) to characterize the anisotropy of bone texture. More specifically, we propose to increase the traditional discrete dual-tree wavelet transform (DDTWT) by using the anisotropic basis functions related to the hyperbolic wavelet transform rather than isotropic spectrum supports. A texture classification framework is adopted to assess the performance of the proposed transforms.

KFCM: Fuzzy c-means (FCM) is the most promising fuzzy clustering methods. Although this Fuzzy C Means is well accepted clustering method it is unsuccessful for large spherical cluster. The idea of this FCM is to alter perfectly the input information into high layered include space, and then it will increases possibilities of linear seperability of the patterns in feature space. Then perform FCM in the feature space. The FCM also determinesthe number of clusters in the dataset which is another good quality of FCM.

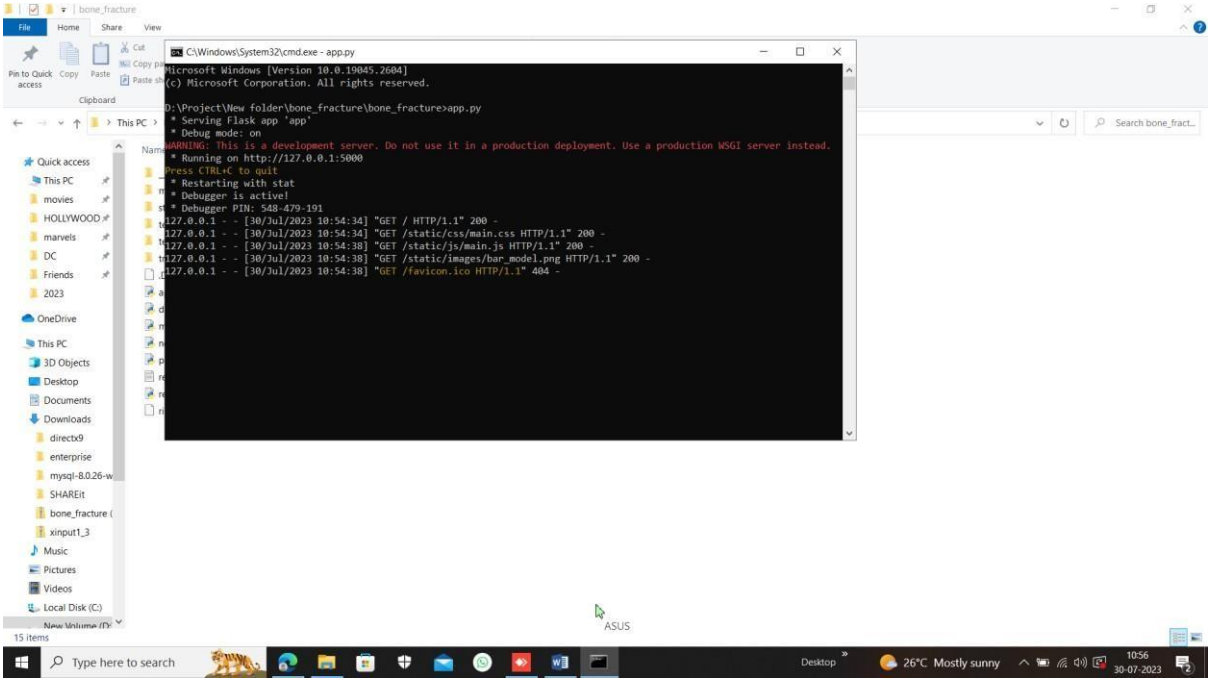
Feature extraction: A pattern consists of multiple instances of a feature. Select a pattern type and define dimensions, placement points, or a fill area and shape to place the pattern members.

Classification: In machine learning, support-vector machines (CNN) are supervised learning with calculations that investigate information utilized for arrangement and examination.

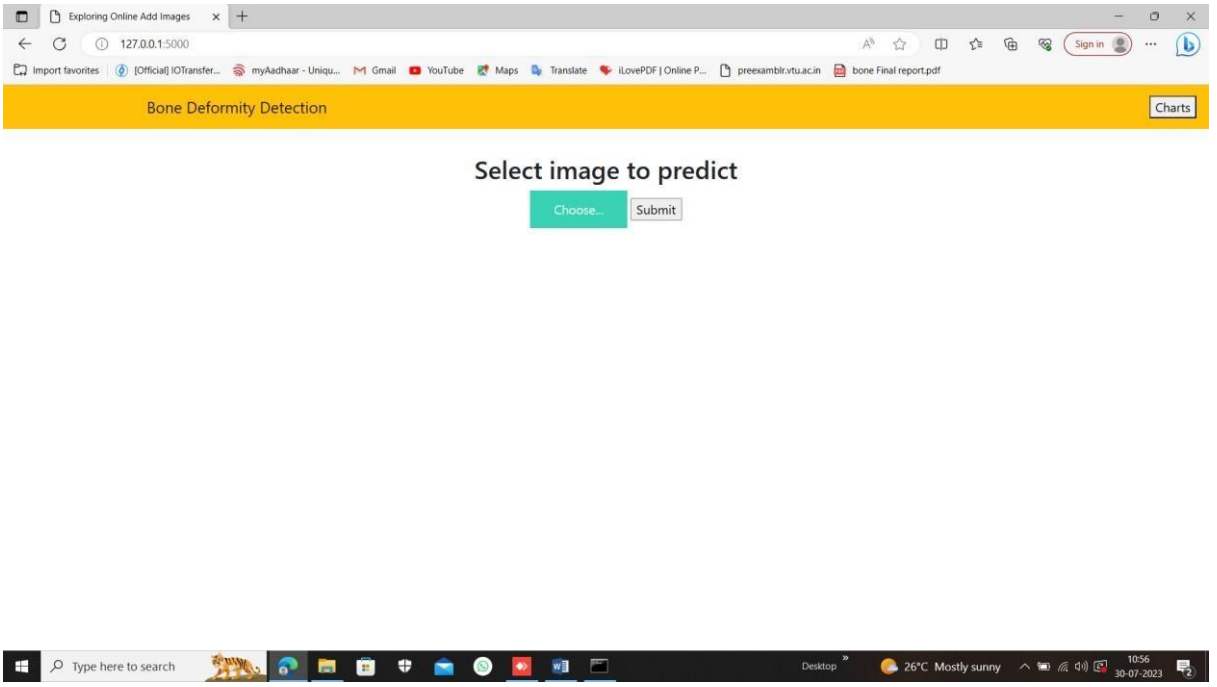
6.2 Snapshots



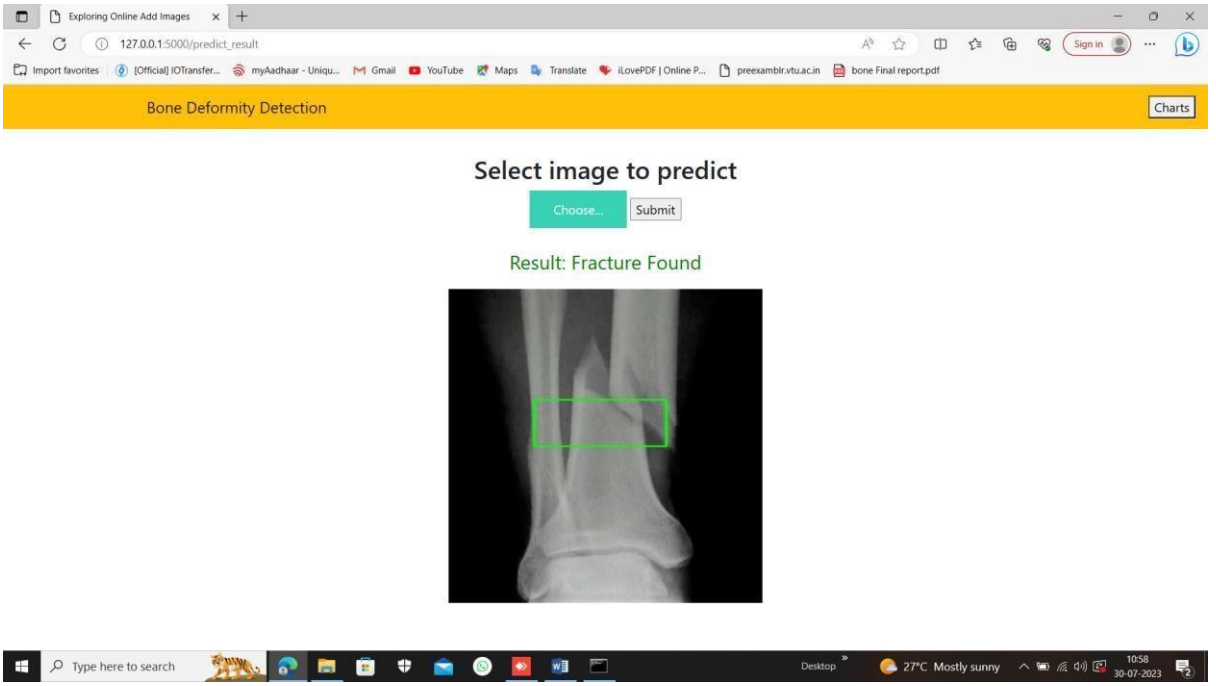
Snapshot 6.1: Dataset of x-ray images



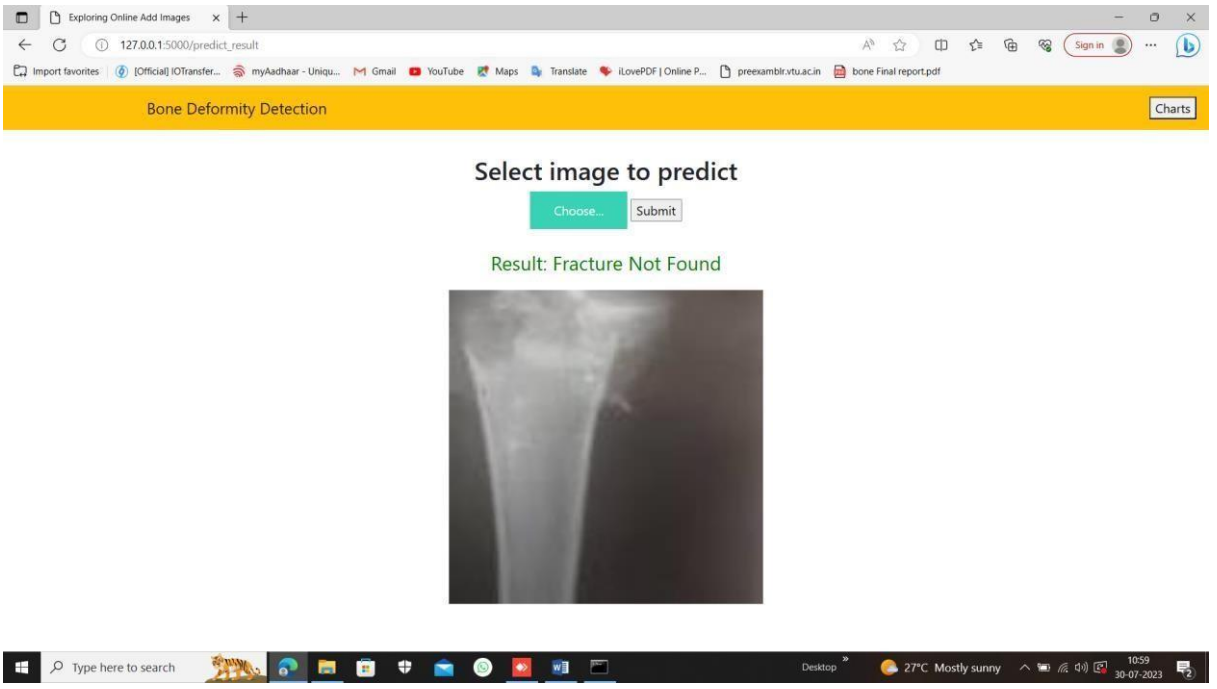
Snapshot 6.2: launching model



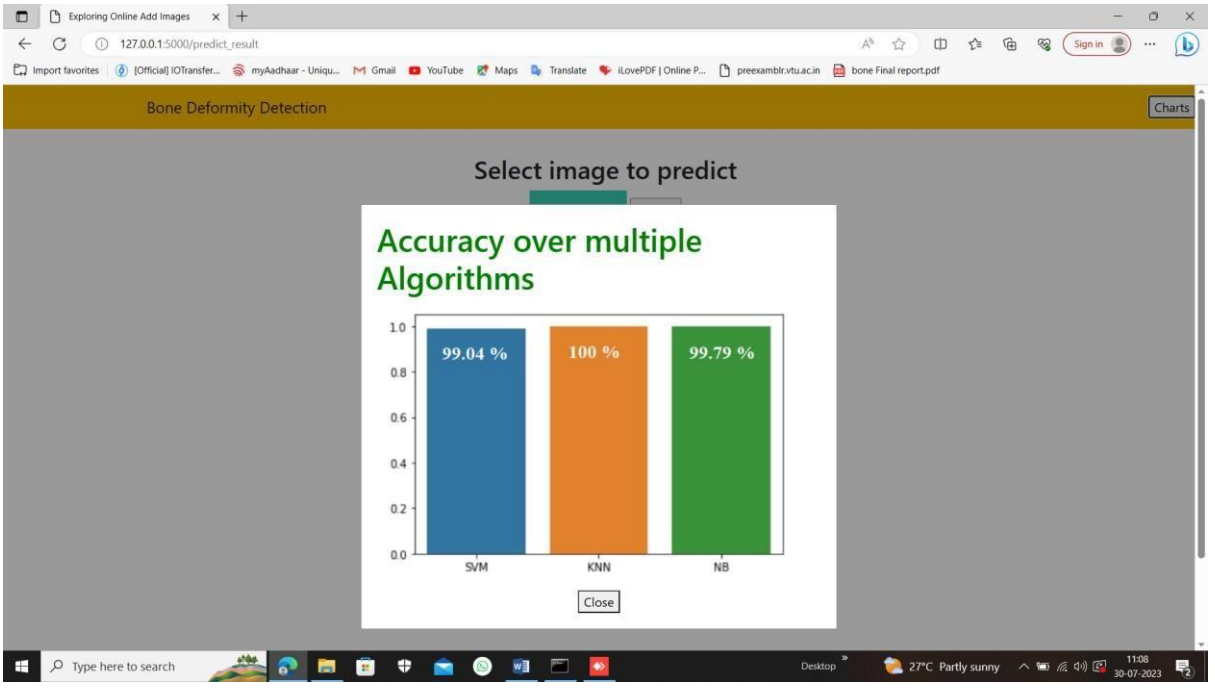
Snapshot 6.3: landing page



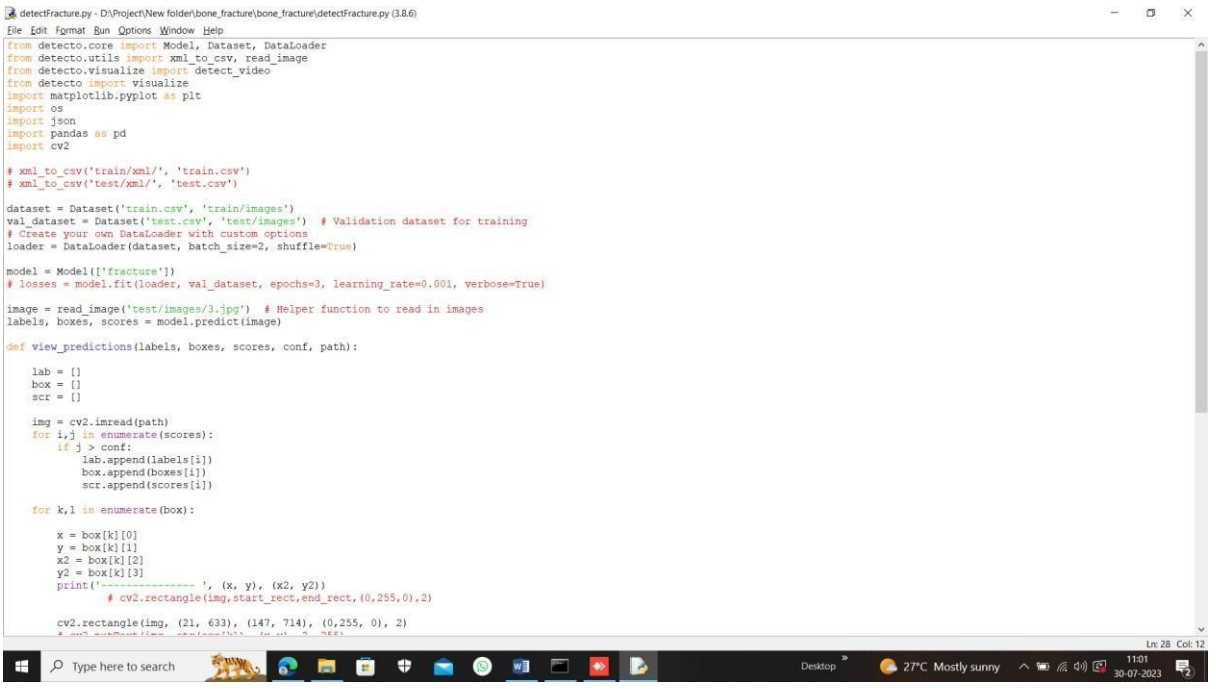
Snapshot 6.4: fracture detecting



Snapshot 6.5: No fracture detected

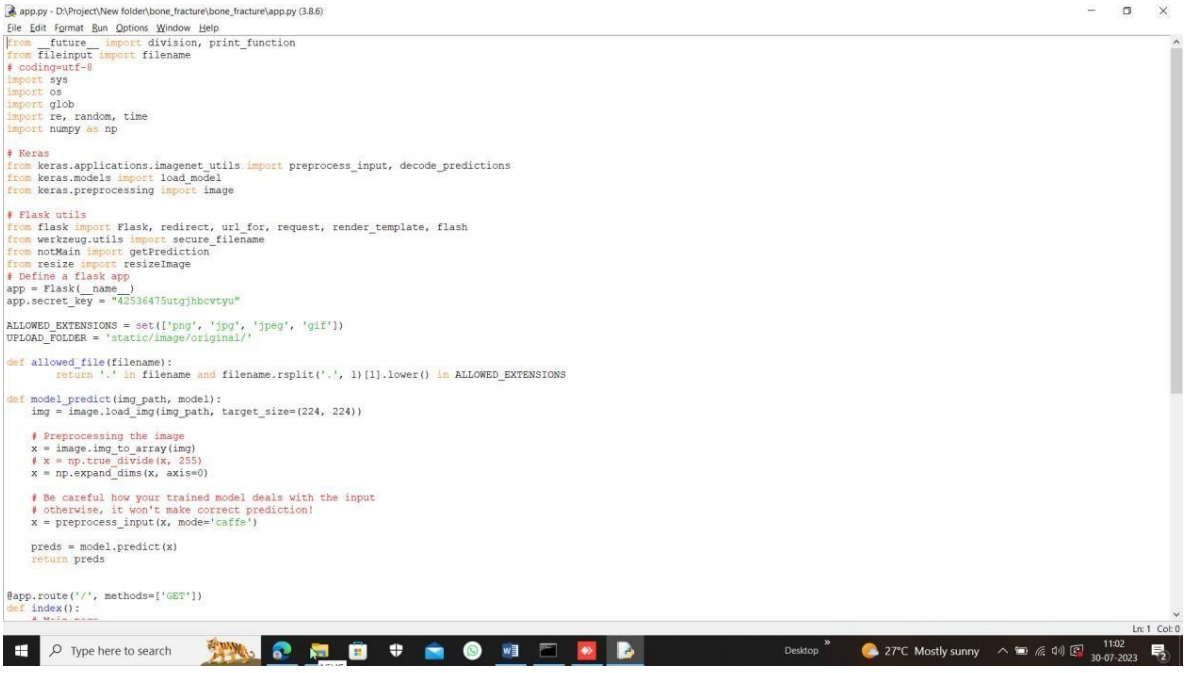


Snapshot 6.6: algorithm performance



```
detectFracture.py - D:\Project\New folder\bone_fracture\bone_fracture\detectFracture.py (3.8.6)
File  Edit  Format  Run  Options  Window  Help
from detecto.core import Model, Dataset, DataLoader
from detecto.utils import xml_to_csv, read_image
from detecto.visualize import detect_video
from detecto import visualize
import matplotlib.pyplot as plt
import os
import json
import pandas as pd
import cv2

# xml_to_csv('train/xml/', 'train.csv')
# xml_to_csv('test/xml/', 'test.csv')

dataset = Dataset('train.csv', 'train/images')
val_dataset = Dataset('test.csv', 'test/images')  # Validation dataset for training
# Create your own DataLoader with custom options
loader = DataLoader(dataset, batch_size=2, shuffle=True)

model = Model(['fracture'])
# losses = model.fit(loader, val_dataset, epochs=3, learning_rate=0.001, verbose=True)

image = read_image('test/images/3.jpg')  # Helper function to read in images
labels, boxes, scores = model.predict(image)

def view_predictions(labels, boxes, scores, conf, path):

    lab = []
    box = []
    scr = []

    img = cv2.imread(path)
    for i,j in enumerate(scores):
        if j > conf:
            lab.append(labels[i])
            box.append(boxes[i])
            scr.append(scores[i])

    for k,l in enumerate(box):

        x = box[k][0]
        y = box[k][1]
        x2 = box[k][2]
        y2 = box[k][3]
        print('--------------- ', (x, y), (x2, y2))
                # cv2.rectangle(img,start_rect,end_rect,(0,255,0),2)

        cv2.rectangle(img, (21, 633), (147, 714), (0,255, 0), 2)
```

Snapshot 6.7: code for fracture detection



```
app.py - D:\Project\New folder\bone_fracture\bone_fracture\app.py (3.8.6)
File  Edit  Format  Run  Options  Window  Help
from __future__ import division, print_function
from fileinput import filename
# coding=utf-8
import sys
import os
import glob
import re, random, time
import numpy as np

# Keras
from keras.applications.imagenet_utils import preprocess_input, decode_predictions
from keras.models import load_model
from keras.preprocessing import image

# Flask utils
from flask import Flask, redirect, url_for, request, render_template, flash
from werkzeug.utils import secure_filename
from notMain import getPrediction
from resize import resizeImage
# Define a flask app
app = Flask(__name__)
app.secret_key = "42536475utgjhbcvtyu"

ALLOWED_EXTENSIONS = set(['png', 'jpg', 'jpeg', 'gif'])
UPLOAD_FOLDER = 'static/image/original/'

def allowed_file(filename):
        return '.' in filename and filename.rsplit('.', 1)[1].lower() in ALLOWED_EXTENSIONS

def model_predict(img_path, model):
    img = image.load_img(img_path, target_size=(224, 224))

    # Preprocessing the image
    x = image.img_to_array(img)
    # x = np.true_divide(x, 255)
    x = np.expand_dims(x, axis=0)

    # Be careful how your trained model deals with the input
    # otherwise, it won't make correct prediction!
    x = preprocess_input(x, mode='caffe')

    preds = model.predict(x)
    return preds


@app.route('/', methods=['GET'])
def index():
```

Snapshot 6.8: Code for building model

CHAPTER 7

SOFTWARE TESTING

7.1 Introduction

During software testing, running a software component confirms of more desired attributes. It is useful to emphasize how well the structure meets the user's expectations, operates as intended, doesn't require installation, and used in all circumstances.

Client needs, we have range of testcases integrated in our program. This application has undergone system testing, integration, and unit. The following are cases that we take into consideration:

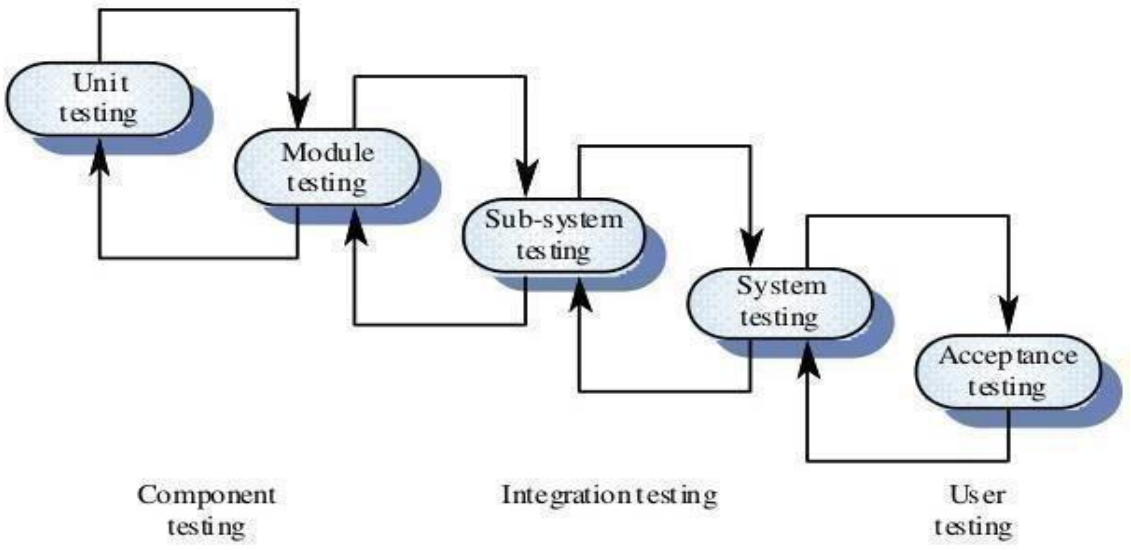


Fig 7.1 Testing-Process

Levels of Testing:

The Code testing program is an inquisitive, logical, and stargazing application. A path is specified set of criteria that program handle.

The testing for strategy examines the relationship of the strategy to the software in depth and it should function in various scenarios.

System Testing:

System testing evaluates the framework. Framework testing is completed following the completion of unit testing reconciliation testing. It will evaluate the framework's general behaviour. It will evaluate the applicability and exhibitivity of the framework.

Unit Testing:

Unittesting is recognition of programs that situates the out where in character devices/addedisubstances of a product are tried. The purpose is to confirm that each stepof the product, application, and development processes is organized.The smallest stablecomponent of any product or utility application is called a "A iunit". It normally has handful of sources of information and, for the most part in a single yield.

Table 7.1 Unit Test Case:

TestCase Number	States	Estimate Result	Condition
Case-one	Run Model bypressing Ctr+F5	System shouldrun the model	Pass
Case-two	Click on ShowButton to open Model	System shouldrun the model	Pass
Case-three	Opening Web application	Opening Web application	Pass
Case-four	Extracti ng Frames	Extracti ng Frames	Pass

Test Case: Valid Image Upload

Description: Upload a valid image file (e.g., JPG, PNG) within the allowed file size and formatlimits.

Expected Result: The image must have successfully uploaded and been saved to the database or server.

Pass Criteria: The image should be visible on the website after successful upload.

Test Case: Invalid Image Format

Description: Attempt to upload a file in an unsupported image format (e.g., GIF, BMP).

Expected Result: The system should display an error message indicating that the image formatis not supported.

Pass Criteria: It should not be possible to upload the image, and an error message should appear instead.

Test Case: Large Image File

Description: Upload an image file that exceeds the maximum allowed file size.

Expected Result: The system should display an error message indicating that the file size istoo large.

Pass Criteria: The error message should displayed, and the image not be uploaded.

Test Case: Empty Image Upload

Description: Attempt to upload an image without selecting any file.

Expected Result: The system should display an error message indicating that no file was selected.

Pass Criteria: The error message be showed, and the image ought to be uploaded.

Test Case: Concurrent Image Upload

Description: Simulate multiple users attempting to upload images simultaneously.

Expected Result: The system should handle concurrent image uploads gracefully without data corruption or conflicts.

Pass Criteria: All uploaded images must save correctly without issues.

Test Case: Image Upload Performance

Description: Upload a large number of images within a specific time frame.

Expected Result: The system should handle the bulk image upload efficiently without any performance degradation or crashes.
Pass Criteria: All images should be successfully uploaded within the specified time frame without any issues.

Test Case: Security Testing
Description: Attempt to upload malicious files like executable files (e.g., .exe) or scripts (e.g., .php) as images.
Expected Result: The system should detect such malicious files and prevent their upload. Pass Criteria: The system should display an error message or reject the upload of maliciousfiles.

Test Case: Image Preview
Description: Test the image preview functionality before finalizing the upload.
Expected Result: The system should display a preview of the selected image before the user confirms the upload.
Pass Criteria: The preview should be accurate and reflect the selected image.

Test Case: Cancel Image Upload
Description: Attempt to cancel the image upload process before it completes.
Expected Result: The system should allow user to cancel the upload and remove temporary data related that are uploaded.
Pass Criteria: The upload process should halt, and the temporarydata should be removed.

Test Case: Retry Image Upload
Description: Attempt to upload the same image file multiple times.
Expected Result: The system should handle retries gracefully and avoid duplication of data.
Pass Criteria: The system should not create duplicate entries for the same image.
Remember these test case are not exhaustive, and you may need to customize them basedon the specific requirements and features of your image uploading functionality. Additionally,consider testing different file formats, file sizes, concurrent users, and edge cases to ensure comprehensive test coverage.

CHAPTER 8

CONCLUSION

The survey was conducted on the classification and detection of bone fractures. This essay presents the numerous current tactics put forth by various authors. On the basis of classification techniques utilized and the accuracy, comparisons between existing methodologies are provided here. The detection of bone fracture can be accomplished using a variety of image processing approaches. The most typical approach for identifying fractures in any Edge of Detection with Sobel Operator. Machine learning is a more effective method for classifying the type of fracture. The size of the dataset, image quality, number of training epochs, and classification will have a significant on how well fractures are classified. Higher classification accuracy can be achieved by cascading the various strategies.Future plans exist. improvements that can be made to current methods because no model can ever be guaranteed to be entirely accurate.

Future Enhancement

In the suggested study, there are 500 normal photos and 400 aberrant ones. Here, 300 of the 500 normal photos are employed in testing, 200 for training, and 200 of the 400 aberrant photos are taken in testing. and training. Three different classifier types are used to compare the results: ANN, BPNN, CNN performs better than the other two classifiers, classifying the data with an accuracy of 96%. The suggested work's future scope can be expanded to include the detection of fractures in bent bones.

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