International Journal For Advanced Research In Science & Technology
A peer reviewed international journal
www.ijarst.in
ISSN: 2457-0362

IDENTIFICATION OF BONE DEFORMITIES USING MACHINE LEARNING

Ms.M.ANITHA[1], Mr. B. VENKATA SRI HARI[2],

#1 Assistant professor in the Master of Computer Applications in the SRK Institute of Technology, Enikepadu, Vijayawada, NTR District

#2 MCA student in the Master of Computer Applications at SRK Institute of Technology, Enikepadu, Vijayawada, NTR District.

ABSTRACT_ The use of computer-based techniques to locate errors is becoming increasingly common across all industries in today's world. Fast identification and high precision are two of the most important aspects of bone fracture detection. These features are exemplified by a highly sensitive device, which is created by combining innovative methods with efficient use of available resources. A crack in a bone or fracture of the bone is the result of an excessive amount of external force that exceeds the boundaries of what the bone is able to endure. Canny Edge detection is a method of image processing that finds bone fractures by making efficient use of automatic fracture detection and getting over the problem of noise reduction.

It does this by analysing images of broken bones. Edge detection can be accomplished using a variety of approaches, including those developed by Sobel, Canny, Log, Prewitt, and Robert, which are all available in the modern world. However, these processes are made more difficult by significant constraints, such as an inability to carry out research at multiple resolutions, which ultimately results in an inability to recognise minute details during the analysis. Because of their inherent inability to discern between edges and noise elements, the techniques do not perform very well with fuzzy photos. However, they function effectively with high-resolution and high-quality pictures. Another important problem of the techniques is that they operate well with such pictures. The proposed strategy involves using the CNN algorithm to the problem-solving process in order to resolve these challenges. The results of the simulations that were performed indicate that the approach that was proposed is a significantly more effective system for carrying out edge detection on aggregate scales

1.INTRODUCTION

In today's world, medical imaging can be thought of as a branch of science that is rapidly ascending the ranks in the field of healthcare. It helps physicians choose alternatives linked to the type of treatment, in addition to playing a vital part in the classification of diseases and providing better care for patients. The diagnosis and treatment of bone fractures, which impact a vast number of people across all age ranges, are becoming increasingly important in today's contemporary world as a result of the growing number of health concerns that are being raised. It is also a common disadvantage in many countries that have already reached a high level of development, in which the fracture variations are also contributing to an increase in the cut. Fractures can be caused by anything as innocuous as a

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simple slip and fall, as well as by diseases of any kind.As a result, it is necessary to arrive at an accurate diagnosis as quickly as possible before prescribing any kind of medication. After that, radiologists and other medical professionals look at the results of the X-ray to determine whether or not a fracture has occurred and, if so, what kind of fracture it is.

When attempting to identify the line, the procedure known as Hough's transformation was utilised as part of the process of feature extraction. Mallikarjuna The development of a speedy and accurate imaging system for the classification of bone fractures that was supported by information gathered from photos and CT scans was the primary focus of Swamy M. S.'s research and development efforts. The current investigation takes use of a variety of approaches to image processing, including extraction of form, segmentation, preprocessing, and edge detection. When evaluating the accuracy of various types of python seven.8.0 victimisation as the tool used for programming, such techniques are categorised as either broken or unbroken, depending on whether or not the bone is fractured. They describe in detail the accuracy of the detection method for bone fractures using the eighth along with its performance and the limits of the system. They divided the development of the system into four steps, which included pre-processing, bone identification, segmentation, and feature extraction, respectively. During the fusion classification process, three distinct classifiers were utilised. These classifiers included the Neural Propagation Network, the Naive Bayes support, and the vector machine classifier. They discussed the findings, which demonstrated a significant improvement in both the classification rate and the detection rate.

2.LITERATURE SURVEY

[1] A model based on a deep neural network has been developed for use in to differentiate between fractured and healthy bones. When applied to such a limited data set, the deep learning model ends up being overfit. As a result, strategies for data augmentation have been implemented in order to raise the total size of the data collection. All three experiments have been carried out in order to assess how well the model works when using softmax and Adam optimizer. When using 5 fold cross validation, the proposed model has a classification accuracy of 92.44% for both healthy and fractured bones. The accuracy on ten percent and twenty percent of the test data is greater than ninety-five and ninety-three percent, respectively. The performance of the suggested model is much higher than [1] of the 84.7% and [2] of the 86%.

[2] These methods, however, are impeded by fundamental limitations in, such as a lack of capacity to do multi resolution research, which ultimately results in an inability to recognise small information while conducting the analysis. Because of their inherent inability to discern between edges and noise elements, the techniques do not perform very well with fuzzy photos. However, they function effectively with high-resolution and high-quality pictures. Another important problem of the techniques is that they operate well with such pictures. The proposed method

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recommends applying the CNN algorithm to the problem in order to resolve it. The results of the simulations that were run indicate that the approach that was proposed is likely to be a significantly more effective system for carrying out edge detection on aggregate scales. Additionally, it has been demonstrated that the proposed system is robust enough to retrieve the required details, perform the necessary analysis on key portions of the images, and manage noise in a significantly more effective manner than the edge detectors that are currently deployable.

3.PROPOSED SYSTEM

• After processing the image, the programme checks to see if there are any fractures contained within the image itself.

• The programme extracts features using an algorithm called CNN, which is superior to the algorithms that we compared it to since it can produce highly accurate findings even when presented with noisy images and employs something called a convolutional neural network.

• The SVM classifier, also known as the Support Vector Machine Classifier, is a linear classifier that is capable of doing non linear classification simply by using the Kernel technique. • This project also has the capability of printing the F1 score, which enables us to compare the accuracy of various models.

3.1 IMPLEMENTATION

The following is the proposed method for developing a disease predicting model:

The features of an input X-ray image and improve the performance of subsequent stages in a system, various image processing techniques can be applied. The following are some common stages or procedures that are often used in the enhancement of X-ray images:

Step 1:Pre-processing

This stage involves initial processing steps to prepare the image for further enhancement. It may include operations such as noise reduction, image resizing, and normalization.

Image Enhancement

This stage aims to improve the visual quality and clarity of the X-ray image. Different techniques can be applied, depending on the specific requirements and characteristics of the image. Some commonly used enhancement techniques include:

Contrast Enhancement

Adjusting the image's contrast to improve the visibility of details.

Histogram Equalization

Spreading out the intensity values in the image to utilize the full dynamic range.

Filtering

Applying spatial or frequency domain filters to enhance certain features or remove noise.

Sharpening

Enhancing the edges and details in the image to improve clarity.

Feature Extraction

This stage involves extracting relevant features from the enhanced image. It may include techniques such as edge detection, region segmentation, and feature extraction algorithms specific to X-ray images, such as lung nodule detection or bone structure analysis.

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Classification and Analysis

After feature extraction, the image can be further processed using machine learning or pattern recognition algorithms. This stage aims to classify and analyze the extracted features, enabling the system to detect abnormalities, identify specific structures, or perform other diagnostic tasks.

Step 2: Edge Detection

Edge detection in image processing is indeed a technique that analyzes changes in intensity to identify boundaries between objects or regions. The quality of edge detection can be affected by various factors, as you mentioned, including lighting conditions, presence of objects with similar intensities, edge density, and noise.

Step 3: Segmentation

Image segmentation is indeed a fundamental step in image analysis and data extraction. It involves partitioning an image into distinct regions or objects based on certain characteristics or criteria. Image segmentation plays a crucial role in various computer vision tasks, including object recognition, scene understanding, and image annotation..

Step 4: Image classifier

In this step different classifier is used like SVM (Support Vector Machine), K-Nearest Neighbor (KNN), Back Propagation Neural Network (BPNN), Nave Byes(NB).

Step 5: Fracture detection

The last stage of this system is fracture detection it I performed by the procedures. First, the useful features. Here is an explanation of the performance of the system: extracted from the image. And then, these features are used to detect fracture or non-fracture image

1. First user must input an image to be processed; the image will then be carried filtering to remove noise that exists in the image.
2. The next step will performed after image filtering process, the image will during Canny Edge method, it will give results more visible lines on an X.
3. The system then check and combines the results of early detection canny with the Original image, then user can clearly see the shape of the bone.
4. To detect the location of the fracture in the image, the system use shape detection with image matching process expressed when the line has an end, and give the result in percentage if and only if image will match with fractured image i. e. input x-ray image.
5. If image will not matched then no fractured will be detected.
6. Then final step is stop

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4.RESULTS AND DISCUSSION

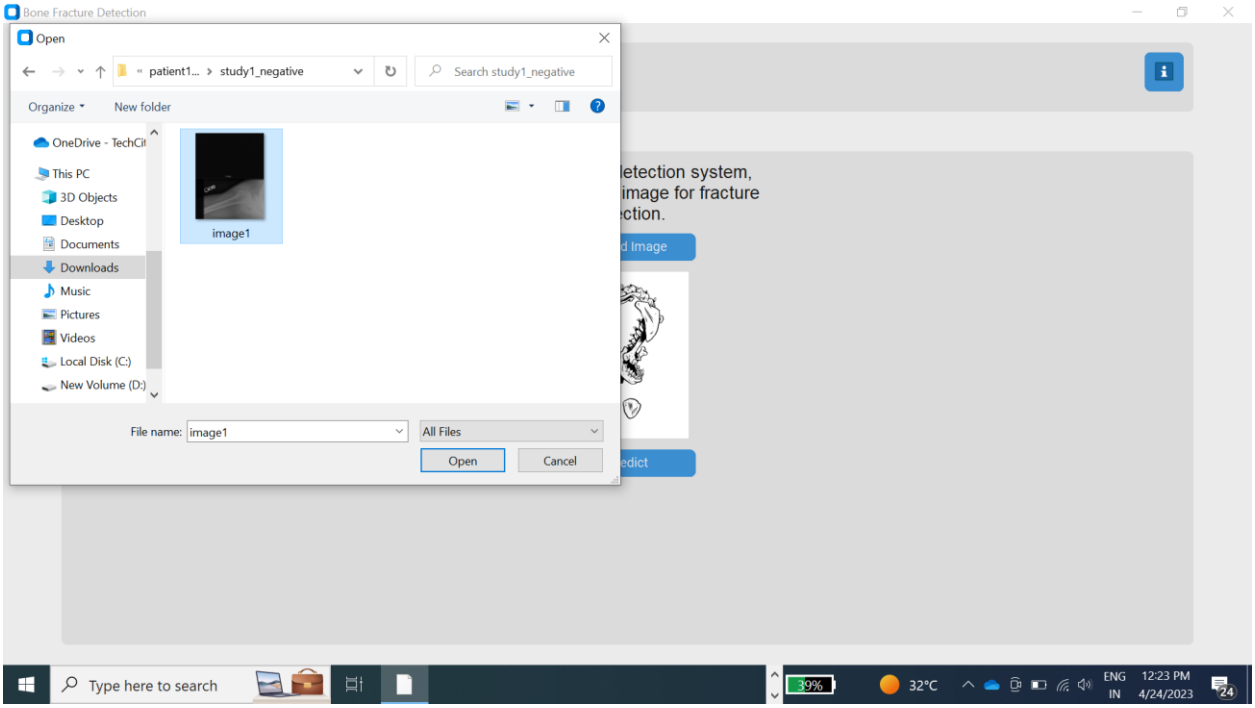

Fig:1 Uploading the image

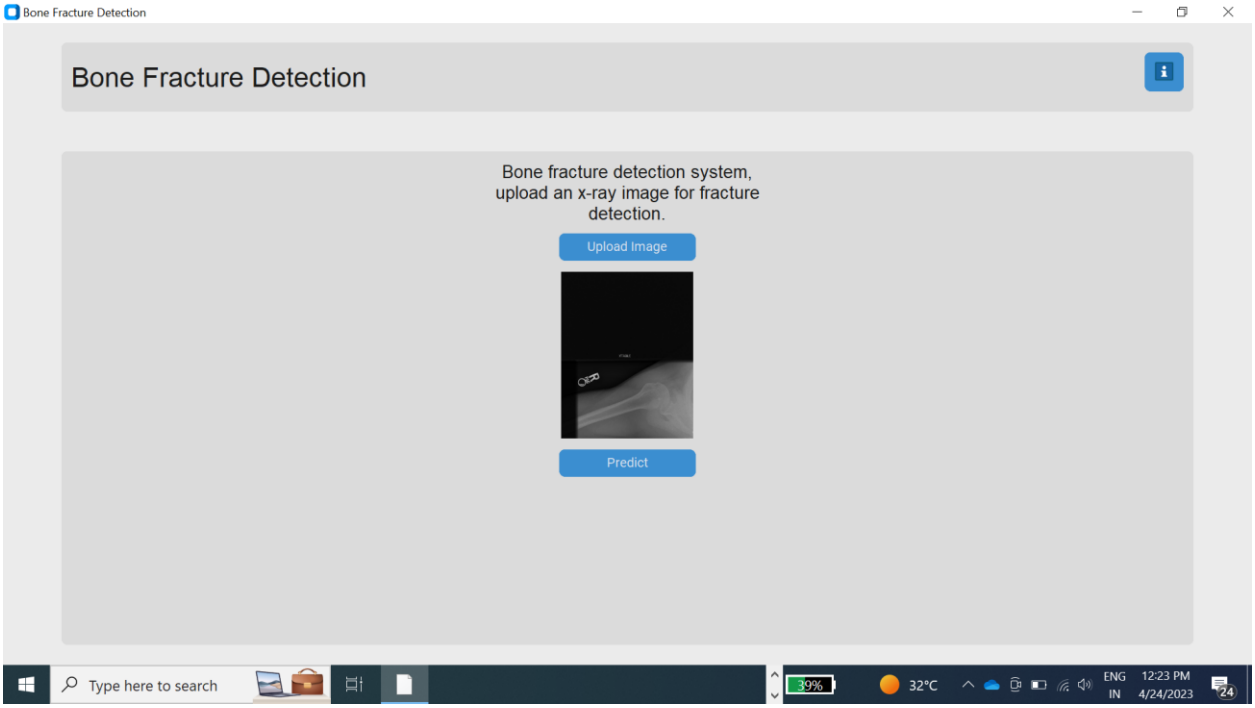

Fig:2 Predicting the image

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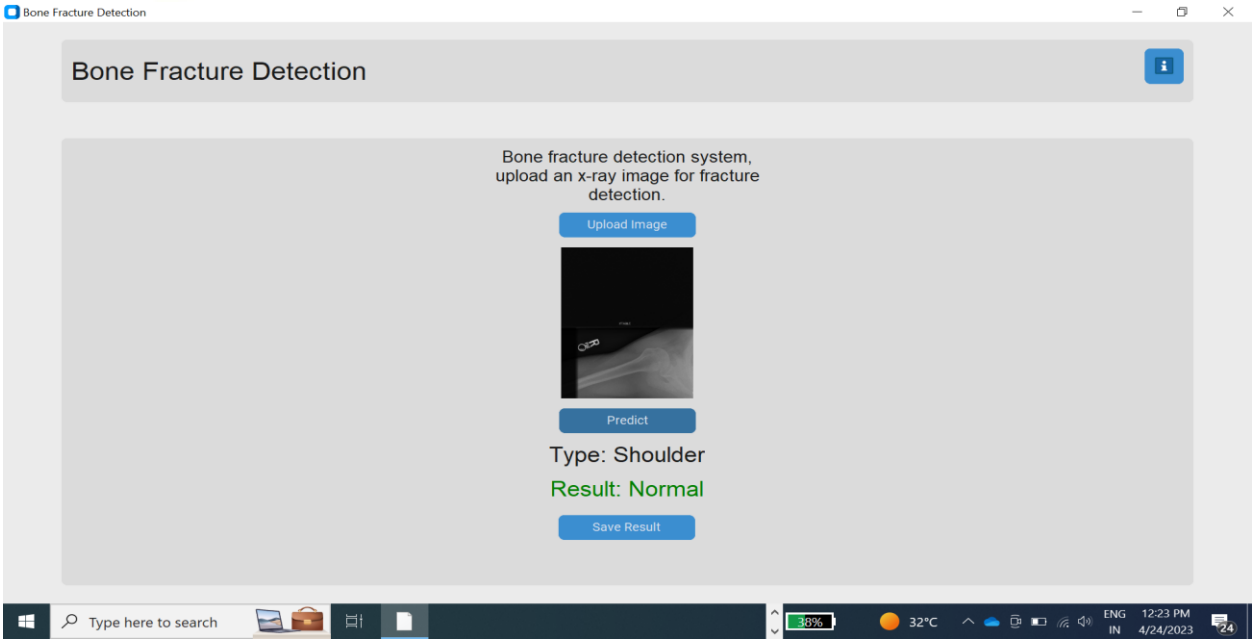

Fig:3 Predicting the result

5.CONCLUSION

Using a graphical user interface application that has been built, a CNN-based picture segmentation approach is proposed for use in detecting bone fractured regions. The portion of the images that was modified by the processing is displayed here. When compared to other well-known edge detection strategies such as Sobel, Prewitt, and Canny, the Affected Area Location demonstrates that the proposed image segmentation system detects bone structure and fracture edges with a greater degree of specificity even when there is noise present. This is the case even when the system is used. The broken part of the image can be seen very clearly because to the CNN-based image segmentation algorithm that was proposed.

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[2] 1, Shinde Shunhangi 2, Bhor Sakshi 3, Pawale Kirti 4, P.R.Patil 5 1,2,3,4Student, SAE Pune, Maharashtra, India. 5Guide, SAE Pune, Maharashtra, India.

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AUTHOR PROFILES

Ms.M.ANITHA completed her Master of Computer Applications and Masters of Technology. Currently working as an Assistant professor in the Masters of Computer Applications in the SRK Institute of Technology, Enikepadu, Vijayawada, NTR District. Her area of interest includes Machine Learning with Python and DBMS.

Mr. B. VENKATA SRI HARI is a student in the Master of Computer Applications at SRK Institute of Technology, Enikepadu, Vijayawada, NTR District. He has a Completed Degree in B.Sc.(computers) from Acharya Nagarjuna University Giddaluru. His areas of interest are DBMS, Java, and Machine Learning with Python.