INFORMATICS INSTITUTE OF TECHNOLOGY

INFORMATICS INSTITUTE OF TECHNOLOGY

In Collaboration with

UNIVERSITY OF WESTMINSTER

Bone fracture detection system using CNN.

A Project Proposal by

Mr. Ganidu Gunsekara

Supervised by

Ms. Dileeka Alwis

Submitted in partial fulfilment of the requirements for the BEng (Hons) in Software Engineering degree at the University of Westminster.

April 2024

ABSTRACT

Problem: Effective identification of bone fractures in X-rays has a great impact in the medical field specially for the trainee doctors with little exposure. If the fracture is complex and less visible, the traditional methods of identifying fractures can be time consuming and be subjected to errors. The aim of this project is to address the above-mentioned challenges by developing a system that uses deep learning to detect bone fractures. In the developed system, the models will effectively classify and locate the bone fracture. The system will then estimate the fracture size and calculate the healing time for that fracture to help the medical practitioners.

Methodology: In the project, two deep learning models are developed which are a classification model and an object detection model, and both uses convolutional neural network architectures (CNN). Both models classify and located X-ray image fractures effectively and the predicted bounding box is used to find the fracture size. Different types of model tuning techniques such as, batch normalization and dropout helped in improving the detection.

Results: The two models achieved promising results with a classification accuracy of 97% ensuring high reliability and a mAP of 73% and an average IoU score of 60% for the object detection model. These metrics show that the system has the potential in automated bone fracture detection which contributes to more efficient and accurate fracture diagnosis.

Subject Descriptors

- Computing methodologies → Machine learning → Machine learning approaches → Object detection
- Applied computing → Life and medical sciences → Health informatics.

Keywords: Bone fracture detection, object detection, convolutional neural network, x-ray analysis, health care diagnostics