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X-ray body Part Classification Using Custom CNN

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Abstract

INTRODUCTION: This work represents a significant step forward by harnessing the power of deep learning to classify X-ray images into distinct body parts. Over the years X-ray pictures were evaluated manually.
OBJECTIVE: Our aim is to automate X-ray interpretation using deep learning techniques.
METHOD: Leveraging cutting-edge frameworks such as FastAI and TensorFlow, a Convolutional Neural Network (CNN) has been meticulously trained on a dataset comprising DICOM images and their corresponding labels.
RESULT: The results achieved by the model are indeed promising, as it demonstrates a remarkable ability to accurately identify various body parts. CNN shows 97.38% performance by compared with other classifiers.
CONCLUSION: This innovation holds the potential to revolutionize medical diagnosis and treatment planning through the automation of image analysis, marking a substantial leap forward in the field of healthcare technology.

Keywords: Analyze X-ray images, CNN, Classification of X-ray Body Parts

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1. Introduction

As in 21st century medical emergencies have increased and this generation have been affected with COVID-19 where there were massive causes over all hospitals due to in availability of equipment's here as imaging data's are clinical and collected and preserved in databases for diagnostically feature relevant information's few clinics in towns are struggling in burden of diagnosis here this technology will help the health sector officials for efficient capabilities of the causes.

In this paper, we created a clever system that can analyse X-ray images and identify the body portion to which they belong. It can tell, for instance, if an X-ray depicts the hand, ankle, or chest. Etc. Deep learning is similar to teaching a computer's brain to spot patterns and make judgement calls in the same way that people learn through experience. We gathered a significant number of X-ray images as well as details on which body part each image corresponds to in order to train the system. We also have a list of labels for each X-ray that identify the bodily portion to which it belongs, and these images are saved in a unique format called DICOM.

Then, after processing, we uniformly sized, brightened, and contrasted these pictures. This phase is crucial for the computer to readily comprehend and compare all of the photos. The next step was to construct a convolutional neural network (CNN). This CNN functions as a smart filter that can examine the images, identify key details, and forecast which body part is seen in the X-ray.

The processed images and their related labels were used to train the CNN. It gained knowledge from countless examples so that it could identify the X-ray patterns associated with various body regions. After training, we put the CNN to the test using brand-new, unveiled X-ray images. The model mostly correctly identified the right bodily components, which was a positive outcome. This innovative technique can assist doctors swiftly analyse X-rays, leading to quicker and more precise diagnosis. By automating the process of locating certain body areas in X-ray images, it may be possible to reduce time and enhance patient care.

2. Related Work

X-rays were first used for medical imaging in the late 19th century after Wilhelm Conrad Roentgen made the discovery