IS for Health Informatics application: Digital dentistry Application

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Abstract—*In dentistry or medicine in general there are a lot of misdiagnosed cases due to human error. The later the diagnosis the worse the case may get. The problem with root fractures is that it usually needs an X-ray and a doctor to be diagnosed but doctors are humans, and they are susceptible to human error. we will use AI in dentistry and how it will aid doctors in their work to diagnose root fractures, Doctors will use the application to scan the X-ray of the patient's tooth and make sure that their diagnosis is accurate or even the patient himself can use the app to get a second opinion and make sure that he was diagnosed correctly*

I. INTRODUCTION

Tooth fracture is a common dental problem that can lead to pain, discomfort, and even tooth loss if left untreated. Early and accurate detection of tooth fractures is crucial for prompt treatment and better patient outcomes. The proposed application aims to improve the efficiency and accuracy of tooth fracture diagnosis by providing a reliable and automated tool for dentists. The application will use a CNN architecture trained on a dataset of X-ray images containing both fractured and non-fractured teeth. The trained model will be capable of accurately identifying the presence and location of tooth fractures in new X-ray images.

II. PROBLEM DEFINITION

A broken tooth often called a cracked tooth or cracked tooth syndrome (CTS), is a condition in which a tooth is cracked. Cracks can be small and harmless. In some cases, teeth can crack or chip.

Fractures happen most usually at the upper front teeth and the teeth in the direction of your lower jaw (mandibular molars). Though people generally fracture one tooth, greater extreme harm or trauma may also fracture more than one tooth.

III. WORKING OF THE PROJECT

The working of this application that when the user opens the application first there is going to be login or sign- up and then the client will choose either if he is with a clinic or individual and then the application will request from the user to upload picture of the X-ray and then it will scan it and then the result will show up. The results will get stored according to what did the user choose either it is a clinic or individual.

IV. OBJECTIVES

The objectives of our research for the proposed application that can scan a photo X-ray to detect tooth fracture are as follows:

1- To develop a deep learning-based application that can accurately detect tooth fractures from X-ray images.

2- To train a convolutional neural network (CNN) architecture on a dataset of X-ray images containing both fractured and non-fractured teeth.

3- To evaluate the performance of the proposed application on a dataset of X-ray images collected from various dental clinics.

4-To determine the efficiency and reliability of the proposed application in detecting tooth fractures in X-ray images.

V. EXPECTED OUTCOMES

The outcome is producing a mobile application that when the user scans an X-Ray it'll process the photo, and inform him whether he got a fractured tooth or not with high efficiency.

VI. CONCLUSION

In conclusion, our proposed application for the automatic detection of tooth fractures from X-ray images using deep learning techniques has the potential to significantly improve the efficiency and accuracy of tooth fracture diagnosis in dentistry. The application uses a CNN architecture trained on a dataset of X-ray images to accurately identify the presence and location of tooth fractures in new X-ray images.

VII. Methodology

The methodology we use is waterfall model. And we used 3200 pictures of teeth as a dataset for this model(1600 fractured and 1600 not fractured) provided to us from the hospital of Misr University For Science And Technology.

System architecture
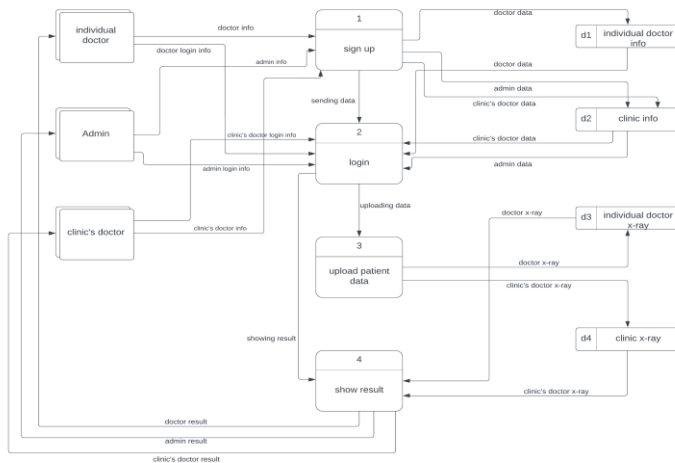
[3]   Park WJ, Park JB. History and application of artificial neural networks in dentistry. Eur J Dent. 2018 Oct-Dec;12(4):594-601

VIII. Result

Our application has an advantage that it can detect the tooth fracture for the clients and the post graduated doctors with accuracy 95%

References

[1]   Braly BV, Maxwell EH. Potential for tooth fracture in restorative dentistry. J Prosthet Dent. 1981 Apr;45(4):411-4.

[2] Rakhshan V, Sforza C, Vucinic P, Vitalariu AM, De Menezes M. Advanced Digital Dentistry. Int J Dent. 2018 Dec 26;2018