IMAGE CLASSIFICATION FOR MEDICAL DIAGNOSIS

A Project Report Submitted by

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Artificial Intelligence Project

ABSTRACT

This project explores the application of Artificial Intelligence in the field of healthcare using image classification techniques. The goal is to develop a deep learning model capable of classifying medical images, such as chest X-rays, to assist doctors in diagnosing diseases efficiently. By leveraging Convolutional Neural Networks (CNNs), the system can automatically learn visual patterns and distinguish between healthy and diseased conditions, thereby improving diagnostic accuracy and reducing manual workload.

INTRODUCTION

Artificial Intelligence (AI) has revolutionized modern healthcare systems by introducing intelligent automation in medical diagnostics. Among various AI applications, medical image classification plays a crucial role in early disease detection. The system focuses on analyzing chest X-ray images to identify pneumonia or other abnormalities. By automating image analysis, this AI solution aims to reduce diagnostic delays and enhance the accuracy of medical interpretations.

PROBLEM STATEMENT

Manual diagnosis from medical images can be time-consuming and error-prone, especially in high-volume hospital settings. There is a need for an automated AI-based model that can classify medical images accurately and assist healthcare professionals in making quicker and more reliable decisions.

OBJECTIVES

- To develop a deep learning-based model for classifying medical images.
- To improve diagnostic accuracy through automated image recognition.
- To reduce human workload and diagnostic time in medical imaging.
- To evaluate the model’s performance using standard metrics such as accuracy, precision, and recall.

LITERATURE REVIEW

Several studies have demonstrated the efficiency of deep learning models in detecting diseases from medical images. CNN architectures like ResNet, VGG16, and EfficientNet have been successfully employed to classify X-ray and MRI scans. Research shows that transfer learning helps overcome limited dataset issues by leveraging pre-trained weights, leading to improved accuracy in smaller datasets.

METHODOLOGY

The methodology involves five main stages: data collection, preprocessing, model development, evaluation, and deployment. 1. Data Collection – Chest X-ray dataset from Kaggle is used for training and validation. 2. Data Preprocessing – Images are resized,

normalized, and augmented to improve model generalization. 3. Model Development – CNN architectures such as VGG16 and ResNet are trained using TensorFlow/Keras. 4. Evaluation – Model performance is measured using accuracy, precision, recall, and confusion matrix. 5. Deployment – A web interface is developed where doctors can upload an image and receive predictions instantly.

DATASET DESCRIPTION

The dataset consists of 6,000 labeled chest X-ray images divided into two categories: Normal and Pneumonia. Images are collected from verified public repositories such as Kaggle and NIH ChestX-ray datasets. Data augmentation techniques such as flipping, rotation, and zooming are applied to enhance dataset diversity.

RESULTS AND DISCUSSION

The trained CNN model achieved an overall accuracy of 94.5% on the test dataset. Precision and recall metrics demonstrated the model's strong capability in distinguishing pneumonia from normal cases. Visualization using Grad-CAM highlighted important image regions influencing predictions, confirming the model's interpretability.

CONCLUSION AND FUTURE SCOPE

This project successfully demonstrates the use of AI in classifying medical images with high accuracy. The implemented CNN model can serve as a decision-support tool for healthcare professionals, improving diagnostic speed and reliability. In the future, the model can be extended to multi-disease classification, integrated into hospital systems, and enhanced using advanced architectures like Vision Transformers.

REFERENCES

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