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BONE FRACTURE DETCTION USING GUI APPLICATION

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ABSTRACT :

Bone deformities can severely impact patient mobility and quality of life. Timely and accurate diagnosis is vital for effective treatment. This paper presents a machine learning-based system using Convolutional Neural Networks (CNNs) to analyze X-ray, CT, and MRI images for the automatic detection of bone deformities. The system integrates deep learning models, data augmentation, and transfer learning, achieving high accuracy while reducing human diagnostic errors. A web-based interface built using Flask enables real-time predictions and usability in clinical settings. Performance metrics including accuracy, precision, recall, and F1-score validate the system's effectiveness.

Keywords: Bone deformity, CNN, deep learning, medical imaging, Flask, real-time prediction, transfer learning, automation.

1. Introduction

Bone deformities, such as scoliosis and joint misalignments, are structural abnormalities that can significantly impact an individual's daily life. Manual diagnosis through radiographic imaging is time-consuming and prone to human error. This research integrates Artificial Intelligence (AI), particularly Convolutional Neural Networks (CNNs), to automate diagnosis. Our system aims to provide high-accuracy predictions from X-ray, CT, and MRI images, reducing diagnostic time and increasing efficiency in medical imaging analysis.

2. Literature Review

Multiple studies have explored deep learning in medical imaging. Agarwal and Jain (2021) demonstrated skeletal abnormality detection with CNNs. Park et al. (2021) used a custom CNN for long bone deformities, integrating Grad-CAM for visualization. Liu et al. (2024) proposed a hybrid 2D-3D CNN for spinal deformities. These works underscore CNNs' effectiveness in image-based diagnosis, encouraging further innovations in real-time clinical tools.

3. Proposed Methodology

The proposed system involves several stages: data collection, preprocessing, model training, deployment, and user interaction. Medical imaging data are preprocessed using noise reduction, resizing, and augmentation techniques. A CNN model—trained using transfer learning with models like ResNet and EfficientNet—learns deformity patterns. The system uses Flask to create a user interface for real-time diagnosis. This end-to-end architecture enables medical professionals to upload scans and receive predictions instantly, along with confidence scores.

4. Conclusion

This project offers a reliable and scalable solution for early detection of bone deformities using CNN-based deep learning models. By reducing dependency on manual diagnosis, the system improves diagnostic efficiency, minimizes human error, and promotes accessibility, especially in underserved regions. Real-time feedback and a web-based dashboard make it suitable for integration in clinical practice.

5. Future Work

Future enhancements include support for 3D medical images, improved explainable AI for model transparency, and integration with hospital information systems for seamless patient management. The model can also be extended to detect other musculoskeletal anomalies.

6. REFERENCES

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