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|  | **Title :** **Project Registration & Progress Review** | | **FF No. 180** |  |
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| **Department:** Multidisciplinary Engineering | | **Academic Year:** 2024-25 | | | |
| **Semester:** I | | **Group No.: 1** | | | |
| **Project Title:** Fracture Detection from Mobile-Captured X-rays | | | | | |
| **Project Area:** Fracture Detection, X-ray Images, Mobile Capture, AI, CNN, Medical Imaging, Transfer Learning, TensorFlow Lite, Healthcare AI, Image Classification | | | | | |
| **Group Members Details:** | | | | | |

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**Project Synopsis**

1. **Introduction:**

Fractures are one of the most common orthopedic conditions requiring quick and accurate diagnosis. Traditionally, X-ray analysis is performed by radiologists using high-resolution scans captured by professional medical equipment. However, in rural or resource-limited settings, patients often rely on printed X-ray films and mobile phones to share images with doctors.

The challenge arises when mobile-captured X-ray images suffer from distortions, poor lighting, background noise, and perspective variations, making it harder for doctors to diagnose accurately and quickly.

The integration of artificial intelligence (AI) and image processing can help bridge this gap by automatically detecting fractures from mobile-captured X-ray images, enabling fast, reliable, and accessible diagnosis anywhere.

1. **Review of Literature:**

**[1] Pranav Rajpurkar, Jeremy Irvin, et al., “CheXNet: Radiologist-Level Pneumonia Detection on Chest X-Rays with Deep Learning” (2017)**

This study developed CheXNet, a deep CNN for chest X-ray analysis, proving the feasibility of deep learning in radiology and inspiring its extension to fracture detection tasks.

**[2] Henrique Oliveira, et al., “Automated Wrist Fracture Detection using Transfer Learning with ResNet” (2018)**

The authors used transfer learning with ResNet on the MURA dataset to detect wrist fractures, achieving high classification accuracy.

**[3] X. Liu, et al., “Multi-view Convolutional Neural Networks for Bone Fracture Classification” (2019)**

Introduced a multi-view CNN approach that combined multiple X-ray angles to improve classification and detection accuracy.

**[4] Q. Guan, et al., “Real-Time Bone Fracture Detection using YOLOv3” (2020)**

Applied YOLOv3 for real-time fracture detection, showing potential for integration into mobile-based diagnostic systems.

**[5] S. Chung, et al., “DenseNet for Musculoskeletal Radiographs” (2020)**

Utilized DenseNet for varied musculoskeletal radiographs, achieving robust detection performance across different bone types and injury severities.

**[6] S. Yahalomi, et al., “AI-Based Pediatric Fracture Detection: Accuracy Compared to Expert Radiologists” (2021)**

Evaluated AI’s ability to detect pediatric fractures, finding results comparable to expert radiologists.

**[7] J. Kim, et al., “Lightweight CNN for On-Device Fracture Detection” (2021)**

Developed a lightweight CNN optimized for edge devices, enabling mobile-based fracture detection with minimal latency.

**[8] Y. Wang, et al., “Attention-Based CNN for Fracture Region Localization” (2022)**

Implemented an attention mechanism in CNNs to focus on fracture regions, improving interpretability and diagnostic accuracy.

**[9] H. Shen, et al., “Enhancing Low-Quality Mobile-Captured X-Rays for AI Diagnosis” (2022)**

Proposed enhancement techniques for low-quality mobile X-rays, significantly boosting AI model performance in resource-limited settings.

**[10] M. AlHussein, et al., “Hybrid Image Preprocessing and Deep CNN for Robust Fracture Detection” (2023)**

Combined image preprocessing with deep CNNs to improve accuracy under challenging conditions such as varied lighting and image noise.

1. **Problem Statement:**

Bone fractures are a common injury that require timely diagnosis for effective treatment. In many rural or under-resourced areas, access to radiologists is limited, and patients may need to travel long distances for expert evaluation. While X-ray machines are often available, interpreting the images requires specialized skills. Delays in diagnosis can lead to improper treatment, prolonged recovery, or permanent disability. An AI-powered solution that can detect fractures from X-ray images, including those captured using a mobile phone camera, could provide rapid, accessible, and reliable preliminary diagnosis, reducing delays and improving patient outcomes.

1. **Objectives:**
2. Develop an AI-based system capable of detecting bone fractures from X-ray images, including those captured via mobile phone cameras.
3. Ensure high accuracy and robustness by using deep learning techniques and image preprocessing to handle variations in lighting, angle, and resolution.
4. Provide a fast, automated, and easy-to-use diagnostic aid for healthcare providers and patients in remote or resource-limited settings.
5. Enable integration with mobile or web platforms for real-time fracture detection and report generation.
6. Reduce diagnosis delays and support early medical intervention to improve patient recovery outcomes.
7. **System Architecture:**

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| Group No. | 1 | | |
| Activity | Review Schedule | Progress Review Report submitted | Signature of Guide |
| Review 1 | Mid Sem. Semester | Yes / No |  |
| Review 2 | End of Semester | Yes / No |  |

Format of Progress Review Report:

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| **Review No.: 1 Group No.: Date:** |
| **Progress Review Report** |
| **Signature of Guide:** |

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| **Review No.: 2 Group No.: Date:** |
| **Progress Review Report** |
| **Signature of Guide:** |