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Deep Learning Approaches towards KNEE OSTEOARTHRITIS

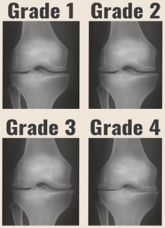
Data Science Stack

- **Data Collection:** Secondary Data is collected from kaggle
- **Preprocessing:** TensorFlow/Keras or PyTorch, Scikit-learn, Matplotlib and Seaborn
- **Model Training:** CNN model optimized for binary classification (KOA vs. non-KOA)
- **Evaluation:** visualization tools such as confusion matrices, ROC curves, and heatmaps to interpret model predictions.

Why CNN?

CNNs excel in X-ray analysis by automatical-ly **extracting key features**, ensuring high accuracy, efficiency, scalability, and generali-zability in medical imaging.

KL Grading

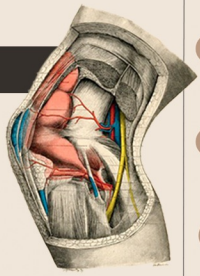


Business Problem To Be Solved

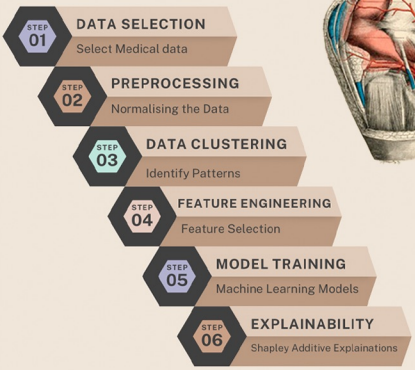
Knee osteoarthritis (KOA) presents a significant healthcare challenge due to its rising prevalence, high treatment costs, and impact on patients' quality of life

This research leverages deep learning techniques to address these key challenges:

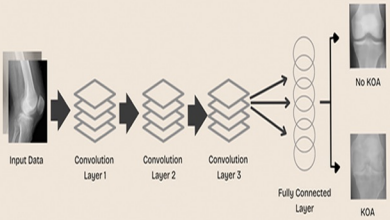
- Understanding the Severity of Knee Osteoarthritis Efficiently
- Early Detection of Knee Osteoarthritis
- Risk Prediction for Knee Osteoarthritis



Research Methodology



Processed CNN Architecture



USP

1. **Automated and Objective Diagnosis**
   Reduces dependency on subjective clinical interpretation
2. **AI-POWERED SEVERITY ASSESSMENT**
   Kellgren-Lawrence (KL) grading to classify severity.
3. **Non-Invasive and Cost-Effective**
   Eliminates the need for expensive and invasive diagnostic procedures
4. **Faster Diagnosis For Improved Patient Care**
   Quicker interventions and better disease management.
5. **No Manual Feature Engineering**
   Learning complex patterns directly from images.

Future Scope

Progression Analysis: Future models can predict KOA progression.
Multimodal Integration: Adding MRI, CT, and clinical data enhances accuracy.
Personalized Treatment: Patient data can guide tailored care.

ROI / Benefits