# Machine Learning Tool to Predict Scaphoid Wrist Fractures

**Problem:** Scaphoid fractures are wrist injuries which are hard to find in X-rays cause the bone is too small and in between lots of small bones. This can cause long-term issues like improper movement, less Flexibility and pain. We need a smart, easy-to-use tool to predict if a scaphoid fracture is present using patient info and images, helping doctors make better decisions quickly. The result will be returned in Percentage.

**Area of Use:** Medical Technology, Healthcare Technology and Prediction Tools

**Objective:** To develop a machine learning model that accurately estimates the probability of a true scaphoid fracture after wrist trauma, reducing diagnostic errors and aiding healthcare professionals in timely decision-making.

**Summary:** This project creates a Tool or a Trained Model to predict scaphoid fracture probability by using patient details and X-ray images. It will be trained on past patient data and checked to ensure it works well. The tool will be available as an easy-to-use web for doctors to use right away, improving diagnosis and patient care.

## Steps:

**Data Gathering:** Collect anonymous patient records, injury details, and X-ray/MRI images from hospitals or public sources like Mendeley Data.

**Data Prep:** Clean up missing info, select the Features, encode categorical variables choose the proper Model to train, drop the usable columns and organize categories . Enhance and clean up images for clarity.

**Data Exploration:** Create charts, correration Heat Maps graphs.To understand the data Visually.

**Model Building:** Try different methods like Random Forest, Gradient Boosting, Logistic Regression, and neural networks for images, and fine-tune settings for best results.

**Model Testing:** Check accuracy using measures like success rate and error rate.

**Validation:** Test the model with multiple data splits and external data to ensure it’s reliable.

**Deployment:** Turn the model into a Web Page connected Azure.

**Output:** A trained model will be capable of giving probability scores (0–100%) for true scaphoid fracture cases.

## Tools Used:

**Language:** Python

**Libraries:** Scikit-learn, Pandas, NumPy, Matplotlib, Seaborn, TensorFlow/Keras, OpenCV and More.

**Frameworks:** Flask

**Database:** MongoDB

**Cloud:** Azure Cloud Services

**Data Sources:** Possible datasets from Mendeley Data.

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