**FINGERPRINT RECOGNITION PIPELINE FOR BLOOD GROUP PREDICTION USING DEEP LEARNING**

**ABSTRACT**

The Fingerprint Recognition Pipeline for Blood Group Prediction is a biometric-based approach that aims to determine an individual's blood group by analyzing fingerprint patterns. This method utilizes image processing techniques to extract key fingerprint features, such as ridges, minutiae points, and texture patterns. It has potential applications in medical diagnostics, forensic science, and biometric identification systems, enhancing accessibility and efficiency in healthcare and security sectors. The traditional issue of the Fingerprint Recognition Pipeline for Blood Group Prediction is image quality and noise. Poor-quality fingerprint scans due to dirt, moisture, skin conditions, or low-resolution sensors introduce noise, making it difficult to extract reliable features for accurate blood group prediction. To overcome these issues, the project proposes a Fingerprint Recognition Pipeline for Blood Group Prediction Using Machine Learning. The pipeline begins with an input fingerprint image, which undergoes preprocessing using Scale-Invariant Feature Transform (SIFT) to enhance important details by denoising and resizing the image. Next, the segmentation stage applies a Density-Based K-Means algorithm to separate meaningful fingerprint regions while handling outliers and performing object detection to extract key patterns. After segmentation, feature extraction is carried out using Histogram of Oriented Gradients (HOG), focusing on texture analysis and medical imaging aspects to capture distinctive fingerprint attributes. These extracted features are then fed into a classification model (EfficientNet), which processes the data through Scalify and Versaflex modules to ensure accurate blood group classification. Finally, the system generates the predicted output, providing a non-invasive and efficient alternative to conventional blood testing methods. This project is proposed in Python.

**BLOCK DIAGRAM**

