



# Saranathan College of Engineering

**Title : Finger Vein Recognition Based on Deep Learning**

**Domain : Deep Learning**

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# Problem Statement :

- Finger vein biometrics offer a secure and reliable method for personal identification, but existing detection methods often suffer from low accuracy and robustness.
- This project aims to address these limitations by employing deep learning models to accurately identify and extract vein patterns from finger images.
- The proposed system goal is to create a robust finger vein detection system capable of achieving high accuracy

# Abstract:

- In this project propose a novel approach for finger vein detection leveraging deep learning techniques along with advanced image processing methodologies.
- Our method begins with preprocessing steps to enhance the quality of finger vein images. Subsequently, a deep learning architecture is employed to automatically extract discriminative features from the preprocessed images.
- The extracted features are then utilized in conjunction with Complete Direction Representation (CDR) to effectively capture the directional information present in finger vein patterns.
- Additionally, Band-Limited Phase-Only Correlation (BLPOC) is employed for precise matching of vein patterns, exploiting the phase information while suppressing irrelevant frequency components

# Objective:

- To develop a robust finger vein detection system utilizing deep learning techniques, specifically focusing on image processing methods.
- Implement preprocessing techniques to enhance finger vein images, including noise reduction, contrast enhancement, and normalization.
- The proposed algorithms to extract directional features from finger vein images using CDR, capturing both local and global information.
- The pattern matching algorithm improved matching accuracy and computational efficiency.

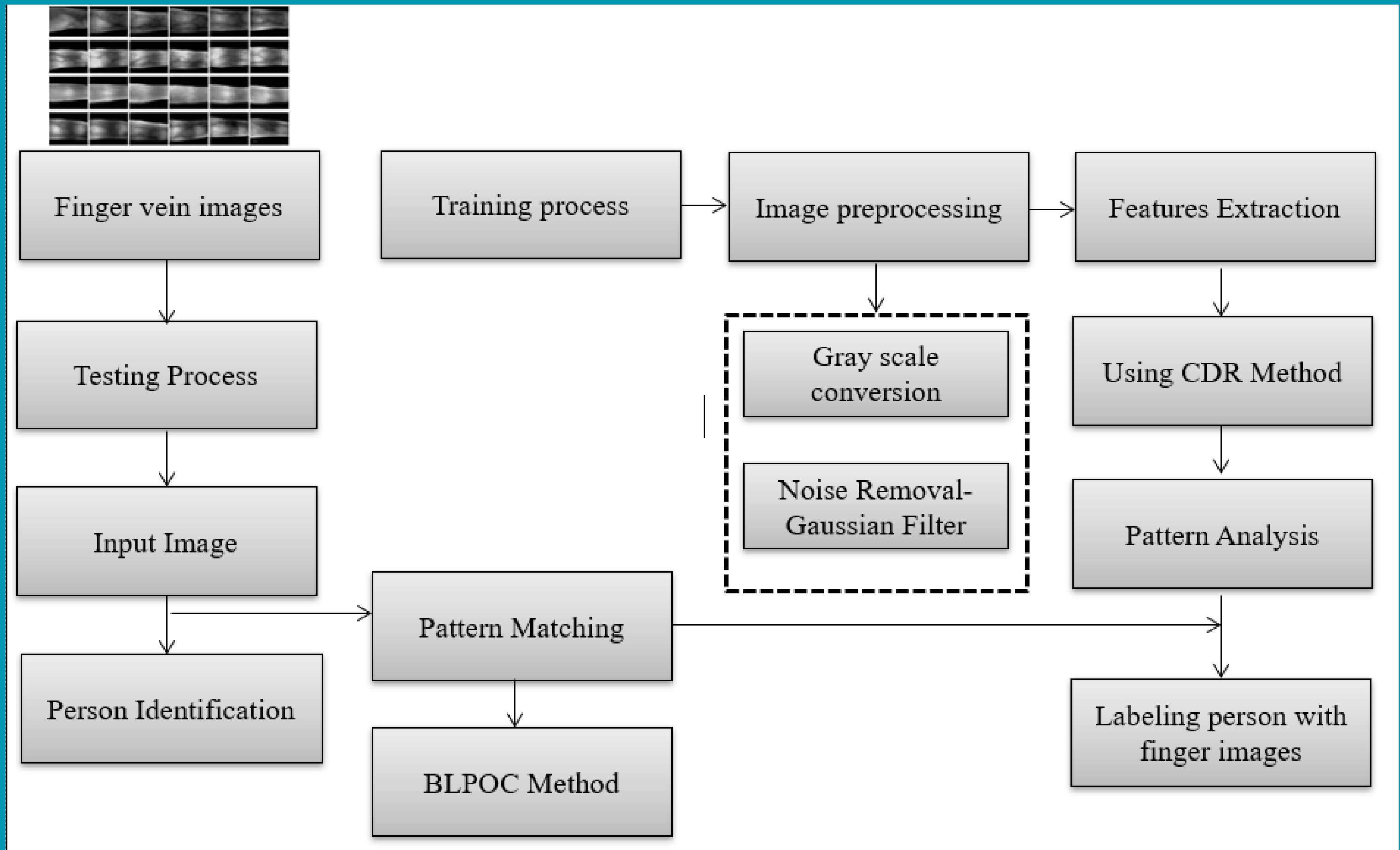
# Existing system:

- Existing system implements a convolutional neural network (CNN)-based approach for finger vein detection.
- Finger vein biometrics offer a secure and convenient means of identification.
- Leveraging CNNs, our method extracts discriminative features from finger vein images to accurately detect and localize veins.
- Through extensive experimentation on benchmark datasets, this model demonstrate the effectiveness of our CNN.
- However, the CNN-based approach may suffer from computational complexity, requiring substantial resources for training and inference.

# Proposed Solution:

- The proposed solution for finger vein detection using deep learning integrates advanced image processing techniques like Complete Direction Representation (CDR) and Band-Limited Phase-Only Correlation (BLPOC) for pattern matching.
- Initially, the input finger vein images are preprocessed to enhance contrast and reduce noise.
- Subsequently, CDR is employed to capture directional information effectively, enabling robust feature extraction from the vein patterns.
- The model is trained on a large dataset of annotated finger vein images to accurately identify vein patterns.
- Finally, BLPOC is utilized for precise vein pattern matching, aligning the input images with the learned representations for accurate detection.

# Block Diagram :





# Reference:

- Han, Chong, Zilong Chen, Jian Guo, and Lijuan Sun. "A Robust Edge Detection Algorithm for Finger Vein Recognition." In 2022 41st Chinese Control Conference (CCC), IEEE, 2022.
- Kumar, T. Sathish, Pachaivannan Partheeban, "Finger Vein based Human Identification and Recognition using Gabor Filter." In 2022 International Conference on Data Science, Agents & Artificial Intelligence (ICDSAAI), IEEE, 2022.
- Assim, Ola Marwan, and Ahmed M. Alkababji. "CNN and Genetic Algorithm for Finger Vein Recognition." In 2021 14th International Conference on Developments in eSystems Engineering (DeSE), IEEE, 2021.
- Yang, Hang, Lei Shen, Yu-Dong Yao, Huaxia Wang, and Guodong Zhao. "Finger vein image inpainting with gabor texture constraints." IEEE Access 8, 2020.
- Oueslati, Amira, Nadia Feddaoui, "An Efficient palm vein Region of Interest extraction method." In 2020 5th International Conference on Advanced Technologies for Signal and Image Processing (ATSIP) IEEE, 2020.