



NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
2025-2026

Batch Number	DB1
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Guide	Sd.Rizwana M.Tech ., (Ph.D).
Title	Learning Ridge Structures: adaptive CNN-Based Local Orientation and Frequency Estimation for Fingerprints
Domain/Technology	DEEP LEARNING
Base Paper Link	https://ieeexplore.ieee.org/document/10719986
Dataset Link	https://github.com/raffaele-cappelli/FFE
Software Requirements	Browser: Any latest browser like Chrome Operating System: Windows 7 Server or later Python (COLAB)
Hardware Requirements	System Type: Intel Core i5 or above RAM: 8 GB Number of cores:5 Number ofThreads: 4
Abstract	<p>Fingerprint identification is one of the most well understood and widely used biometric methods for identifying individuals, relying on the accurate identification of ridge structures in fingerprint images. There has been significant work to date on estimating ridge information (i.e., orientation) in fingerprint images. However, estimating ridge quantity (i.e., ridge frequency) presents challenges, especially for noisy or low-quality images. In this work, we propose an end-to-end solution using Convolutional Neural Networks (CNNs) to simultaneously estimate both ridge frequency and ridge orientation from fingerprint images. The proposed method includes preliminary processing to extract the fingerprint area from an image and orientation encoding to facilitate the network's learning process. The system has been trained with enhanced data and dense pixel-wise supervision to enhance noise and low contrast robustness. The system was evaluated on a typical fingerprint dataset and it yielded a mean absolute percentage error (MAPE) of 4.58 for frequency estimation leading to a substantial improvement over traditional image processing methodology.</p>

Signature of the student(s)

Signature of the Guide

Signature of the project coordinator