Human-in-the-Loop Thermal-to-RGB Translation System for Assisted Living

Project Overview

Goal:
Improve caregiver decision-making through visually enhanced, privacy-compliant images generated from thermal data.
Approach:
A U-Net based deep learning model trained on paired thermal-RGB data (PST900 dataset).

1. Set Up the Environment
Install required Python packages:
pip install torch torchvision matplotlib numpy opencv-python

2. Add Thermal Images
Place thermal images (256x256, normalized) into the google drive.

3. Run the Model- (HITL.py)
The model will load pretrained weights (or you can train from scratch).
Translated RGB images are saved to results/ with the same filename as the input.

Metric	Value	Meaning
SSIM	0.72	High visual structure fidelity
PSNR	18.27 dB	good image clarity for posture analysis
L1 Loss	0.098	Balanced pixel accuracy vs. privacy

Dataset
PST900 Dataset from DARPA Subterranean Challenge
Link: https://subtdata.darpa.mil/
Includes 894 synchronized RGB-Thermal image pairs.