MODEL CARD

Person Detection

MODEL DETAILS

This model is trained to detect persons in images by predicting bounding boxes and classifying pose into two categories: frontal and non-frontal. It is specifically designed and optimized for embedded deployment, ensuring low latency and efficient resource utilization.

Figure 1: Person Detection Model Output.

MODEL SPECIFICATIONS

Inputs

- 256×144×1 grayscale image

Outputs

- Person bounding boxes
- Pose classification of the detected person: frontal or non-frontal

Architecture

- The model uses a YOLO-like anchor-free architecture with two detection scales

Parameters

- 548,572 (543,812 trainable, 4,760 non-trainable)

AUTHORS	Lattice Semiconductor	**SOURCE CODE**	Training Source Code
VERSION	pd-nx33-anchor_free-8.2.1	**TOOLCHAIN**	LATTE
RELEASE	2025-12-18		LSCQuant

PERFORMANCE EVALUATION

Live Evaluation

Evaluations were performed on Lattice CLNX-33 FPGA and IMX219 camera, under a controlled, standardized environment to ensure consistency and reproducibility of results. While these conditions shaped the reported metrics, the model architecture is designed for flexibility, supporting potential deployment across a wide range of platforms, including non-FPGA environments.

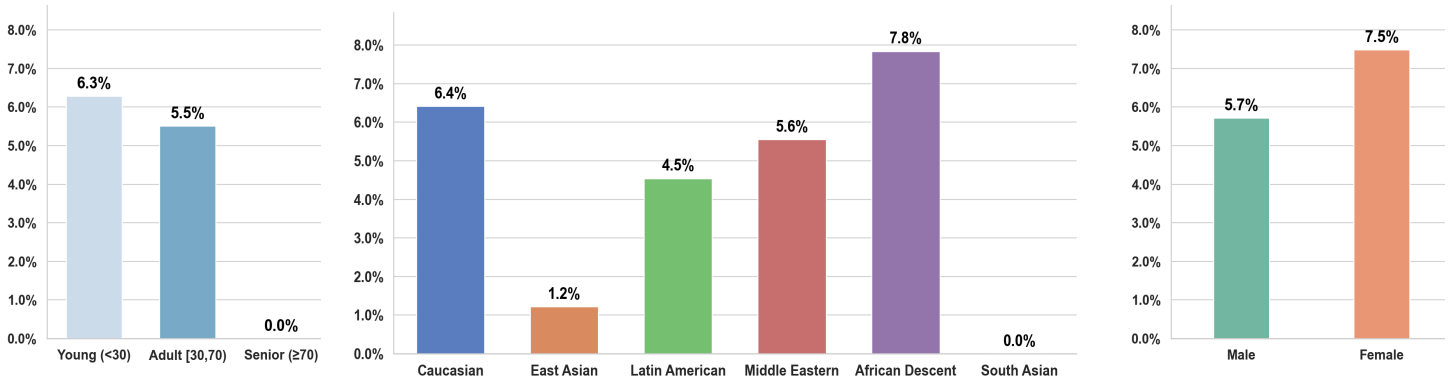
- Illumination: The model demonstrated reliable performance under standard indoor lighting conditions.
- Depth: The model's output remained reliable within a detection range of up to 6 meters.
- Pose Estimation: For each detected person within the operating range, the model provides a reliable classified pose, indicating whether the individual is frontal or non-frontal relative to the camera.

Offline Evaluation

The KPIs for the evaluation data are reported in Table 1. Categorical metadata for quantitative analysis were generated using Gender Classifier, Age Classifier, and Deep Face. Figure 2 illustrates the false negative rate by age, ethnicity and gender categories.

Table 1: Model performance across datasets.

Dataset	Metric	Value	Notes
Lattice FPGA	mIoU F1 Score mAP@0.5 Pose Classifier F1	0.88 98.5% 0.997 92.6%	 924 images 1096 person bounding boxes
Lattice RGB	mIoU F1 Score mAP@0.5 Pose Classifier F1	0.89 99% 0.999 88.5%	 479 images 479 person bounding boxes
Filtered COCO	mIoU F1 Score mAP@0.5 Pose Classifier F1	0.88 93.45% 0.9635 80%	 787 images 1101 person bounding boxes



(a) Age (b) Ethnicity (c) Gender

Figure 2: False Negative Rate by age, ethnicity, and gender categories.