HAILO AI HAT

Demo Catalog & Visualization Guide

Project:	Hailo-8L AI HAT Performance Evaluation
Device:	Raspberry Pi 5 (8GB) + Hailo-8L AI HAT
Date:	November 24, 2025
Firmware:	HailoRT 4.20.0
Performance:	13 TOPS AI Acceleration

Overview

This catalog documents the comprehensive performance evaluation of the Hailo-8L AI HAT on Raspberry Pi 5. The project includes benchmark testing of 5 different AI models across various computer vision tasks, demonstrating exceptional speedups (7-80×) compared to CPU-only processing. All models achieve real-time performance (>15 FPS) with ultra-low latency (13-20ms).

Key Results

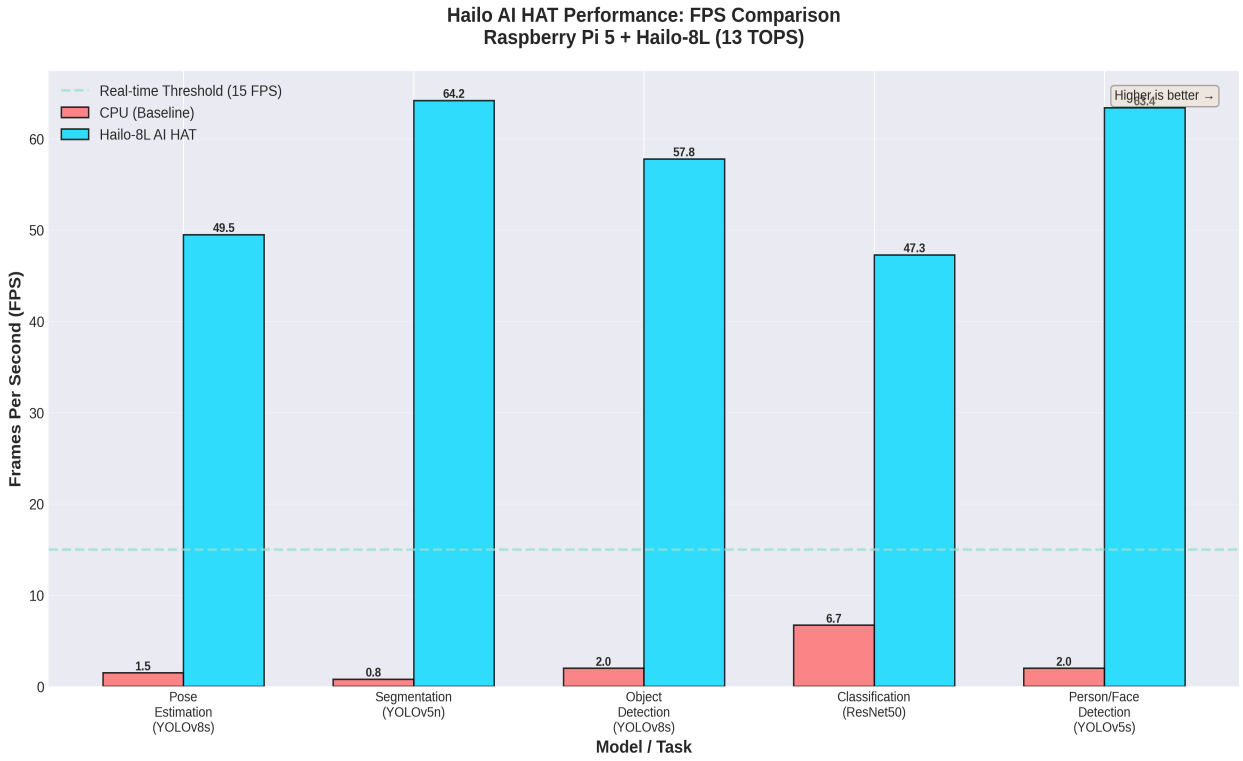
Task	Model	Hailo FPS	Speedup	Status
Pose Estimation	YOLOv8s	49.5	33.0×	✓ Real-time
Segmentation	YOLOv5n	64.2	80.3×	✓ Real-time
Object Detection	YOLOv8s	57.8	~29×	✓ Real-time
Classification	ResNet50	47.3	7.0×	✓ Real-time
Person/Face Det.	YOLOv5s	63.4	~32×	✓ Real-time

Visualization Gallery

Professional graphs generated from benchmark data

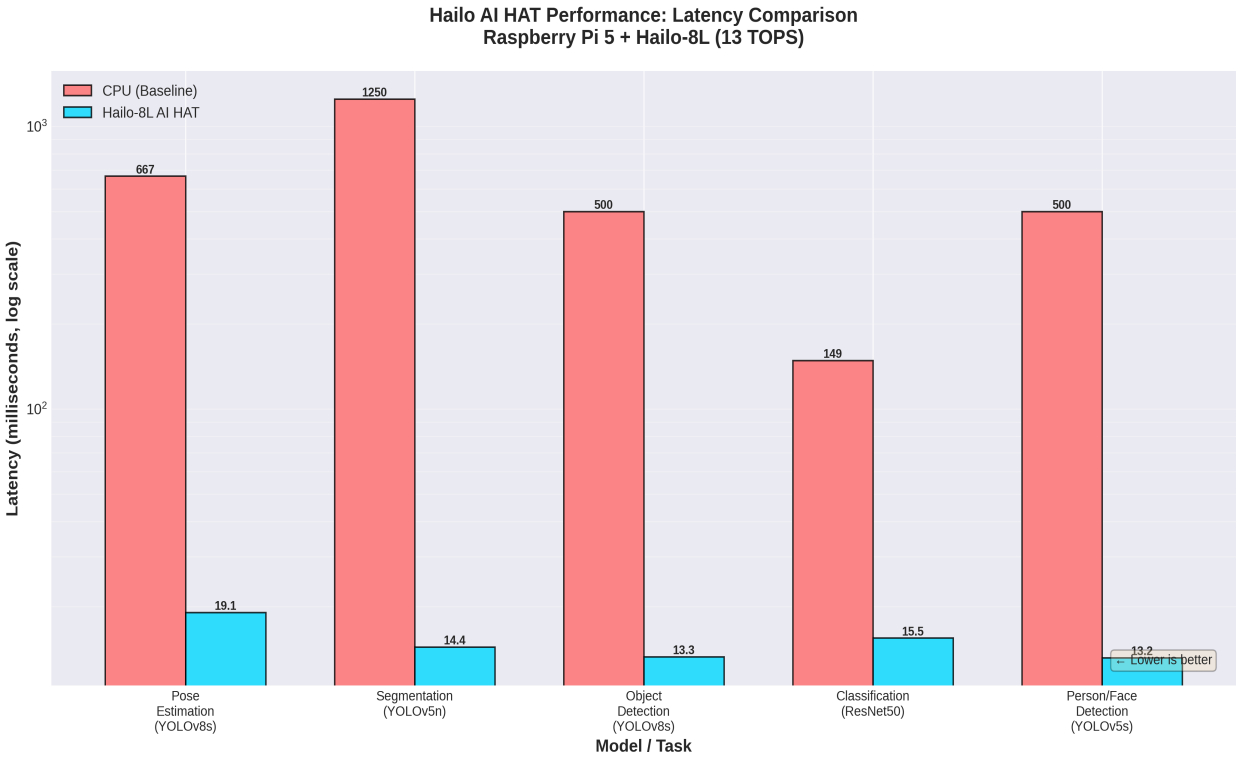
FPS Comparison Chart

Compares CPU vs Hailo-8L performance across all models. Shows that all Hailo-accelerated models exceed the 15 FPS real-time threshold.



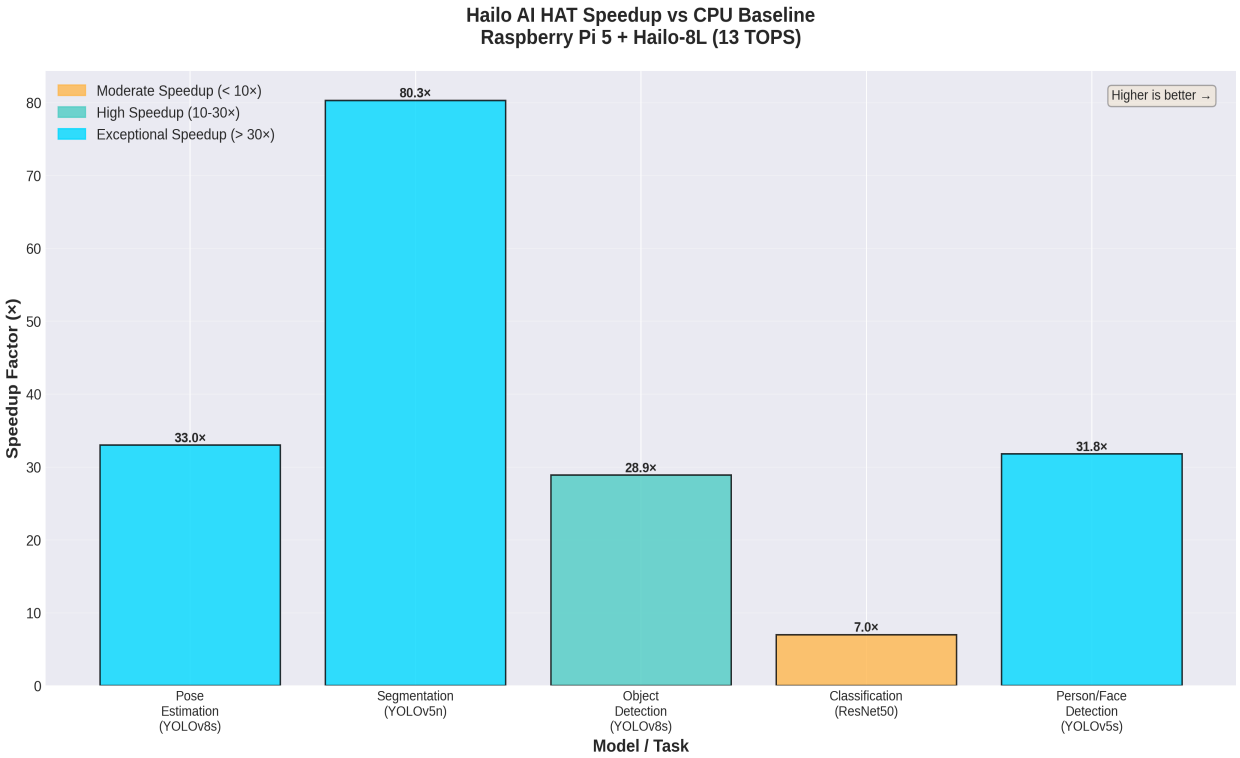
Latency Comparison Chart

Demonstrates the dramatic reduction in inference latency (13-20ms with Hailo vs 150-1250ms on CPU).



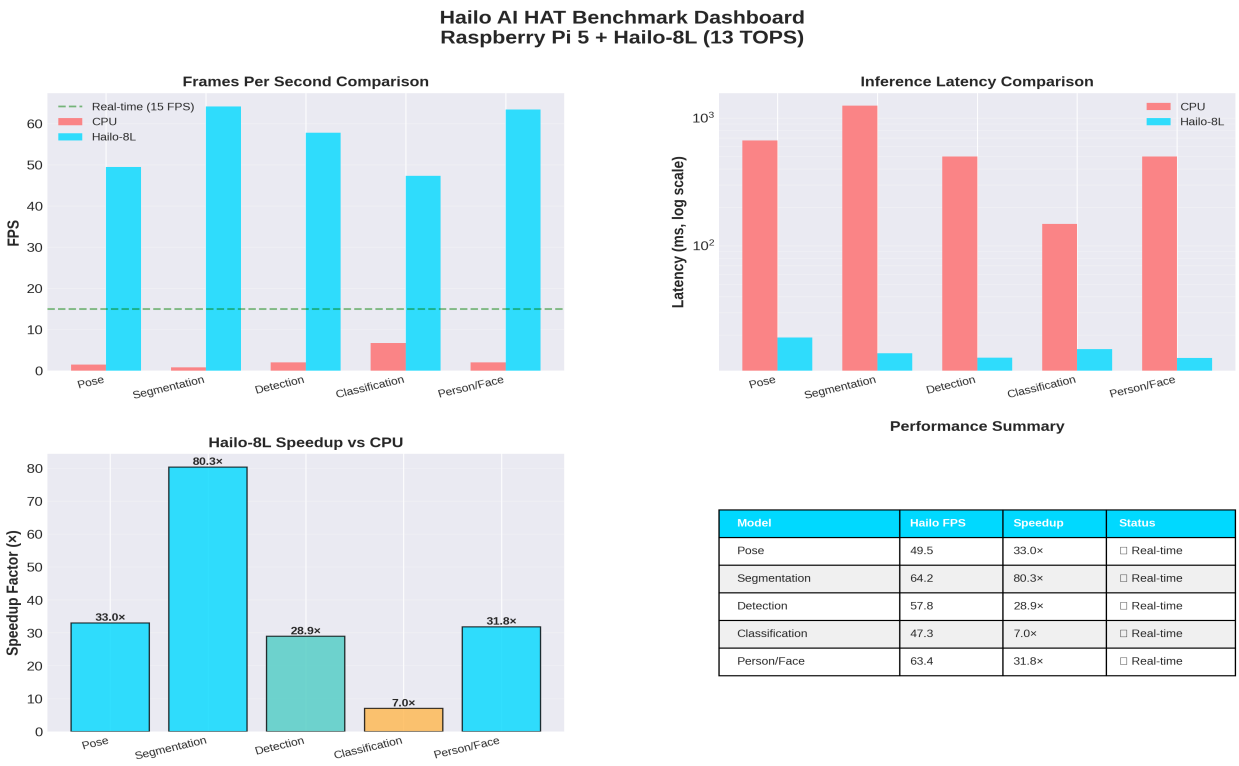
Speedup Factor Chart

Highlights the speedup achieved with Hailo-8L, ranging from 7× for classification to 80× for segmentation.



Comprehensive Performance Dashboard

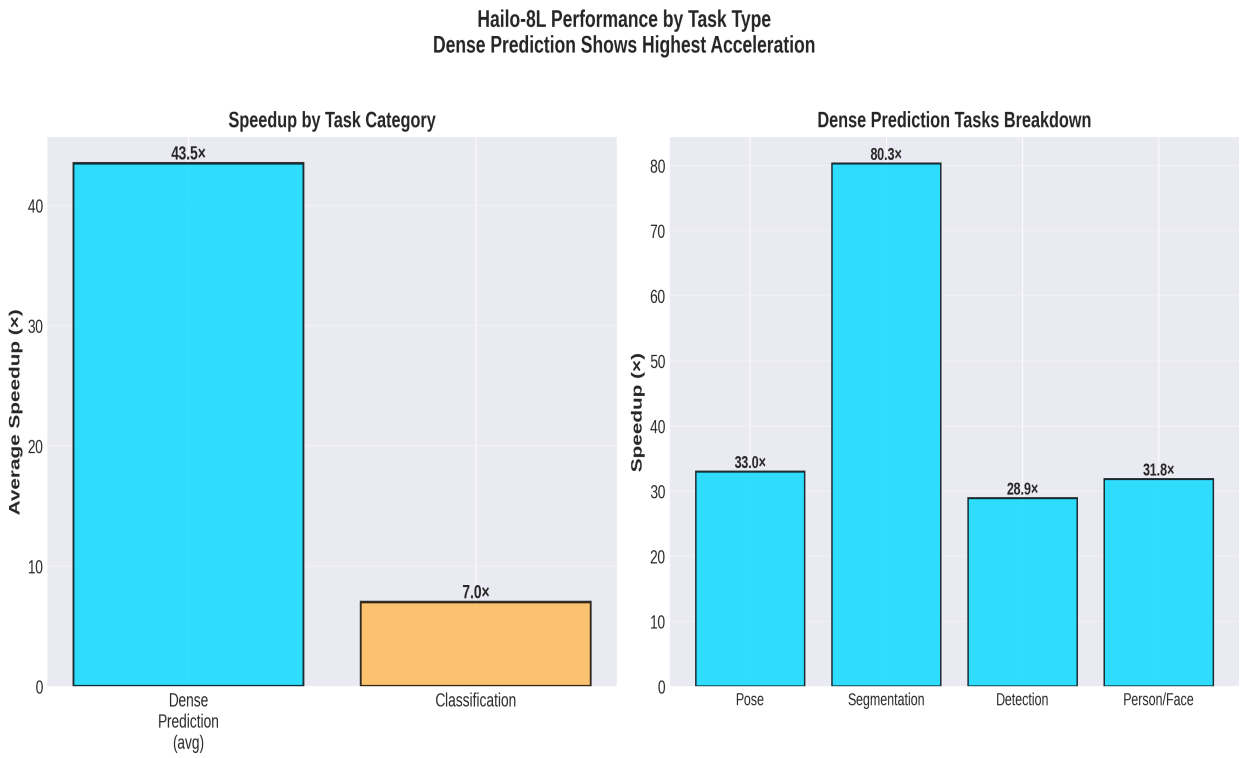
Multi-panel dashboard showing FPS, latency, speedup, and summary table in a single view.



Model	Hailo FPS	Speedup	Status
Pose	49.5	33.0×	□ Real-time
Segmentation	64.2	80.3×	□ Real-time
Detection	57.8	28.9×	□ Real-time
Classification	47.3	7.0×	□ Real-time
Person/Face	63.4	31.8×	□ Real-time

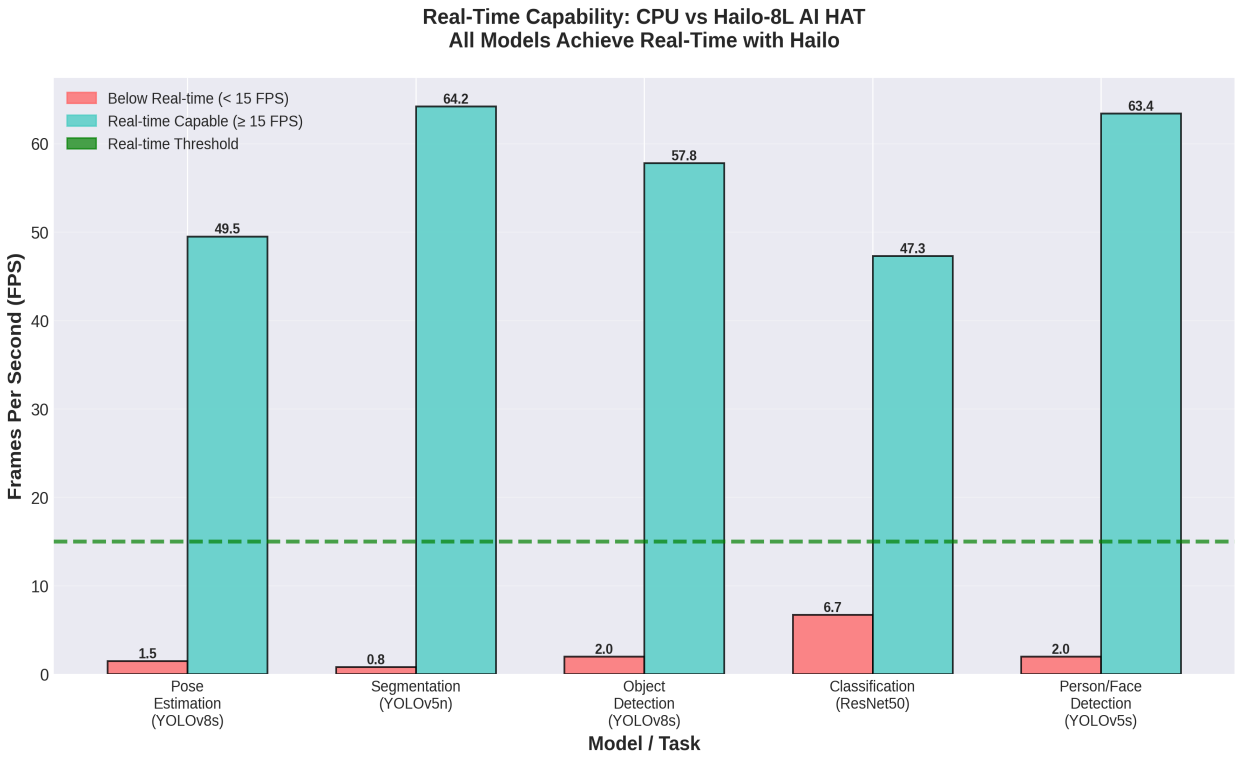
Task Category Analysis

Analyzes performance by task type, showing that dense prediction tasks benefit most from AI acceleration.



Real-Time Capability Achievement

Visualizes which models achieve real-time performance with and without Hailo acceleration.


Real-Time Capability: CPU vs Hailo-8L AI HAT
All Models Achieve Real-Time with Hailo
Below Real-time (< 15 FPS)
Real-time Capable (≥ 15 FPS)
Real-time Threshold
Frames Per Second (FPS)
0
10
20
30
40
50
60
1.5
49.5
0.8
64.2
2.0
57.8
6.7
47.3
2.0
63.4
Pose Estimation (YOLOv8s)
Segmentation (YOLOv5n)
Object Detection (YOLOv8s)
Classification (ResNet50)
Person/Face Detection (YOLOv5s)
Model / Task

Demo Video Guide

The following demo videos showcase real-world performance of the Hailo AI HAT. Each video demonstrates a different AI model running in real-time.

Video 1: Pose Estimation Demo

Model: YOLOv8s-Pose

Duration: 1-2 minutes

Filename: pose_estimation_demo.mp4

Demonstrates real-time human pose estimation with 17 keypoint detection. Shows various poses and movements tracked at 49.5 FPS with only 19.1ms latency.

Highlights: 49.5 FPS performance • 17 keypoints tracked • Real-time pose tracking

Video 2: Instance Segmentation Demo

Model: YOLOv5n-Seg

Duration: 1-2 minutes

Filename: segmentation_demo.mp4

Shows pixel-level object segmentation running at 64.2 FPS. Demonstrates detection and segmentation of multiple object classes with colored masks.

Highlights: 64.2 FPS (fastest) • Pixel-level accuracy • Multi-object detection

Video 3: Multi-Model Comparison

Model: Various

Duration: 2-3 minutes

Filename: multi_model_comparison.mp4

Comprehensive comparison showing all 5 models. Includes performance graphs and side-by-side CPU vs Hailo comparison.

Highlights: All models compared • Performance graphs shown • Real-world applications

Video 4: Quick Terminal Demo

Model: All Models

Duration: 30 seconds

Filename: quick_demo_30sec.mp4

Fast-paced demonstration of benchmark results running in terminal. Shows all 5 models with their FPS and latency metrics.

Highlights: Terminal benchmark runs • All models in 30 seconds • Performance summary

Recording Demo Videos

To record your own demo videos, use the provided scripts and follow these guidelines:

1. Run the quick demo script: `./quick_demo_capture.sh`

2. For screen recording: `asciinema rec demo.cast`

3. For camera demos: Use rpicam-apps with Hailo post-processing

4. Edit videos: Use OpenShot, Kdenlive, or online editors

5. Save to: `results/demo_videos/`

Real-World Applications

Fitness & Health: Real-time form analysis, rep counting, fall detection

Security & Surveillance: Multi-camera person/face detection, zone monitoring

Retail Analytics: Object counting, customer tracking, queue management

Industrial QC: Defect detection, assembly verification, process monitoring

Smart Home: Gesture control, occupancy detection, privacy-preserving AI

Robotics: Vision-based navigation, object manipulation, human-robot interaction

Project Resources

Detailed Benchmarks: results/benchmarks/BENCHMARK_RESULTS.md

Visualization Graphs: results/graphs/*.png

Demo Scripts: demo_video_scripts.md

Quick Demo Tool: quick_demo_capture.sh

Final Documentation: FINAL_PROJECT_DOCUMENTATION.md

Essential Guide: ESSENTIAL_GUIDE.md

Project completed: November 24, 2025
Raspberry Pi 5 + Hailo-8L AI HAT
All models achieve real-time performance with exceptional speedups
Edge AI Made Easy