Introduction to Intel® Distribution of OpenVINO™ toolkit for Computer Vision Applications

100: Beginner-level
Lesson 05

Introduction to Intel® Distribution of **OpenVINO™** toolkit for Computer Vision Application

OpenVINO 100 – **Course agenda**

Lesson 1: Introduction, why do we need Artificial Intelligence (AI).

Lesson 2: What is Video, what is computer vision, how do we accelerate it on modern computers.

Lesson 3: How to accelerate Video processing

Lesson 4: How to accelerate Neural Network for vision applications

Lesson 5: Video Analytics pipeline

Lesson 6: Demos, OpenVINO at work

Lesson 7: The full flow, from Data to a product using Intel tools-Part 1.

Lesson 8: The full flow, from Data to a product using Intel tools-Part 2.

Lesson 9: Summary, intro to next course (200)


Inference time: N/A for async mode
OpenCV rendering time: 23.551 ms
1 99.7 %
Async mode is on. Processing request 1

“PER FRAME”

"PER FRAME"

Decode

- Video must first be decoded (un-compressed)

"PER FRAME"

Pre-Processing

- Image processing to improve the quality

"PER FRAME"

Pre-Processing

- Image processing to improve the quality
- Scale, Resize, curve out regions of interest (ROI)

"PER FRAME"

Pre-Processing

- Image processing to improve the quality
- Scale, Resize, curve out regions of interest (ROI)
- Select only selected frame (and skip the others)

"PER FRAME"

Inference

- Use a deep-learning based model to inference
- Could be multiple models

"PER FRAME"

Decode → Pre Processing → Inference → Post Processing → Encode

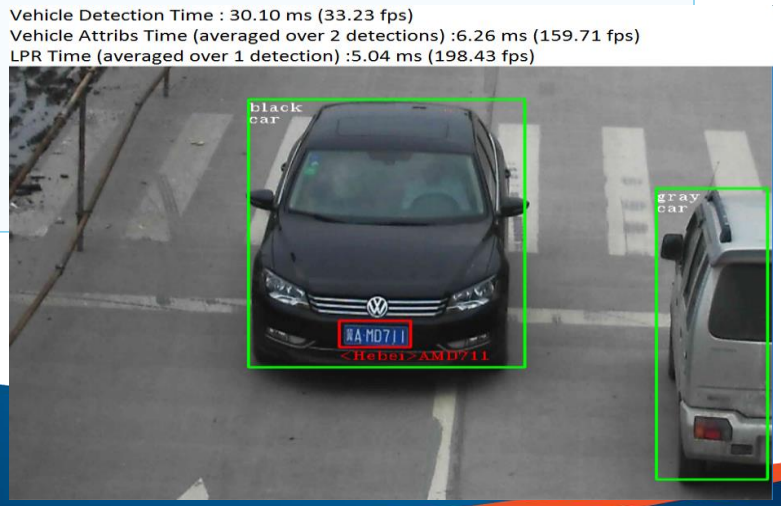
Inference

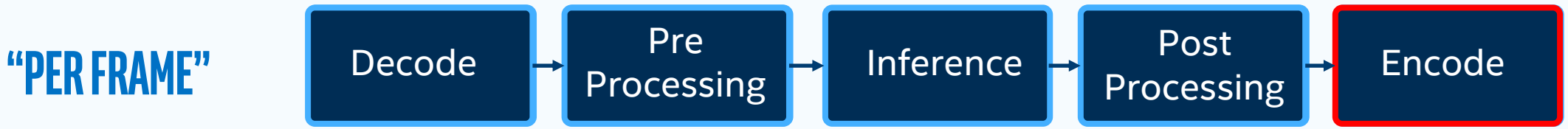
- Use a deep-learning based model to inference
- Could be multiple models

"PER FRAME"

Post-Processing

- processing required after the inference stage
- Examples:
  - In classification, find the label, (possibly) render it on the right place in the image
  - Highlight (rectangle over) detected objects

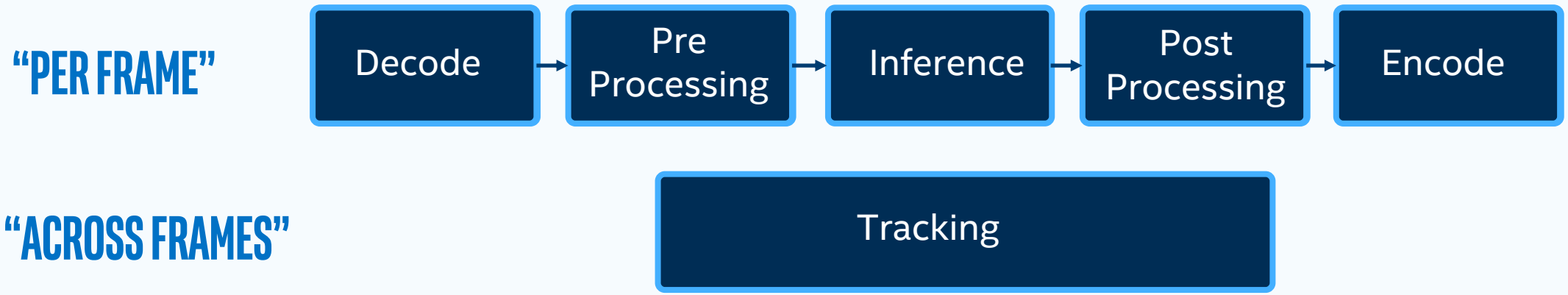




Encode

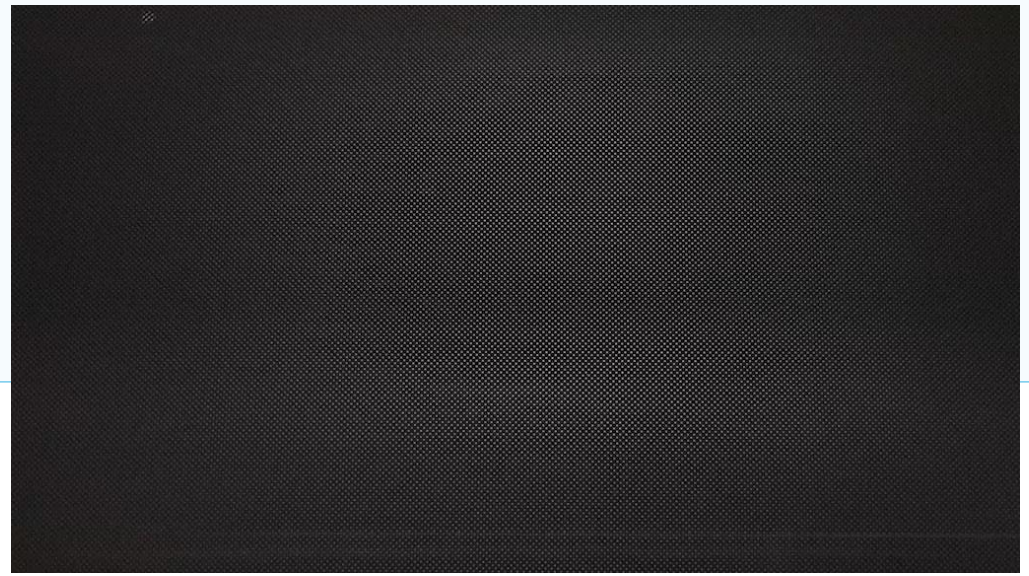
- Compress the video back

“PER FRAME”

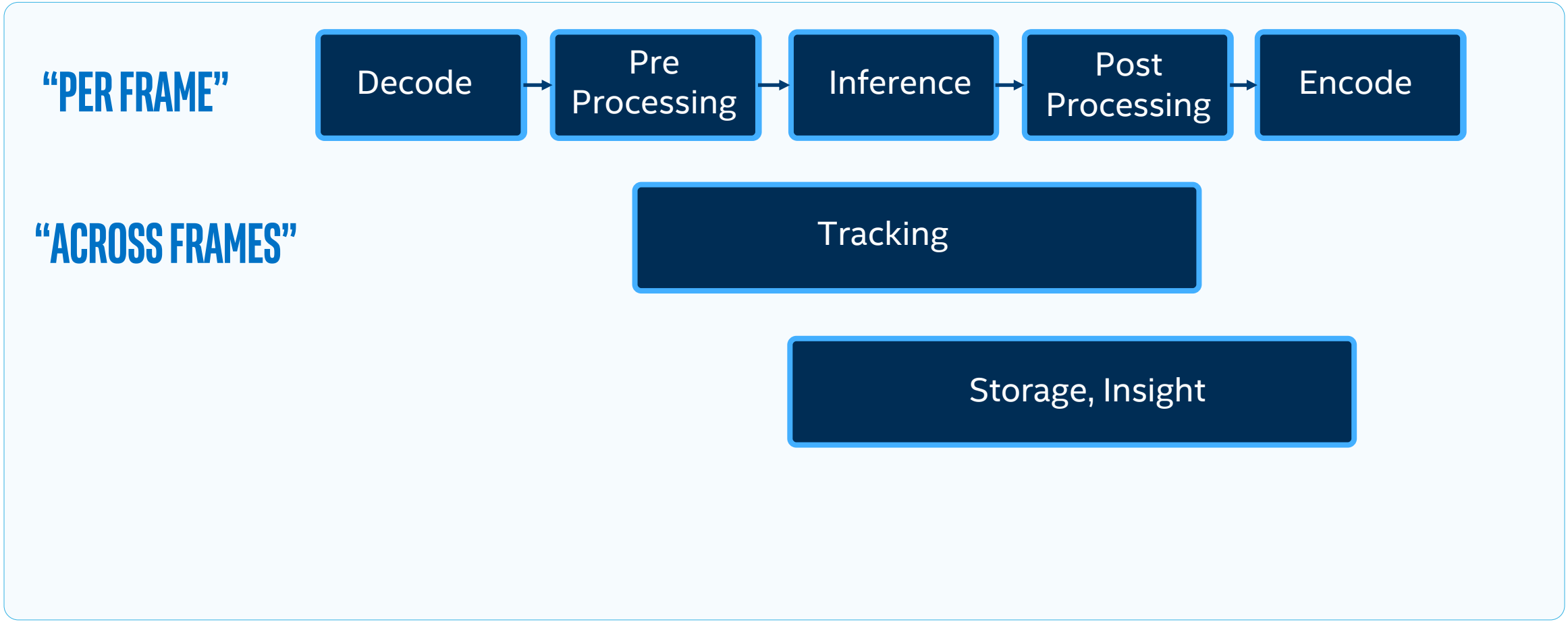

“PER FRAME”
Decode
Pre Processing
Inference
Post Processing
Encode
“ACROSS FRAMES”
Tracking

"PER FRAME"

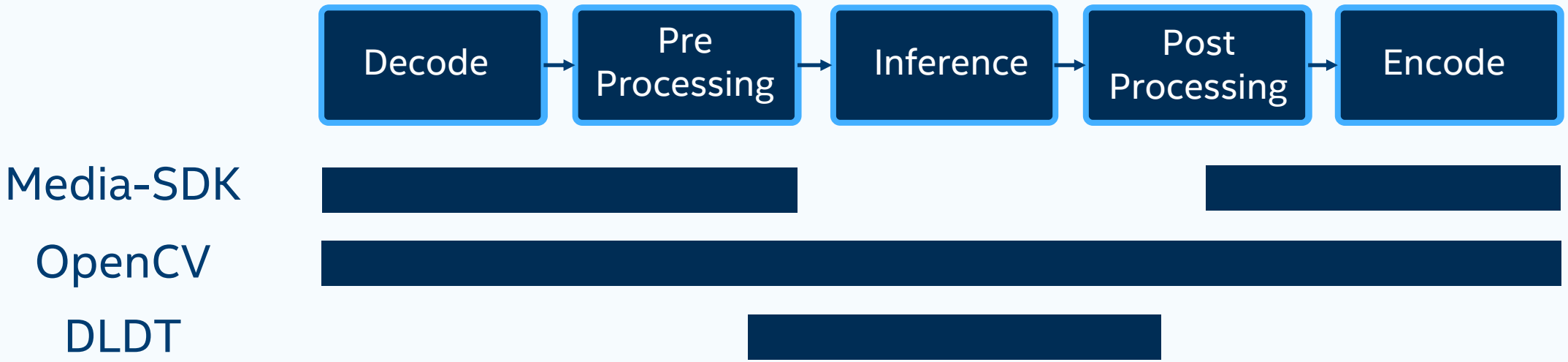
"ACROSS FRAMES"



Storage, Insight


"PER FRAME"
Decode
Pre Processing
Inference
Post Processing
Encode
"ACROSS FRAMES"
Tracking
Storage, Insight


Decode
Pre Processing
Inference
Post Processing
Encode


Decode
Pre Processing
Inference
Post Processing
Encode
Media-SDK
OpenCV
DLDT

Intel® Distribution of OpenVINO™ toolkit

Intel® Architecture-Based Platforms Support

Intel® Vision Accelerator Design Products & AI in Production/ Developer Kits

OS Support: CentOS* 7.4 (64 bit), Ubuntu* 16.04.3 LTS (64 bit), Microsoft Windows* 10 (64 bit), Yocto Project* version Poky Jethro v2.0.3 (64 bit), macOS* 10.13 & 10.14 (64 bit)

Intel® Distribution of OpenVINO™ toolkit

Traditional Computer Vision

Optimized Libraries & Code Samples

OpenCV* | **OpenVX*** | **Samples**

For Intel® CPU & GPU/Intel® Processor Graphics

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For Intel® CPU & GPU/Intel® Processor Graphics

Tools & Libraries

Increase Media/Video/Graphics Performance

Intel® Media SDK
Open Source version

OpenCL™ Drivers & Runtimes

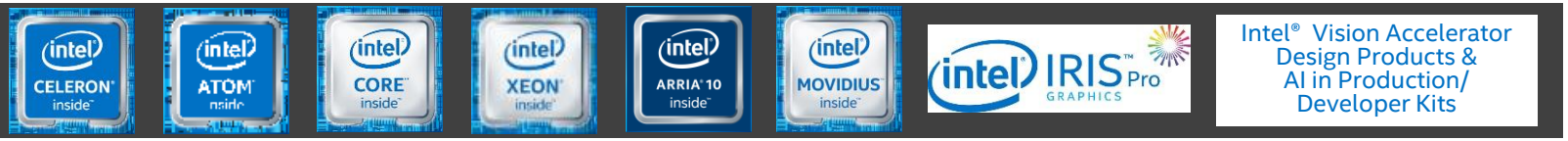
For GPU/Intel® Processor Graphics

Optimize Intel® FPGA (Linux* only)

FPGA RunTime Environment
(from Intel® FPGA SDK for OpenCL™)

Bitstreams

Intel® Architecture-Based Platforms Support



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Intel® Distribution of OpenVINO™ toolkit

Deep Learning

Intel® Deep Learning Deployment Toolkit

Model Optimizer
Convert & Optimize

IR

Inference Engine
Optimized Inference

IR = Intermediate Representation file

Open Model Zoo

40+ Pretrained Models

Samples

Model Downloader

Calibration Tool | Benchmark app | Model Analyzer | Accuracy Checker | Aux. Capabilities

Traditional Computer Vision

Optimized Libraries & Code Samples

OpenCV*

OpenVX*

Samples

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Summary

- **Video Analytics =** Video Processing + Computer Vision + AI (Inference)
- Video Analytic **pipeline**.. most common workload for many vision applications
- The pipeline include many operations, but the most ‘expensive’ ones are usually done on every frame (“per frame”)
- **OpenVINO** has all the software components required to build a video analytic pipeline.. And an AI application
- OpenVINO is supported on many Intel platforms, many operating systems, it is FREE and has all the required tools.