

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

100: Beginner-level
Lesson 08

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

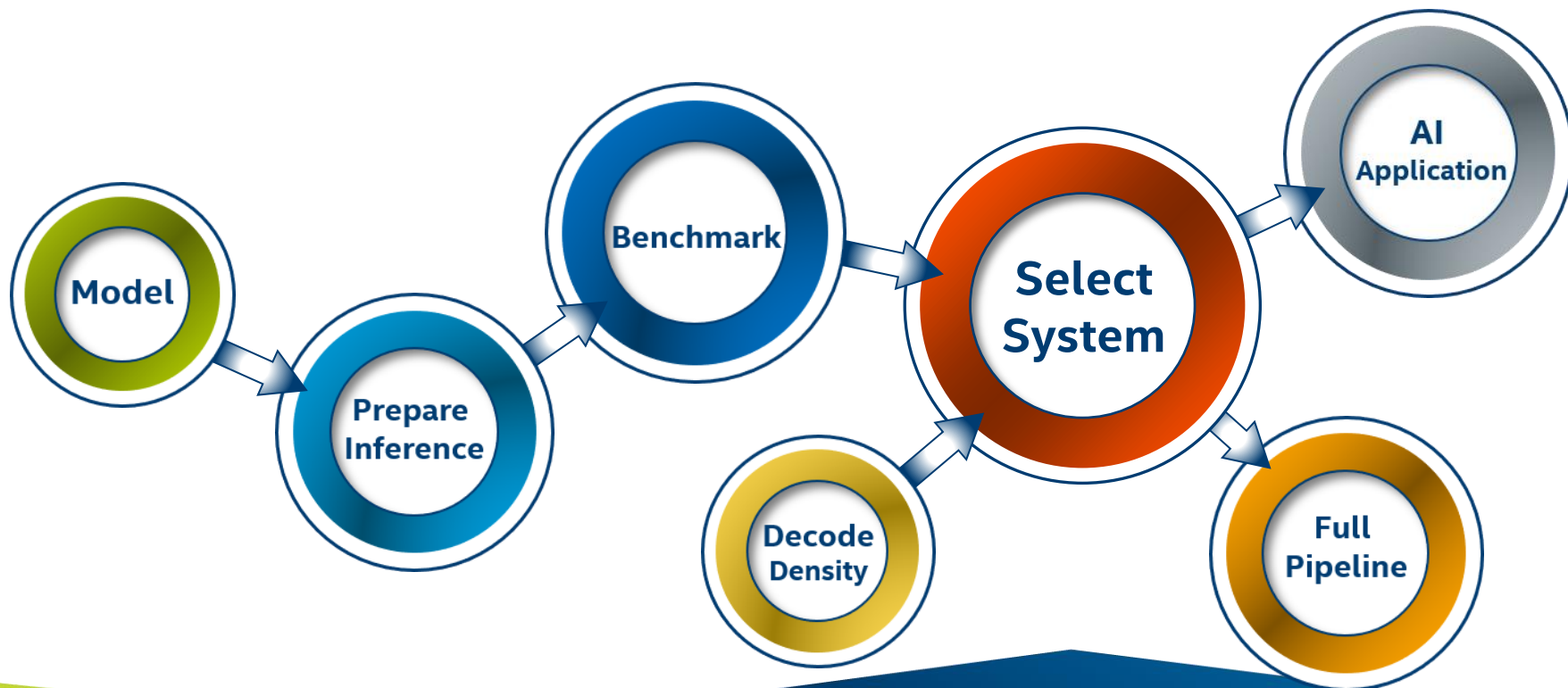
Lesson 7: The full flow, from Data to a product using Intel tools-Part 1.

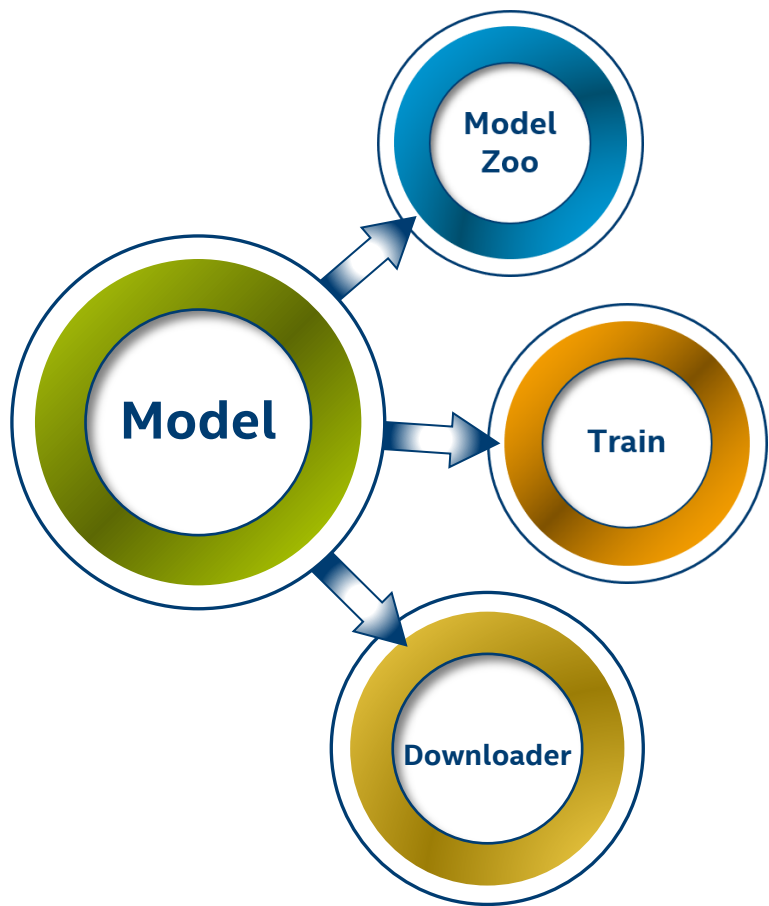
Lesson 8: The full flow, from Data to a product using Intel tools-Part 2.

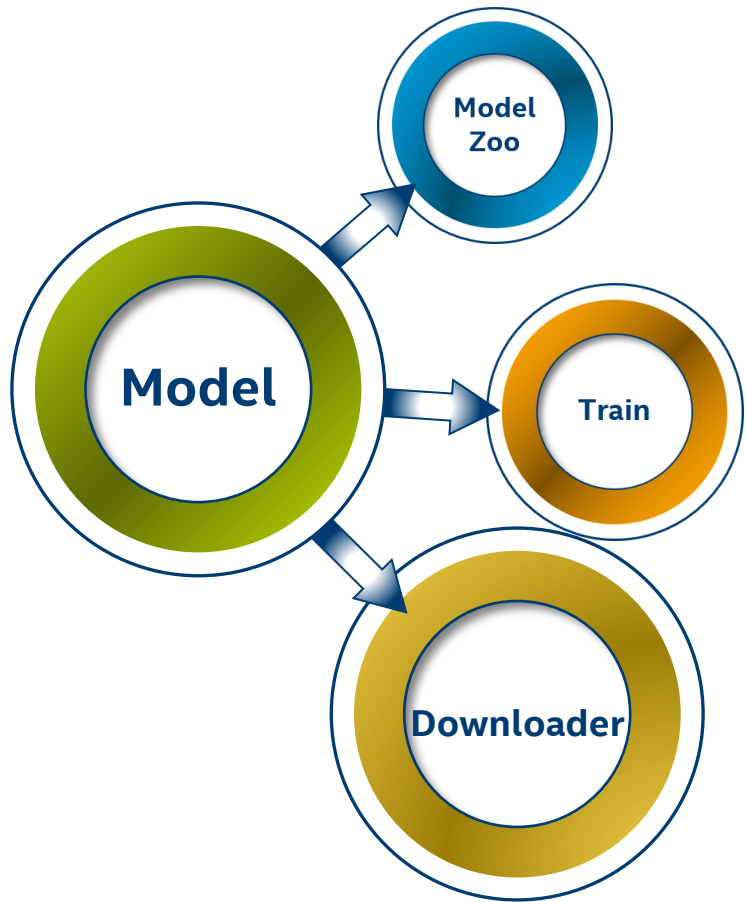
Lesson 9: Summary, intro to next course (200)









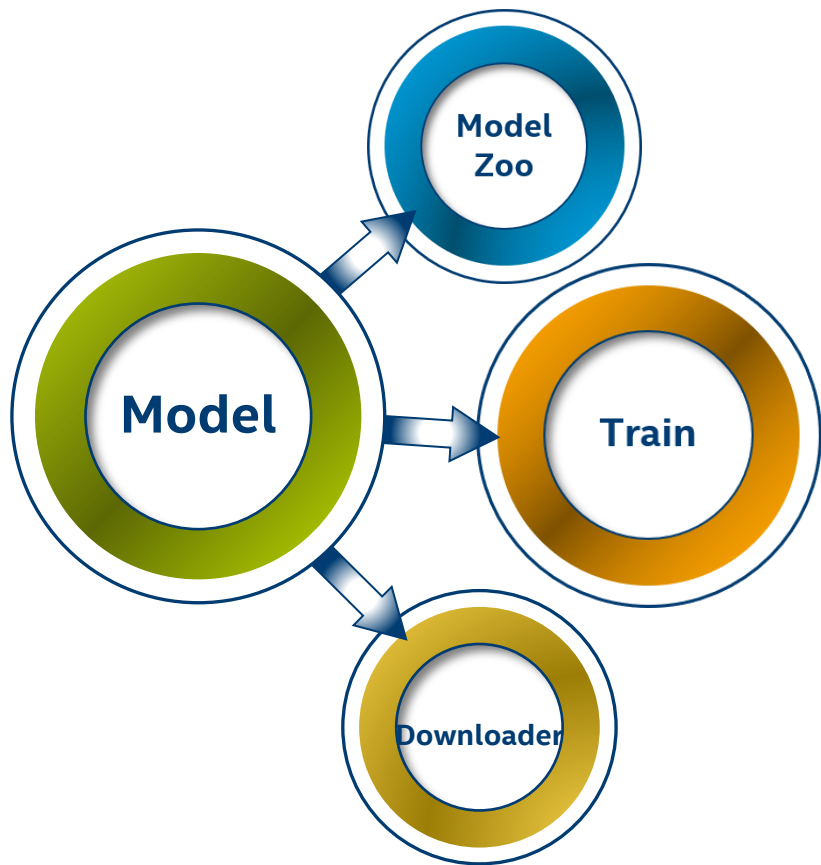


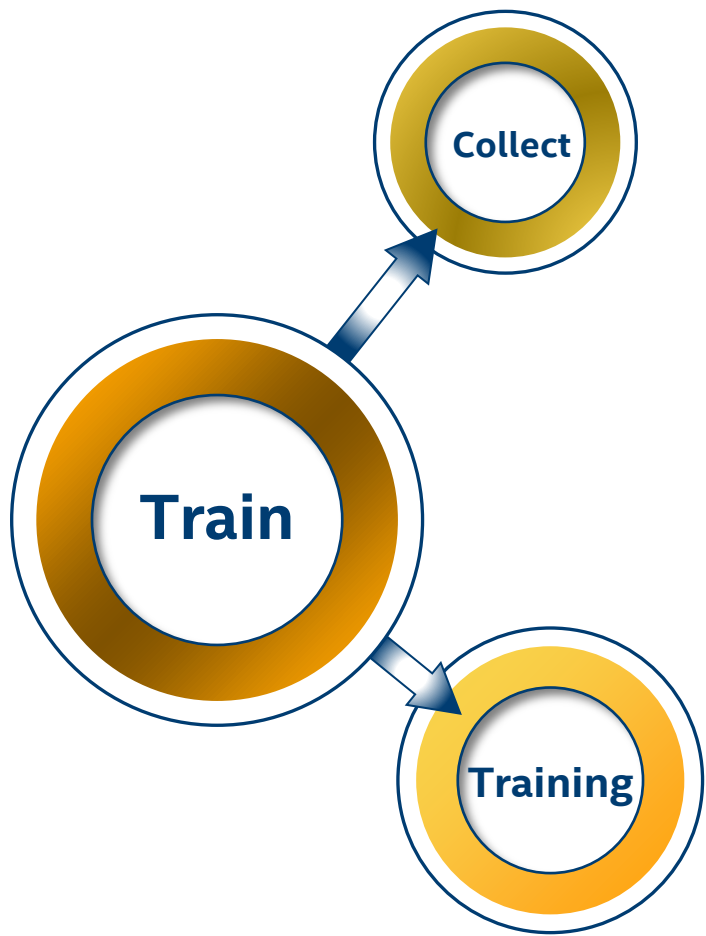
“Model Downloader”

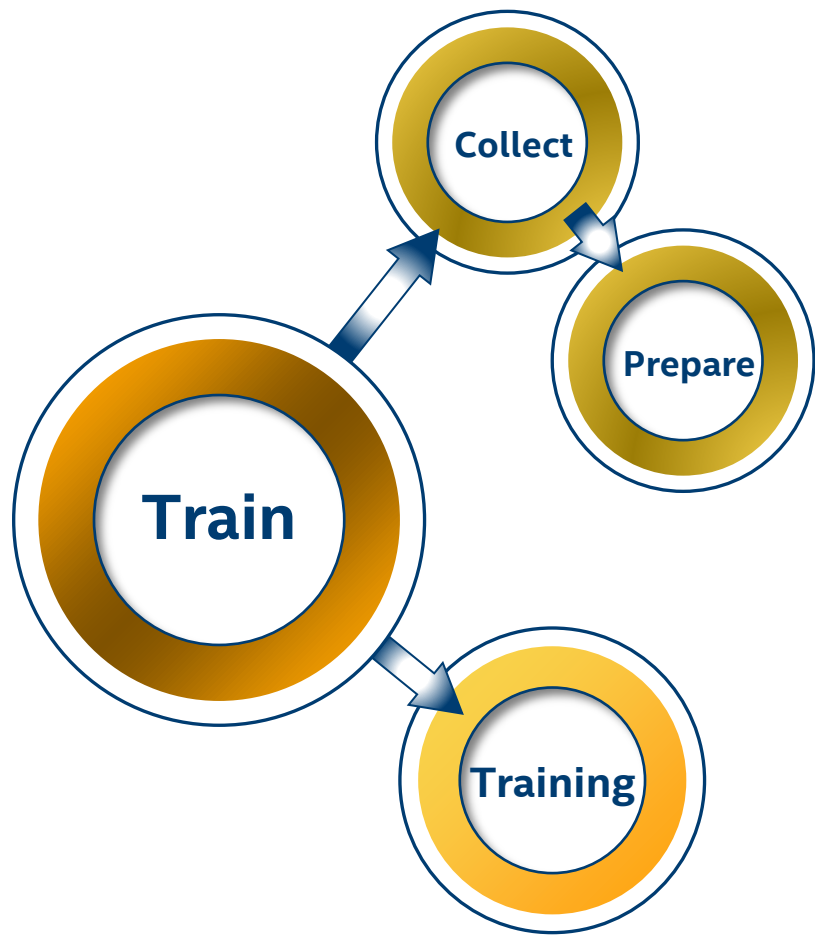
.. download various open source pre-trained models

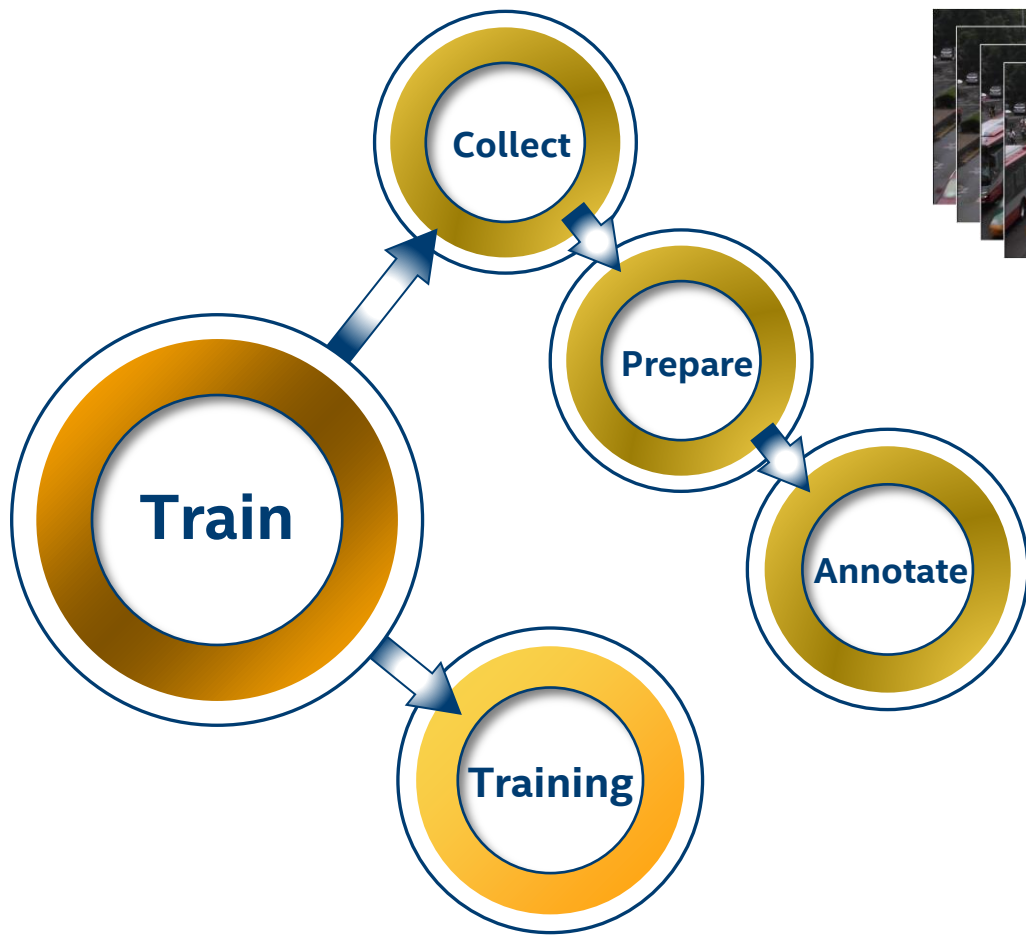
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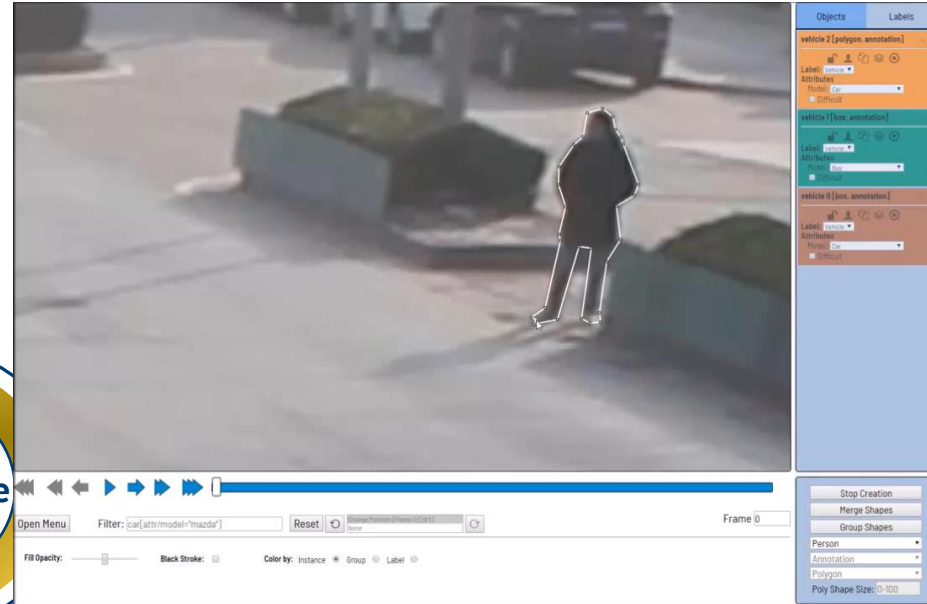
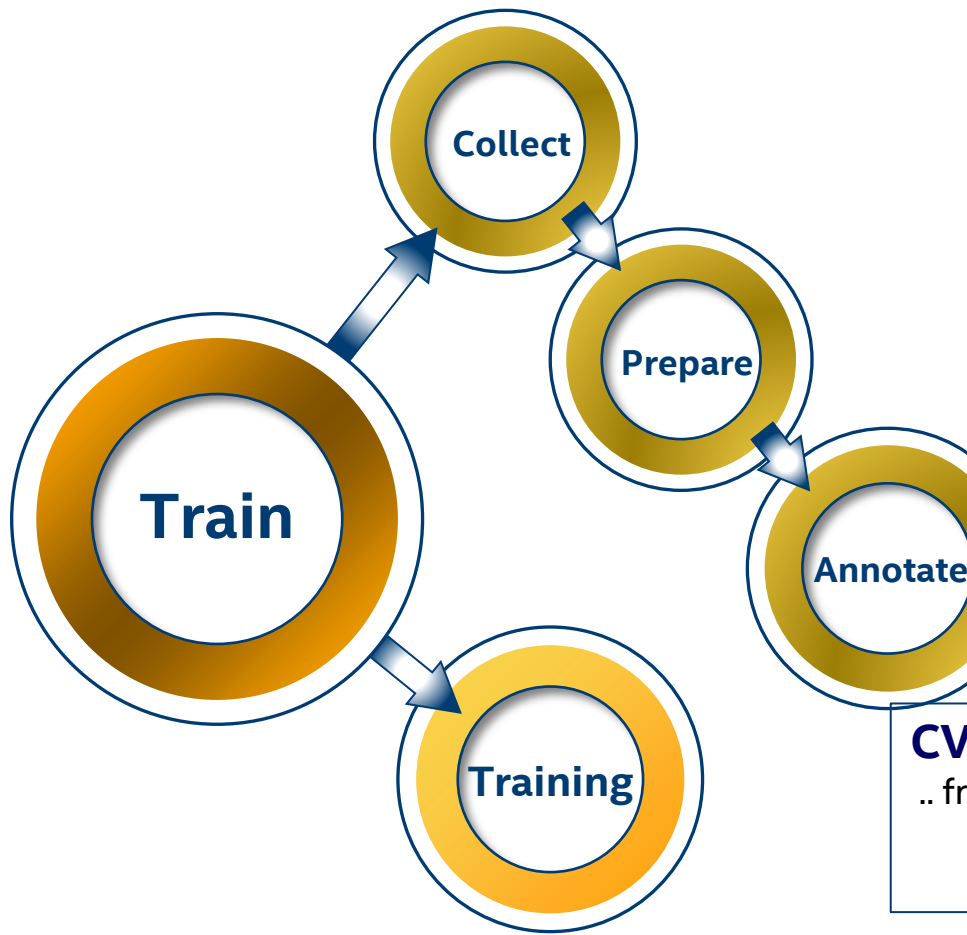
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CVAT ("Computer Vision Annotation Tool")

.. free, online, interactive

..video and image annotation

Use **OpenVINO** for automatic annotation

Train

Training

Collect, Integrate, ETL & ELT

Open Open (Managed) Proprietary

kafka oozoo pentaho talend TIBCO JasperSoft Informatica And more...

Store & Manage Big Data

Open Open (Managed) Proprietary: Paxata And more...

HBASE Flink cloudera MAPR mongoDB FLINK HORTONWORKS Quale STORM Lightbend And more...

IT Systems Management

Vagrant puppet CHEF Ansible NEW RELIC CLOUDFOUNDRY Jenkins bluedata And more...

docker kubernetes APCERA XENONSTACK SALTSTACK OPENSHIFT Jira Software MIRANTIS And more...

Manage Metadata

collibra Waterline Data Blue River Analytics ZALONI And more...

Pre-Process Data

DataRobot Alation Datameer Lavastorm DATAWATCH Paxata unifi DataKitchen TRIFACTA tamr alteryx ClearStory composable Lore ID And more...

Deep Learning

TensorFlow mxnet Caffe spark BigDL PaddlePaddle PyTorch ONNX And more...

Machine Learning & Analytics

pandas Spark MLlib H2O ai presto XGBoost NumPy Levens databricks And more...

Proprietary

MATLAB CognitiveScale feedzai DataRobot Amenit Analytics ARCADIA DATA gamalon DataRobot FIS alteryx Palantir rapidminer DATASCIENCE.COM KNIME data iku CAMBRIDGE SEMANTICS And more...

Deploy Inference

OpenVINO SplaidML And more...

Visualize

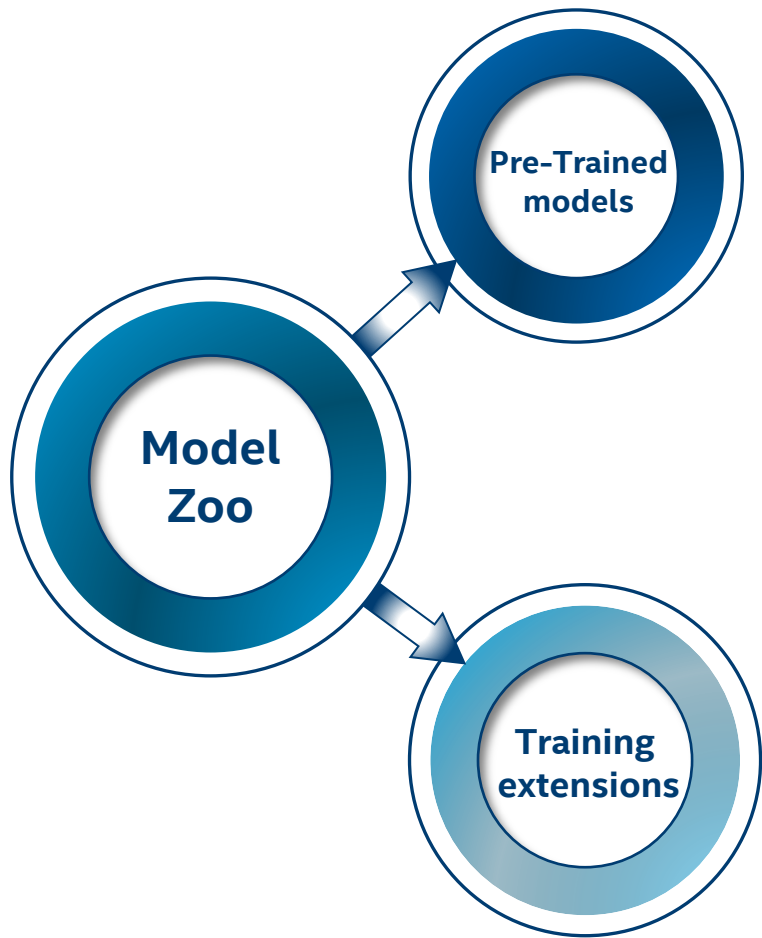
ggplot2 mald3 IP[y]: Python Boken kibana matplotlib Data-Driven Documents Gephi Grafana And more...

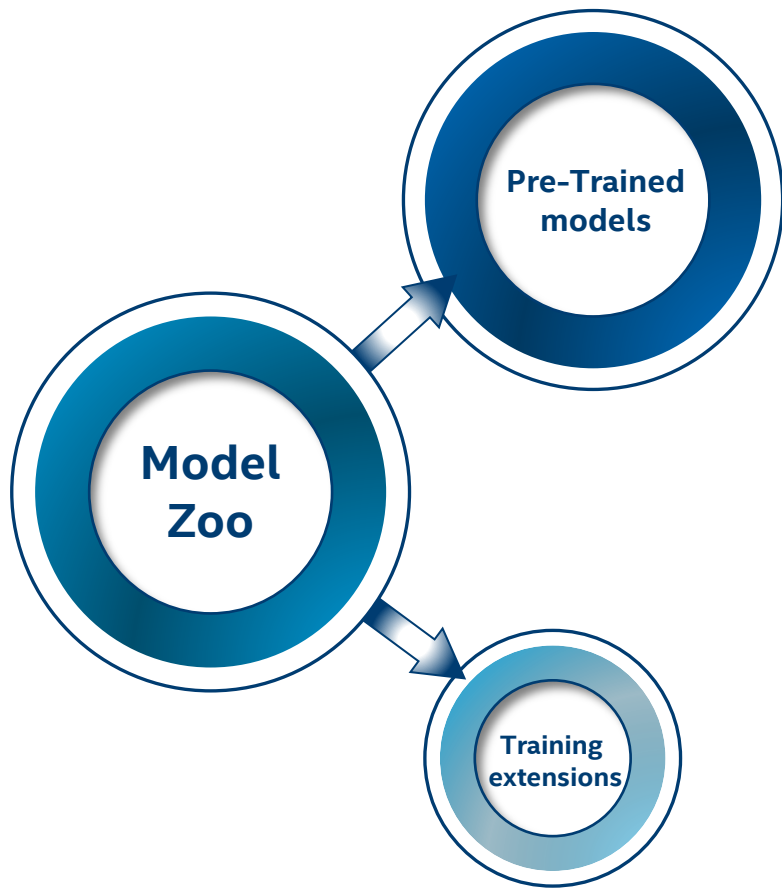
Proprietary

tableau TIBCO Spotfire Qlik And more...

API's

Enterprise Applications

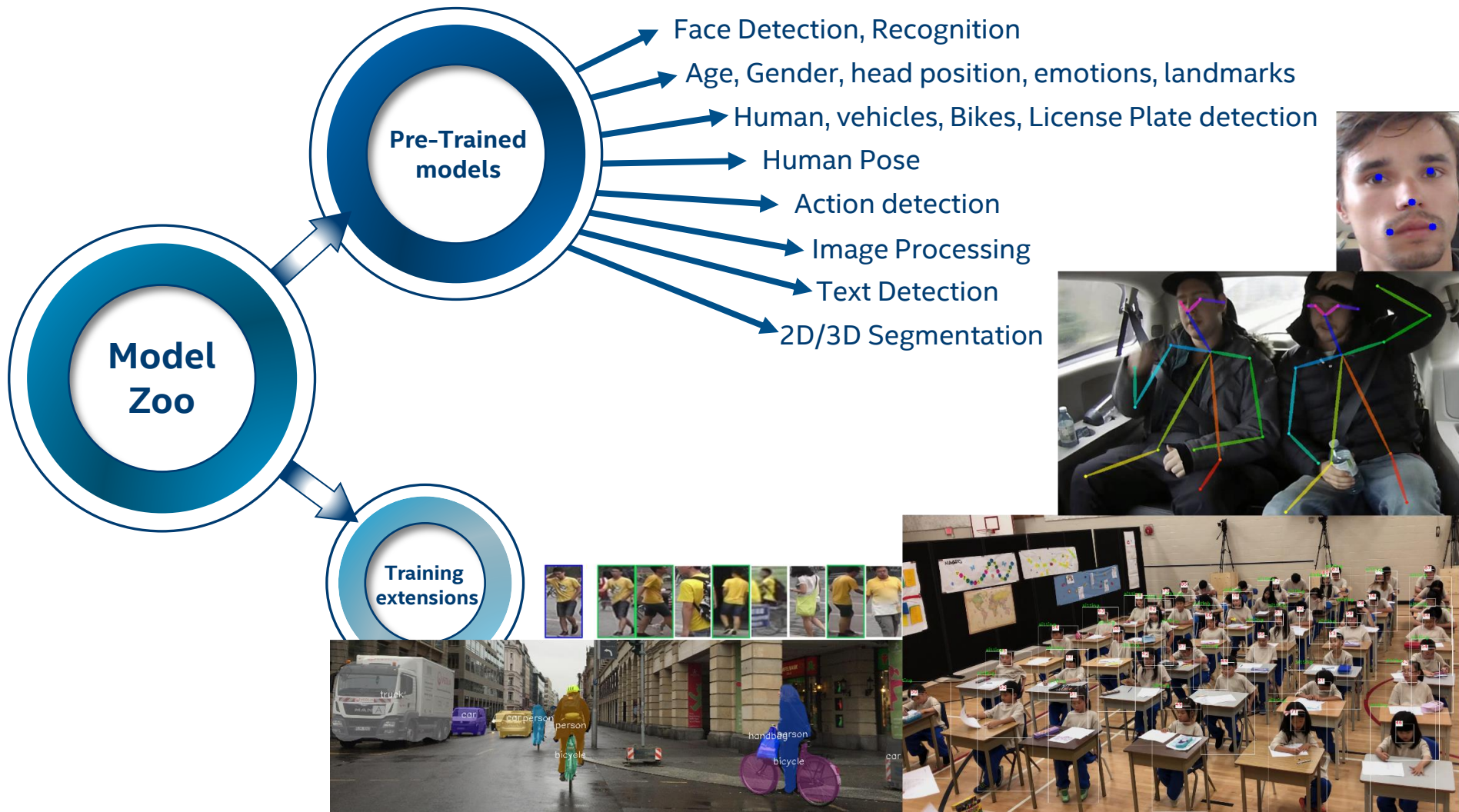




Model Zoo

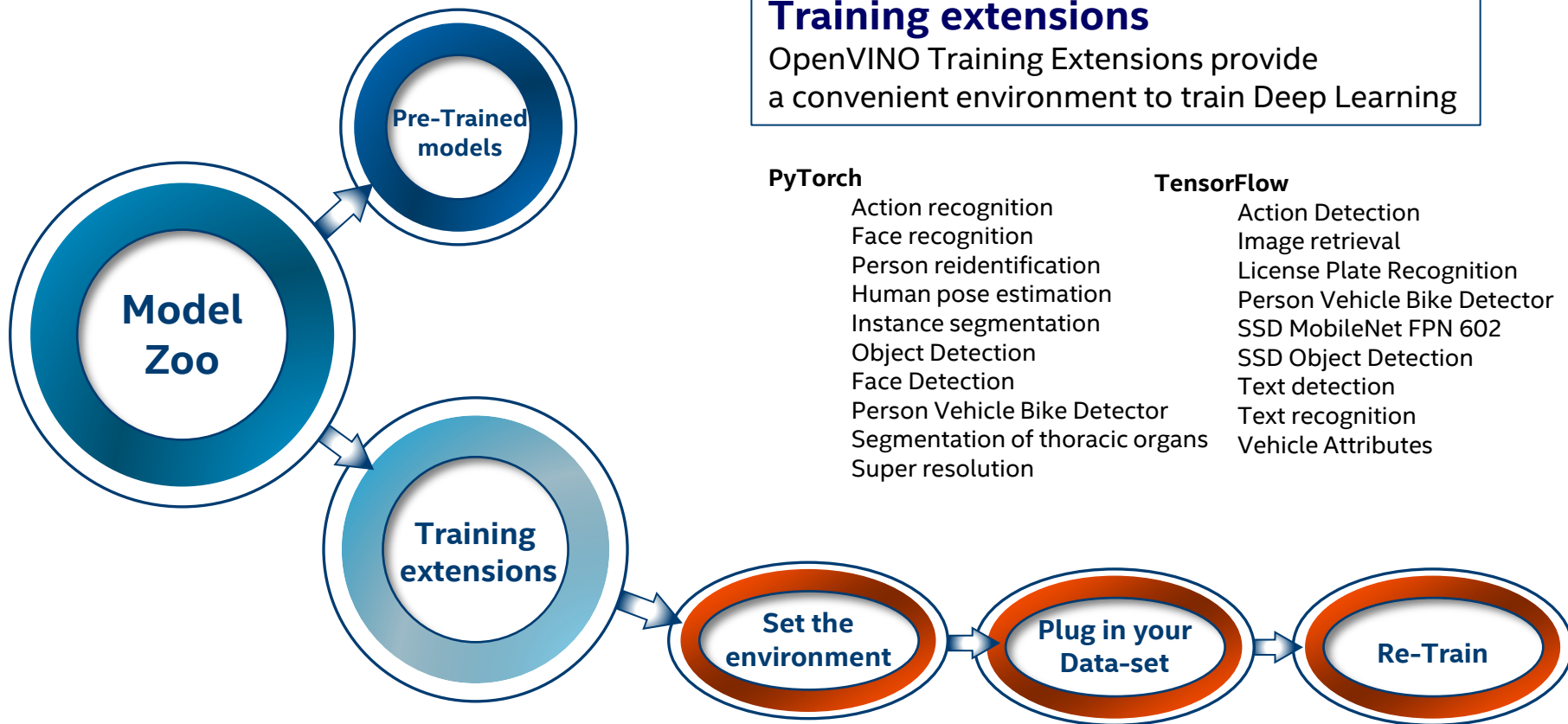
Free, Optimized, Ready for use

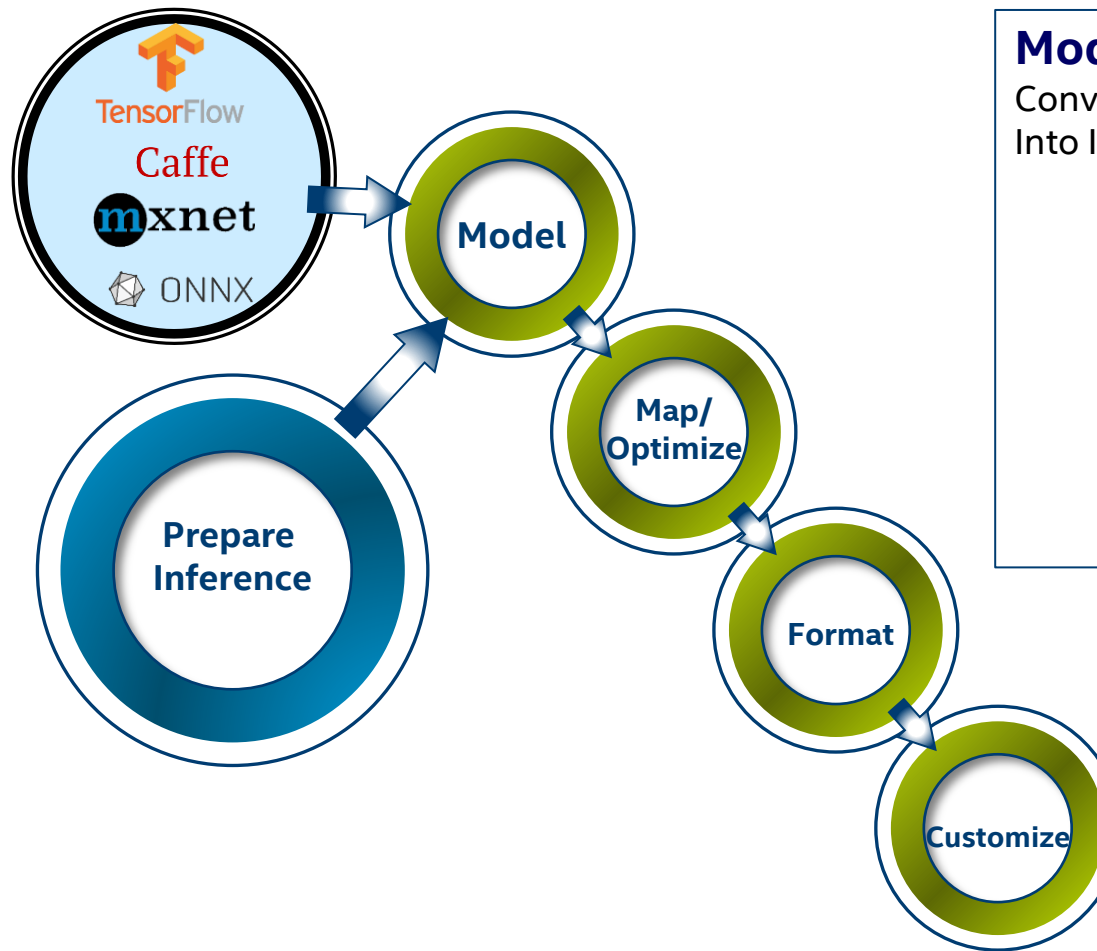
Pre-trained deep-learning based models.



Training extensions

OpenVINO Training Extensions provide a convenient environment to train Deep Learning



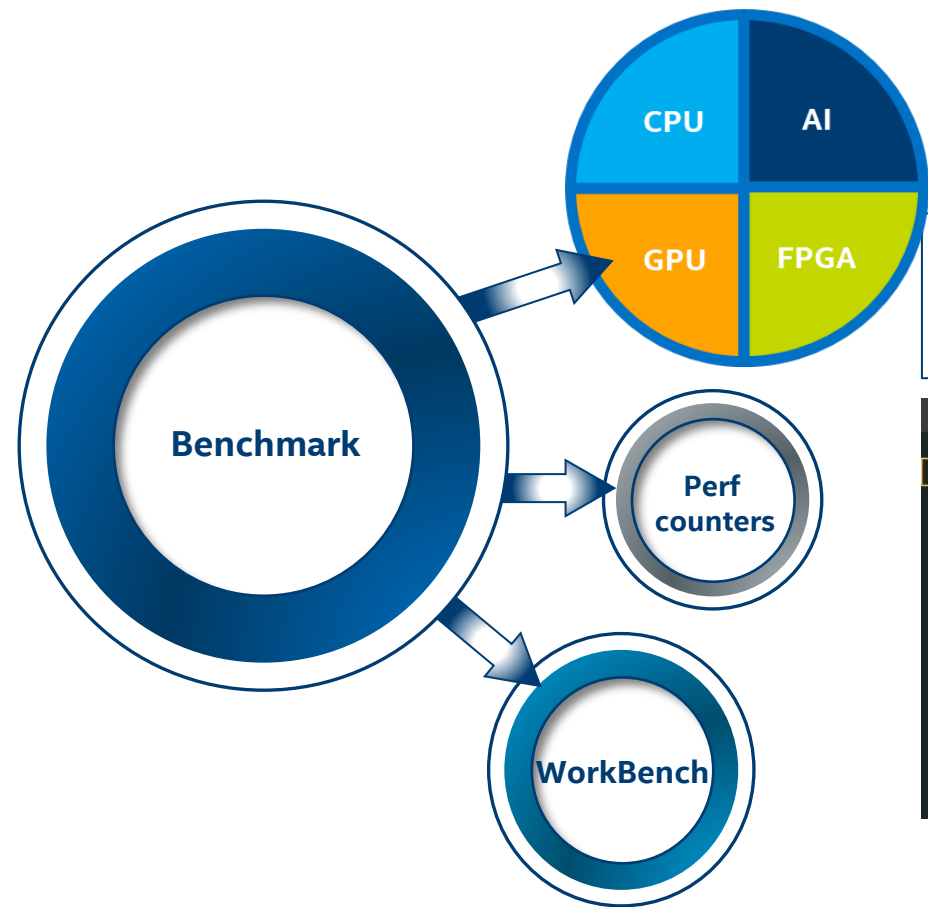


Model Optimizer

Convert Models from public training frameworks
Into IR (Intermediate Representation)

- Convert
- Map to library kernels
- Optimize the topology
- many operations
 - scale, normalize, mean
 - Reshape
 - cutting / replacing
- Format Conversion (FP32, FP16, INT8 more..)

```
File Edit View Search Terminal Help
--> mo_caffe.py
--input_model ~/My-Model/squeezenet1.1.caffemodel
--output_dir ~/My-Model/
```



Benchmark

Benchmark your performance using the “benchmark-app” on your local machine

```
File Edit View Search Terminal Help  
--> ./benchmark_app -m ~/my-model.xml
```

Intel® DevCloud for the Edge

Benchmark

CPU

AI

GPU

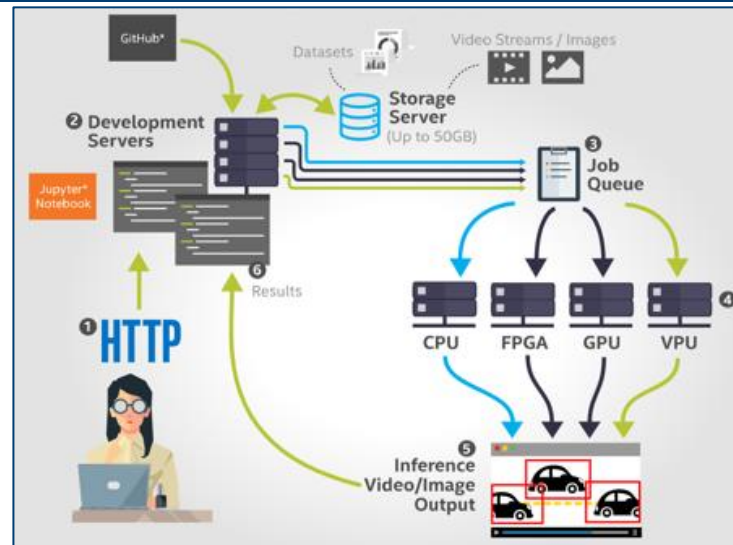
FPGA

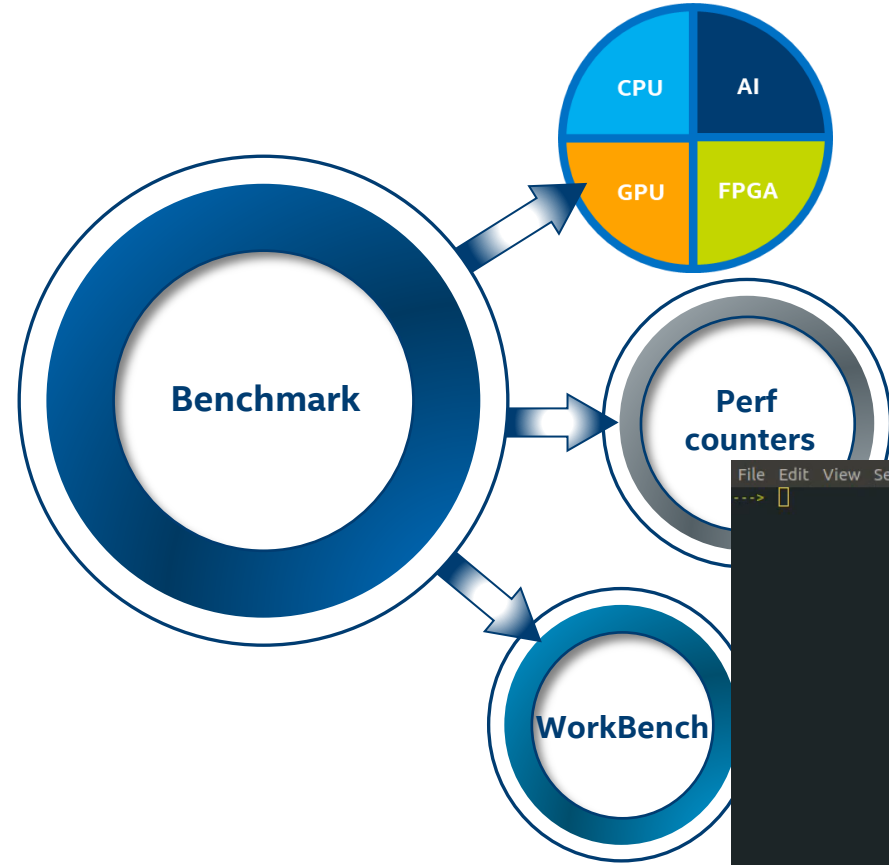
Perf
counters

WorkBench

Dev Cloud

Benchmark the performance
on a dedicated machine in the cloud... Dev-Cloud





Performance Counters

OpenVINO Inference-engine API can report per layer run-time information

File Edit View Search Terminal Help

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WorkBench

GUI for performance profiling/ tuning of DL models

Benchmark

CPU

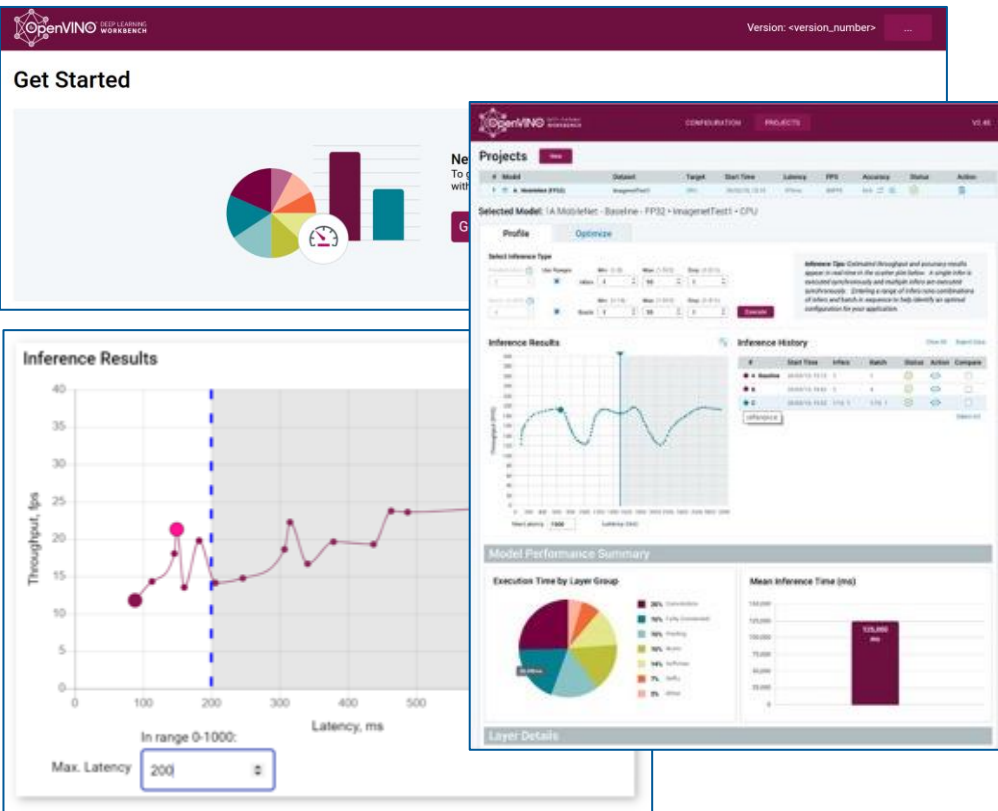
AI

GPU

FPGA

Perf
counters

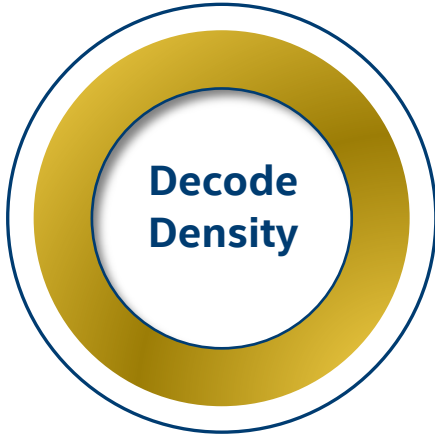
WorkBench



Media-SDK

Accelerate Video Encode/Decode/ Processing

Access Intel Quick Sync (integrated GPU), works well on our CPUs

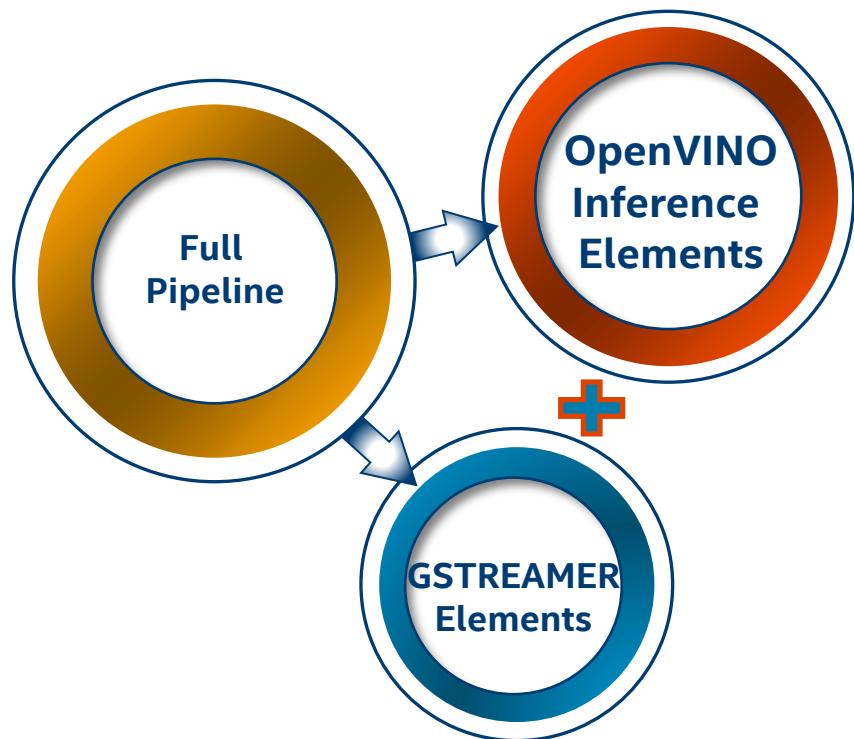
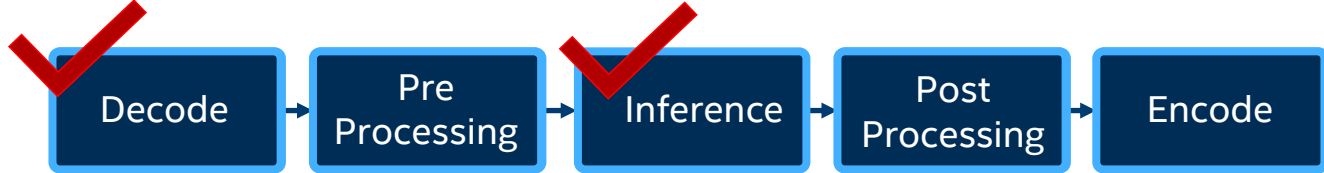


Encode/Decode

H.265/HEVC
H.264/AVC
JPEG/MJPEG
MPEG2
VP8/VP9
...

40+ video quality and Processing

- Color Conversion
- Scaling
- De-interlacing
- De-noising
- Frame Rate Conversion
- Composition
- Rotate
- On-Screen-Display and Composition
- De-warp

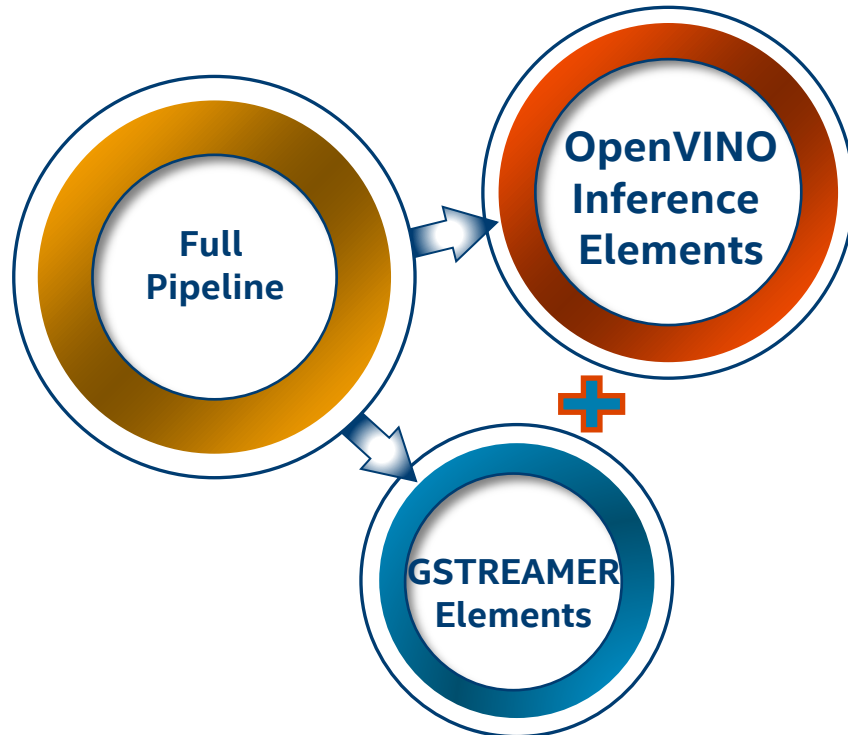


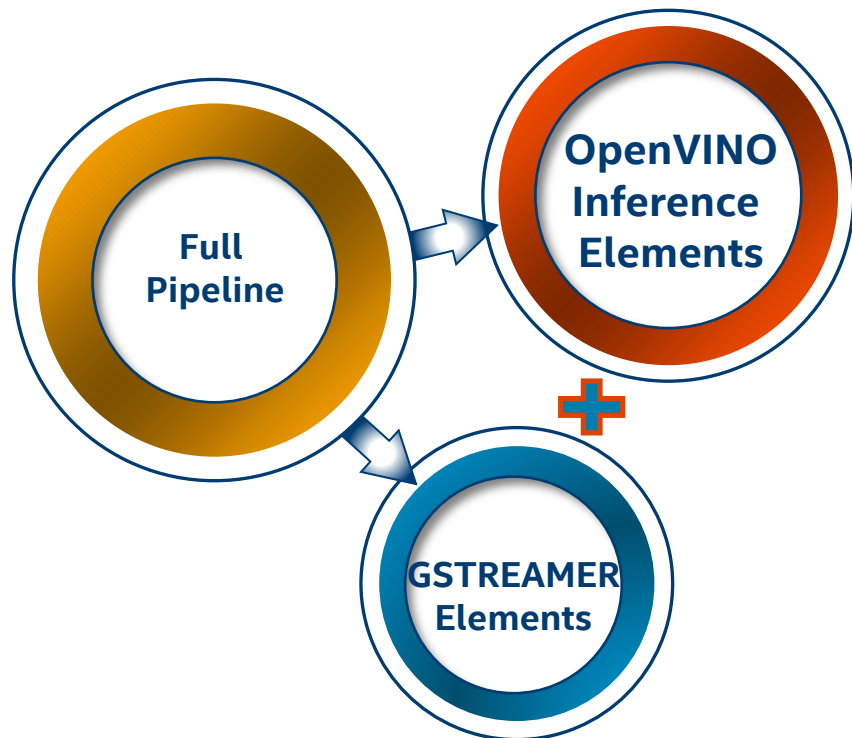
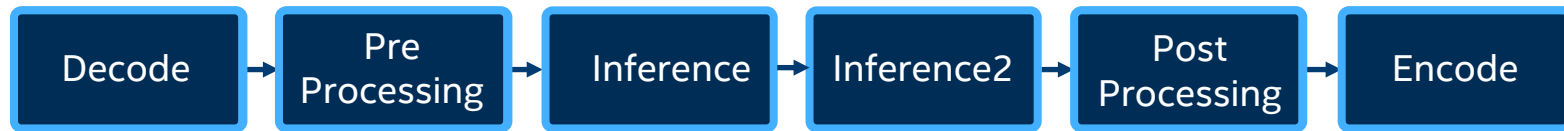


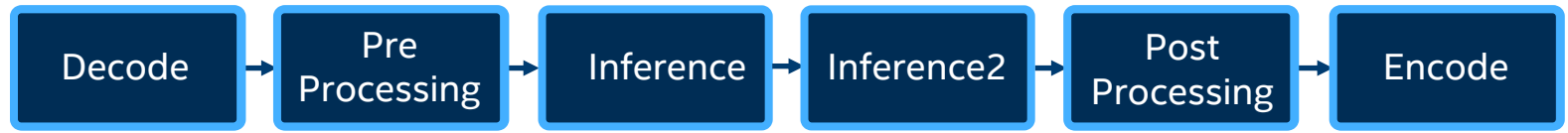
GStreamer Video Analytics (GVA) Plugin

New Gstreamer elements for inference using OpenVINO

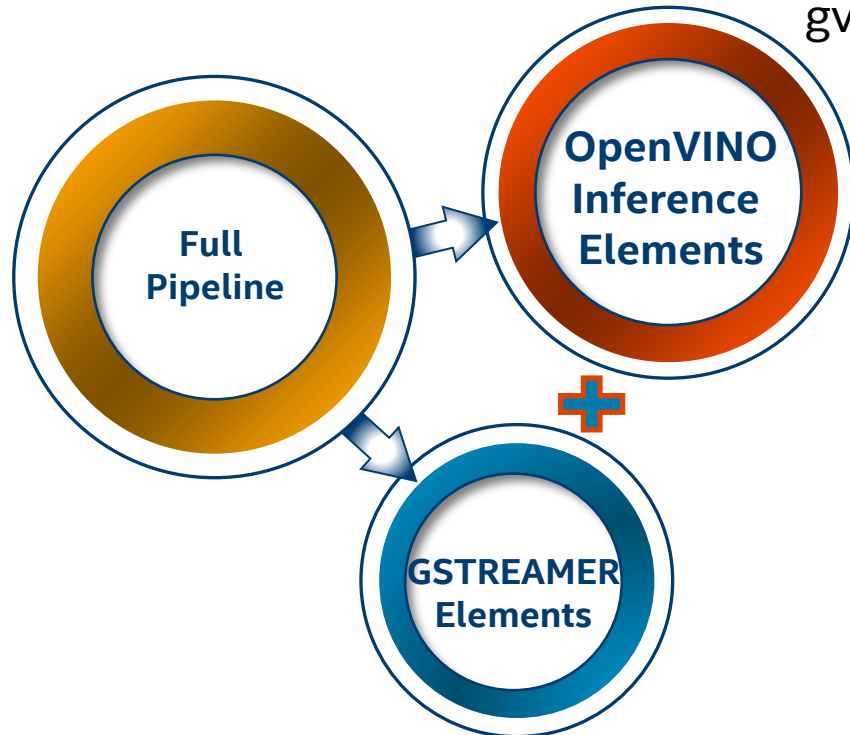
- Classification
- Object Detection,
- Recognition
- Tracking
- Visualizing/ Rendering the results..

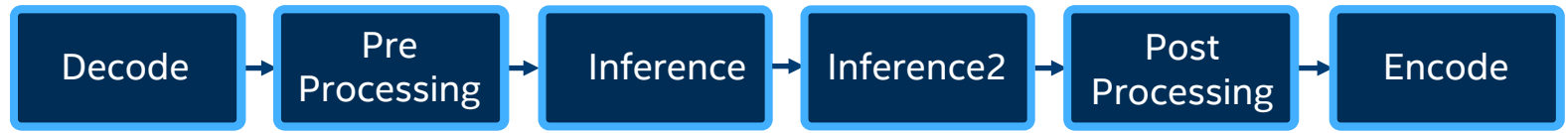






```
gst-launch-1.0 filesrc location=video1.mp4 ! decodebin ! videoconvert ! \  
    gvaDETECT model=face-detection.xml ! \  
    gvaCLASSIFY model=emotions-recognition.xml ! \  
    gvawatermark ! ximagesink sync=false
```



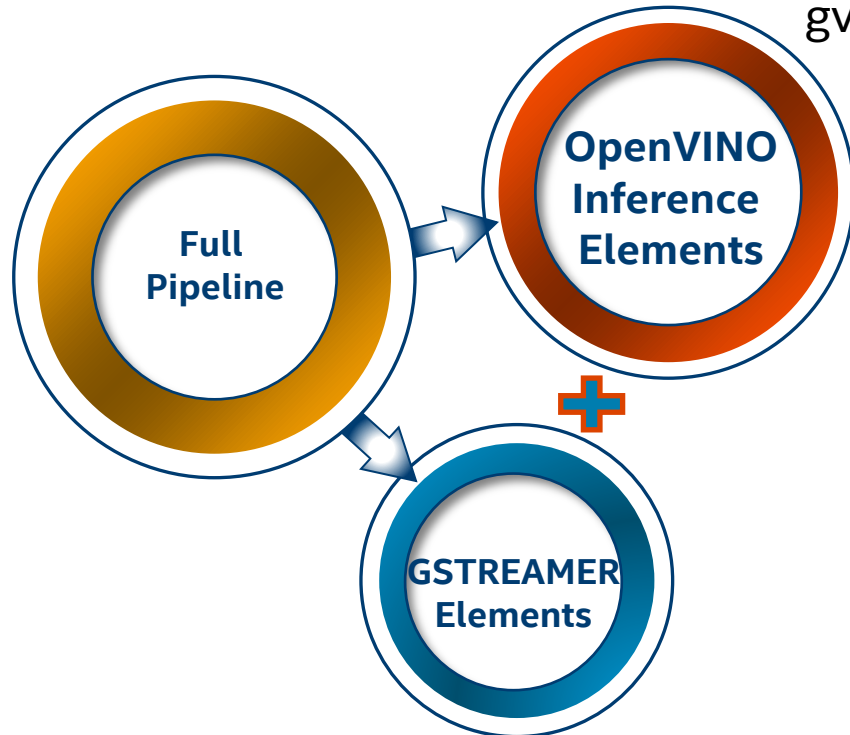


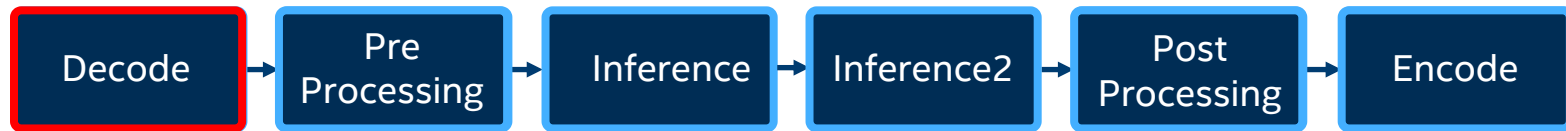
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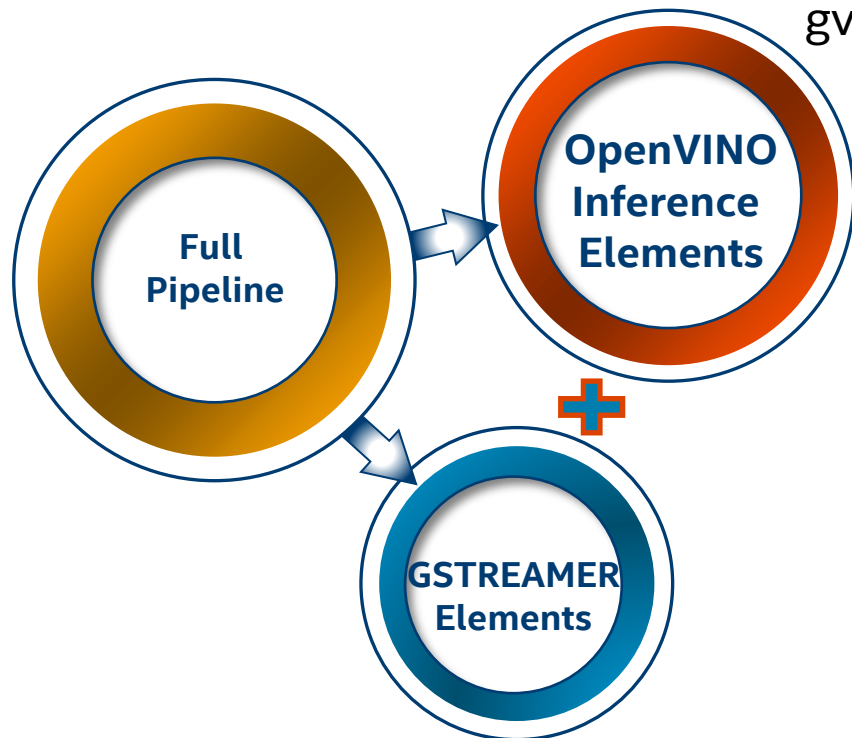


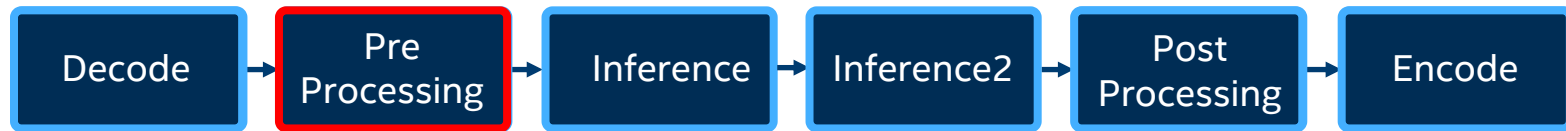
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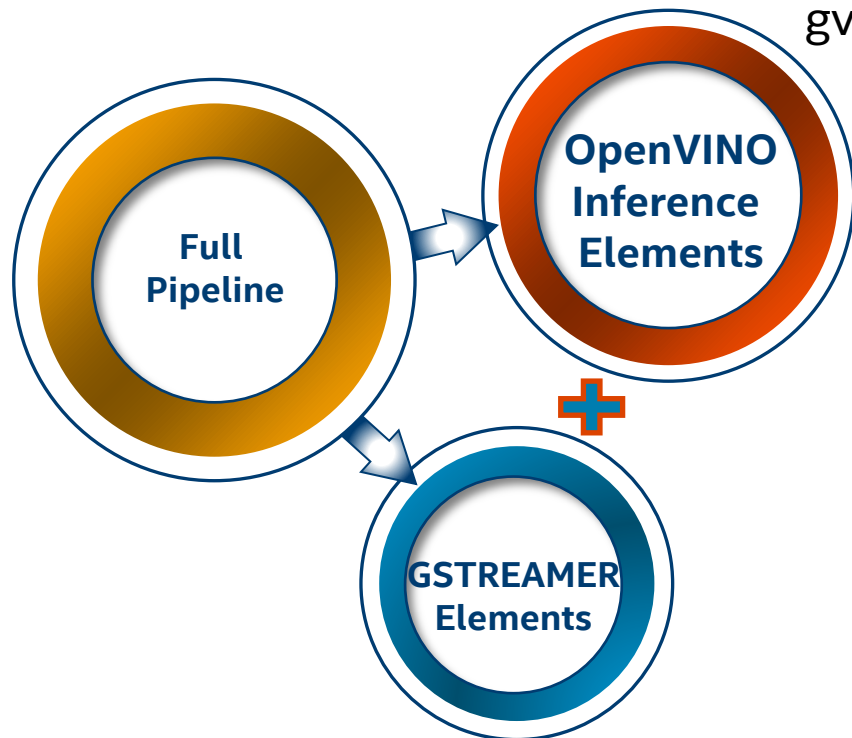
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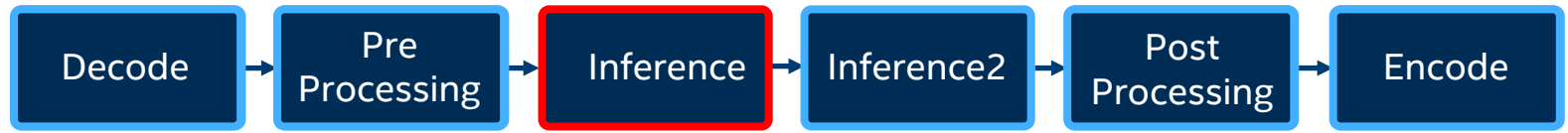
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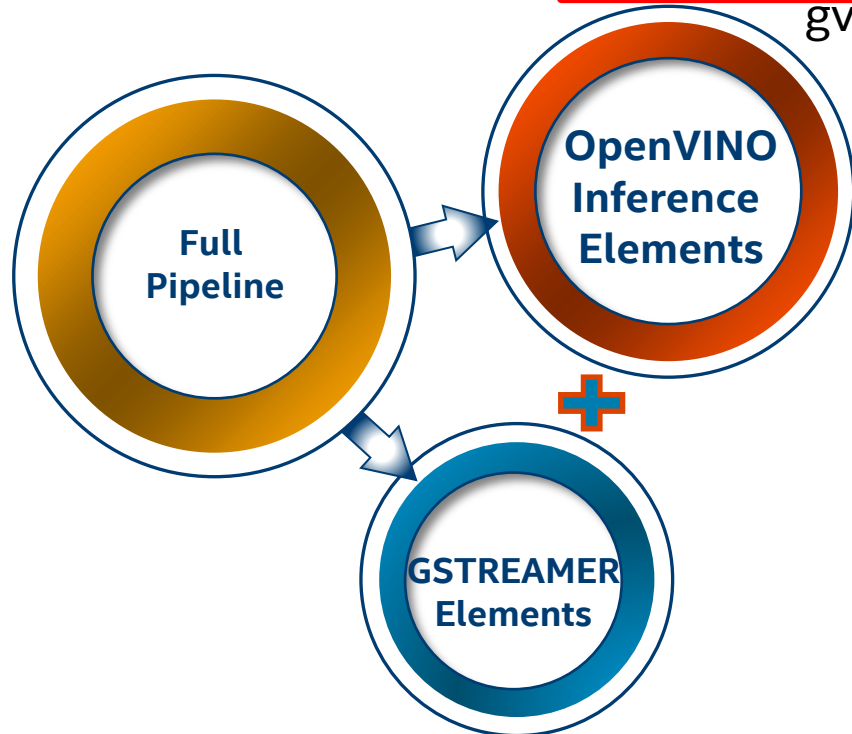


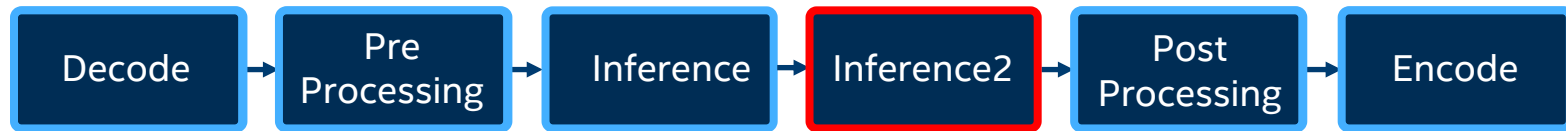
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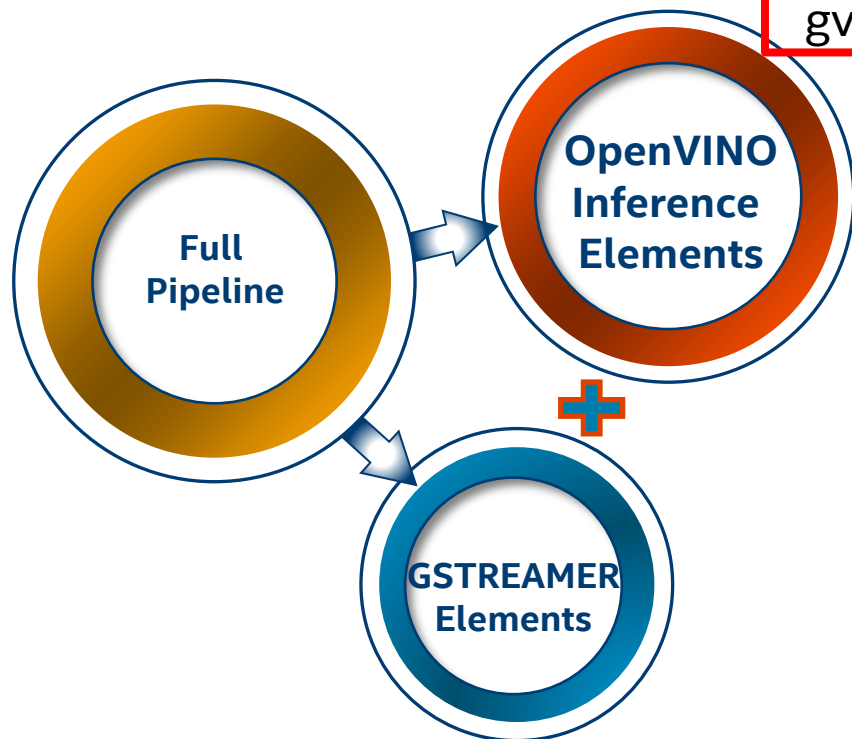


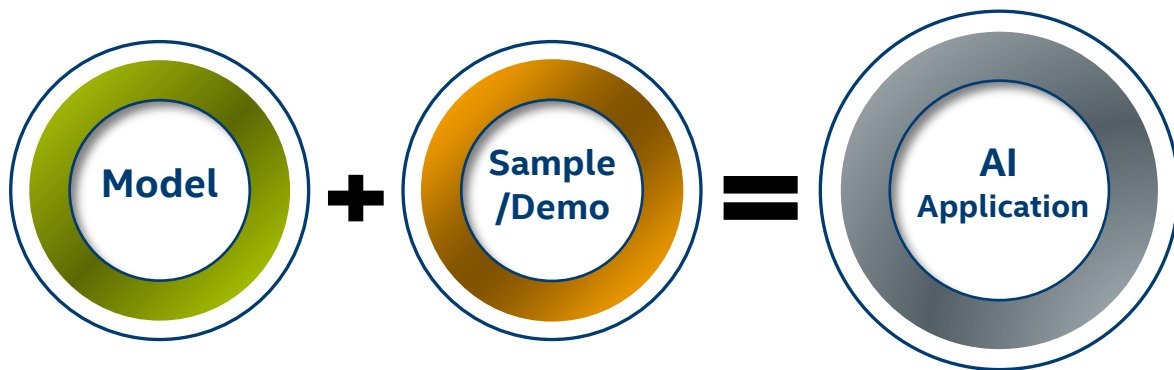
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ADD VIDEOS???

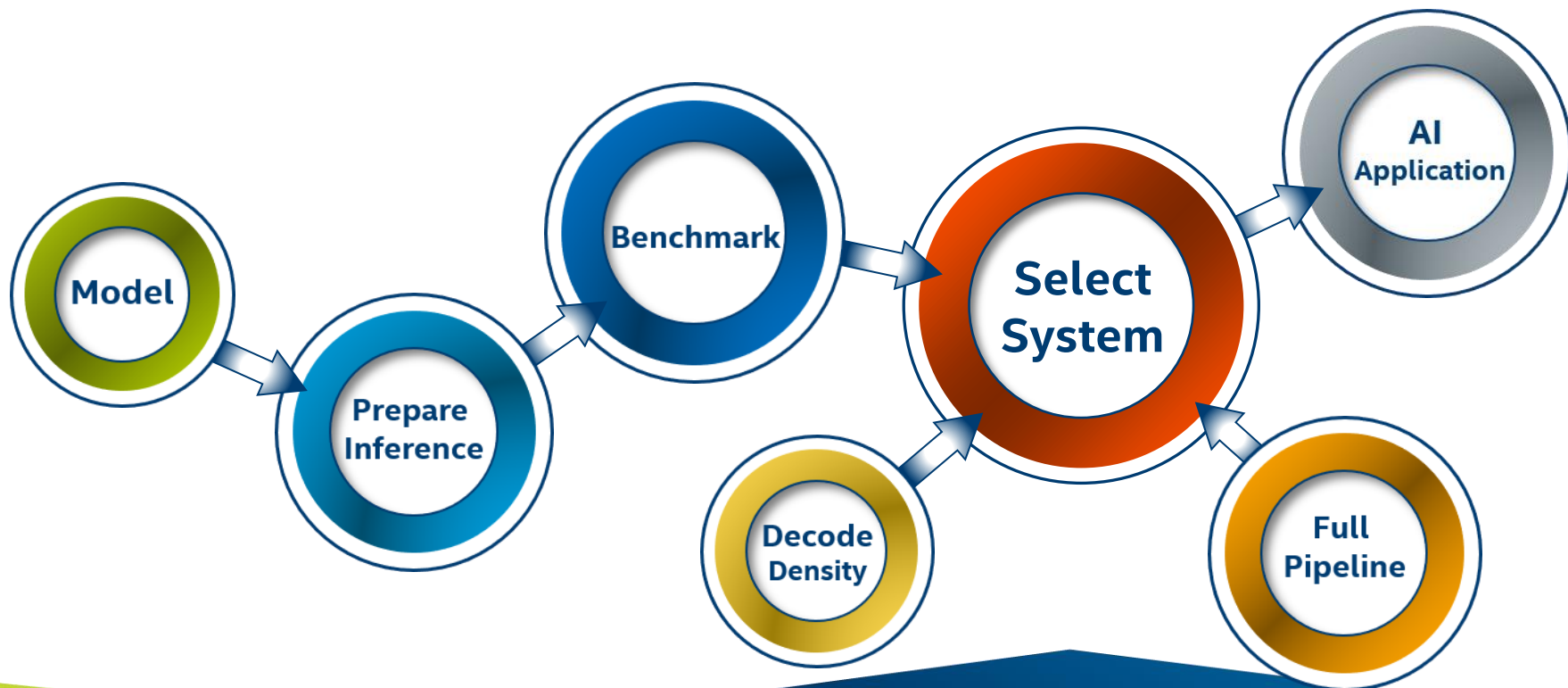
Demo and Sample

- Object Detection Using Faster R-CNN
- Image Classification
- Pipelined Image Classification
- Security Barrier Camera
- Object Detection for Single Shot Multibox Detector (SSD)
- Object Detection for SSD Using an Asynchronous API
- Neural Style Transfer
- Hello Infer Classification
- Interactive Face Detection
- Image Segmentation
- Multichannel Face Detection



OR





Summary

- **OpenVINO is a comprehensive toolkit** for building Video-Analytic pipelines
- The full flow is **supported by tools, utilities and resources** for you to use
 - Getting the DL model
 - Prepare the model for inference
 - Benchmark the performance
 - Check the decode and encode density
 - Simulate the full pipeline
 - Build an AI application



