

# Video Streaming + CV/ML Frameworks

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# 关键技术指标

- 端到端延迟
- 并行处理数量

# Video Analytics Frameworks

Framework	Year	Maintainer	Stars	Language	Video Streaming Framework	CV/ML Frameworks Support	Arch	OS
<a href="#">OpenCV</a>	2010	Community	60k	C/C++ Python Java	FFmpeg Gstreamer	OpenCV	arm arm64 x64 x86	Linux MacOS Windows iOS Android
DeepStream	2018	Nvidia	-	C/C++ Python	Gstreamer(GPU-accelerated: Nvidia)	TensorRT Caffe	arm arm64 *more	Ubuntu *more
<a href="#">dlstreamer</a>	2019	Intel	340	C/C++	Gstreamer(GPU-CPU accelerated: VAAPI)	OpenVINO OpenCV	x64 x86	Linux* *more
<a href="#">NNStreamer</a>	2018	Samsung	468	C/C++	Gstreamer	Tensorflow Tensorflow-Lite pytorch caffe2	arm arm64 x64 x86 *more	Tizen Ubuntu Android; Yocto MacOS *more
<a href="#">GstInference</a>	2019	RidgeRun	81	C/C++	Gstreamer	Neural Compute SDK (NCSDK) TensorflowV1 Caffe TensorRT OpenCV * more		
<a href="#">gst-plugins-tf</a>	2019	-	10	Python	Gstreamer	Tensorflow		Linux* *more

# Video Streaming

## GStreamer vs FFMpeg

**FFMpeg** Library / Tool：通常作为一个有用的命令行工具或程序依赖的库

**GStreamer** Framework：适合构建视频流之上的应用

- FFMpeg 适合简单的音视频应用，因为它的 API 封装了所有细节，很多时候几个 API 组装就完事了
- GStreamer 高度模块化的管线驱动式的媒体框架，扩展性极强，适合人工智能、视频分析相关的高级前沿扩展

# GStreamer

样例代码：模拟保存摄像头视频

```
gst-launch-1.0 -v videotestsrc \ # 使用测试源模拟摄像头  
! video/x-raw,framerate=25/1, width=640, height=360 \ # 设置需要的大小、格式和帧率  
! x264enc \ # 使用 x264 将视频编码到 H.264  
! mpegtsmux \ # 将其放入 MPEG-TS 传输流  
! filesink location=test.ts # 保存到文件
```

[gstreamer 官网](#)

# GStreamer with Python

```
import sys
import gi

gi.require_version('Gst', '1.0')
gi.require_version('GstBase', '1.0')

from gi.repository import GObject, Gst

Gst.init(sys.argv)
GObject.threads_init()
Gst.segtrap_set_enabled(False)

def main():
    pipeline = Gst.parse_launch('videotestsrc ! ximagesink')
    pipeline.set_state(Gst.State.PLAYING)
    loop = GObject.MainLoop()
    try:
        loop.run()
    except KeyboardInterrupt:
        pass

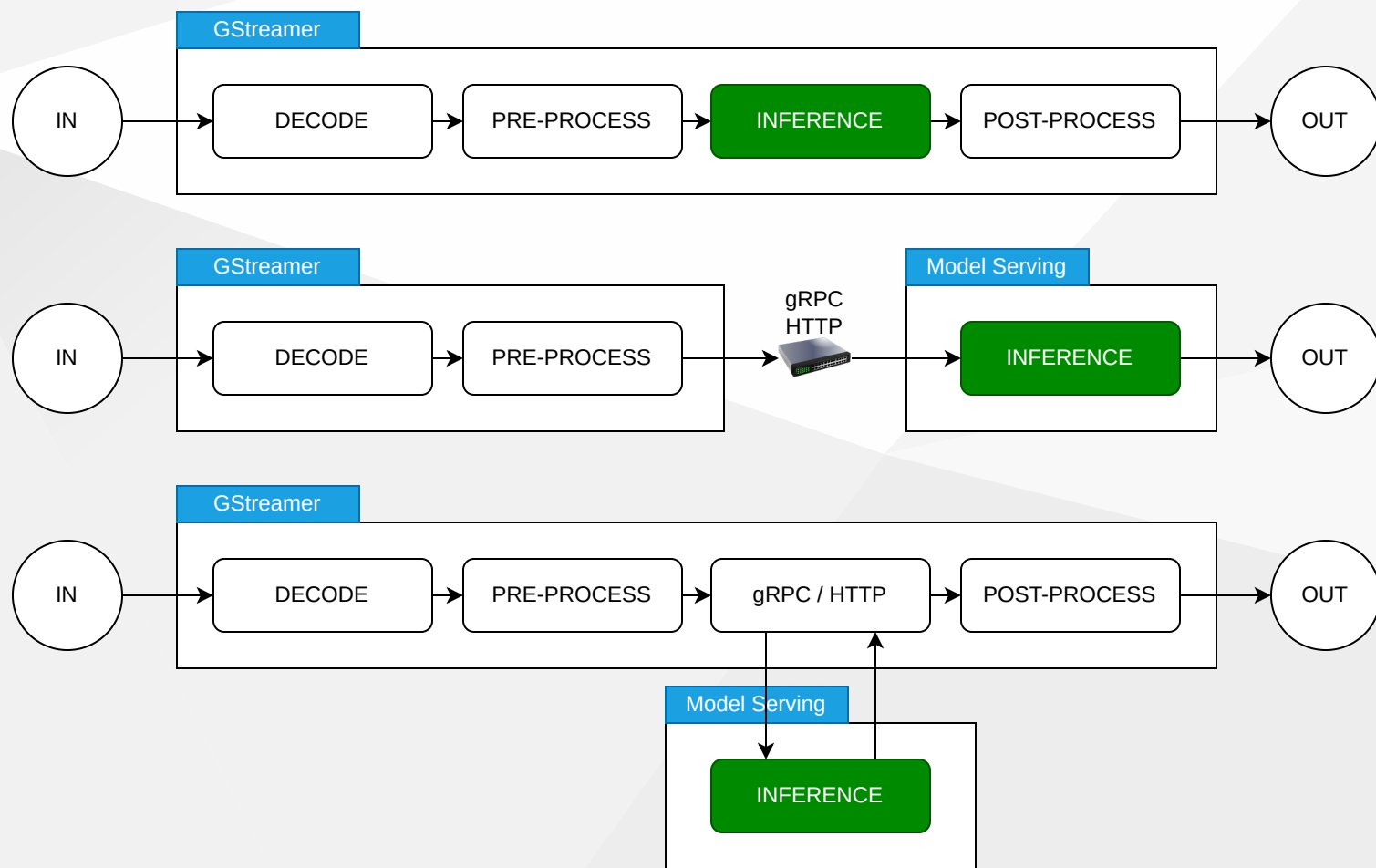
    pipeline.set_state(Gst.State.NULL)

if __name__ == '__main__':
    main()
```

[GStreamer/gst-python](#)  
[jackersson/gstreamer-python](#)

# 通信架构

进程内 vs 跨进程（跨机器）



# Video Streaming + CV/ML 技术方案

## 1. GStreamer + DeepStream + TensorRT

**DeepStream** NVIDIA 的视频流 AI 分析 toolkit

**TensorRT** 针对 NVIDIA GPU 进行高性能推理加速，支持 TensorFlow、Caffe、Mxnet、Pytorch 等几乎所有的深度学习框架

[deepstream\\_python\\_apps](#)

[NVIDIA DeepStream SDK](#)

缺点：DeepStream 不开源

跨进程方式：**GStreamer + DeepStream + Triton inference server**



# Video Streaming + CV/ML 技术方案

## 2. GStreamer + NNStreamer + TensorFlow

**NNStreamer** 让 GStreamer 轻松的支持 Neural Network, Samsung 开源

[NNStreamer - Github](#)

[NNStreamer - Docs](#)

[nnstreamer/nnstreamer-example](#)

# Video Streaming + CV/ML 技术方案

## 3. GStreamer + DLStreamer + TensorFlow

缺点：只限 Intel 芯片

## 4. GStreamer + GstInference(r2inference) + TensorFlow

[GstInference – Performing TensorFlow inference on GStreamer](#)

缺点：只支持 TensorFlow v1

## 5. GStreamer + GStreamer-with-Tensorflow(gst-plugins-tf) + TensorFlow

[GStreamer-with-Tensorflow](#)  
[jackersson/gst-plugins-tf](#)