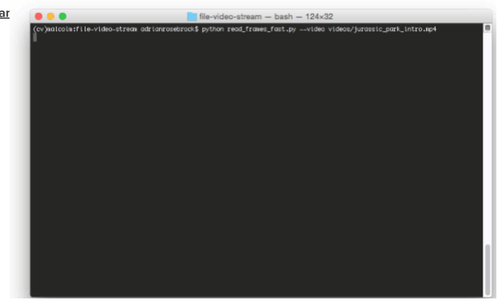
Faster video file FPS with cv2.VideoCapture and OpenCV

by Adriar



Have you ever worked with a video file via OpenCV's `cv2.VideoCapture` function and found that reading frames ***just felt slow and sluggish?***

I've been there — *and I know exactly how it feels.*

Your entire video processing pipeline crawls along, unable to process more than one or two frames per second — even though you aren't doing any type of computationally expensive image processing operations.

Why is that?

Why, at times, does it seem like an *eternity* for `cv2.VideoCapture` and the associated `.read` method to poll another frame from your video file?

The answer is almost always ***video compression and frame decoding.***

Depending on your video file type, the codecs you have installed, and not to mention, the physical hardware of your machine, much of your video processing pipeline can actually be consumed by ***reading*** and ***decoding*** the next frame in the video file.

That's just computationally wasteful — and there is a better way.

In the remainder of today's blog post, I'll demonstrate how to use threading and a queue data structure to ***improve your video file FPS rate by over 52%!***

Looking for the source code to this post?

JUMP RIGHT TO THE DOWNLOADS SECTION →

Faster video file FPS with cv2.VideoCapture and OpenCV

When working with video files and OpenCV you are likely using the `cv2.VideoCapture` function.

First, you instantiate your `cv2.VideoCapture` object by passing in the path to your input video file.

Then you start a loop, calling the `.read` method of `cv2.VideoCapture` to poll the next frame from the video file so you can process it in your pipeline.

The *problem* (and the reason why this method can feel slow and sluggish) is that you're ***both reading and decoding the frame in your main processing thread!***

As I've mentioned in **previous posts (https://pyimagesearch.com/2015/12/21/increasing-webcam-fps-with-python-and-opencv/)**, the `.read` method is a ***blocking operation (https://en.wikipedia.org/wiki/Blocking_(computing))*** — the main thread of your Python + OpenCV application is entirely blocked (i.e., stalled) until the frame is read from the video file, decoded, and returned to the calling function.

By moving these blocking I/O operations to a separate thread and maintaining a queue of decoded frames ***we can actually improve our FPS processing rate by over 52%!***

This increase in frame processing rate (and therefore our overall video processing pipeline) comes from *dramatically reducing latency* — we don't have to wait for the `.read` method to finish reading and decoding a frame; instead, there is *always* a pre-decoded frame ready for us to process.

To accomplish this latency decrease our goal will be to move the reading and decoding of video file frames to an entirely separate thread of the program, freeing up our main thread to handle the actual image processing.

But before we can appreciate the *faster, threaded* method to video frame processing, we first need to set a benchmark/baseline with the slower, non-threaded version.

The slow, naive method to reading video frames with OpenCV

The goal of this section is to obtain a baseline on our video frame processing throughput rate using OpenCV and Python.

To start, open up a new file, name it `read_frames_slow.py`, and insert the following code:

Faster video file FPS with cv2.VideoCapture and OpenCV

```
# import the necessary packages
from imutils.video import FPS
import numpy as np
import argparse
import imutils
import cv2

# construct the argument parse and parse the arguments
ap = argparse.ArgumentParser()
ap.add_argument("-v", "--video", required=True,
    help="path to input video file")
args = vars(ap.parse_args())

# open a pointer to the video stream and start the FPS timer
stream = cv2.VideoCapture(args["video"])
fps = FPS().start()
```

Lines 2-6 import our required Python packages. We'll be using my **imutils library (https://github.com/jrosebr1/imutils)**, a series of convenience functions to make image and video processing operations easier with OpenCV and Python.

If you don't already have `imutils` installed ***or*** if you are using a previous version, you can install/upgrade `imutils` by using the following command:

Faster video file FPS with cv2.VideoCapture and OpenCV

```
$ pip install --upgrade imutils
```

Lines 9-12 then parse our command line arguments. We only need a single switch for this script, `--video`, which is the path to our input video file.

Line 15 opens a pointer to the `--video` file using the `cv2.VideoCapture` class while **Line 16** starts a timer that we can use to measure FPS, or more specifically, the throughput rate of our video processing pipeline.

With `cv2.VideoCapture` instantiated, we can start reading frames from the video file and processing them one-by-one:

```
Faster video file FPS with cv2.VideoCapture and OpenCV
# loop over frames from the video file stream
while True:
    # grab the frame from the threaded video file stream
    (grabbed, frame) = stream.read()

    # if the frame was not grabbed, then we have reached the end
    # of the stream
    if not grabbed:
        break

    # resize the frame and convert it to grayscale (while still
    # retaining 3 channels)
    frame = imutils.resize(frame, width=450)
    frame = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
    frame = np.dstack([frame, frame, frame])

    # display a piece of text to the frame (so we can benchmark
    # fairly against the fast method)
    cv2.putText(frame, "Slow Method", (10, 30),
        cv2.FONT_HERSHEY_SIMPLEX, 0.6, (0, 255, 0), 2)

    # show the frame and update the FPS counter
    cv2.imshow("Frame", frame)
    cv2.waitKey(1)
    fps.update()
```

On **Line 19** we start looping over the frames of our video file.

A call to the `.read` method on **Line 21** returns a 2-tuple containing:

1. `grabbed` : A boolean indicating if the frame was successfully read or not.
2. `frame` : The actual video frame itself.

If `grabbed` is `False` then we know we have reached the end of the video file and can break from the loop (**Lines 25 and 26**).

Otherwise, we perform some basic image processing tasks, including:

1. Resizing the frame to have a width of 450 pixels.
2. Converting the frame to grayscale.
3. Drawing the text on the frame via the `cv2.putText` method. We do this because we'll be using the `cv2.putText` function to display our queue size in the fast, threaded example below and want to have a fair, comparable pipeline.

Lines 40-42 display the frame to our screen and update our FPS counter.

The final code block handles computing the approximate FPS/frame rate throughput of our pipeline, releasing the video stream pointer, and closing any open windows:

```
Faster video file FPS with cv2.VideoCapture and OpenCV
# stop the timer and display FPS information
fps.stop()
print("[INFO] elasped time: {:.2f}".format(fps.elapsed()))
print("[INFO] approx. FPS: {:.2f}".format(fps.fps()))

# do a bit of cleanup
stream.release()
cv2.destroyAllWindows()
```

To execute this script, be sure to download the source code + example video to this blog post using the ***"Downloads"*** section at the bottom of the tutorial.

For this example we'll be using the ***first 31 seconds*** of the *Jurassic Park* trailer (the .mp4 file is included in the code download):

Let's go ahead and obtain a baseline for frame processing throughput on this example video:

```
Faster video file FPS with cv2.VideoCapture and OpenCV
$ python read_frames_slow.py --video videos/jurassic_park_intro.mp4
```

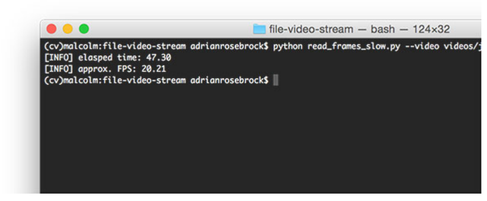


Figure 1: The slow, naive method to read frames from a video file using Python and OpenCV.

As you can see, processing *each individual frame* of the 31 second video clip takes approximately 47 seconds with a FPS processing rate of 20.21.

These results imply that it's actually taking *longer* to read and decode the individual frames than the actual length of the video clip!

To see how we can speedup our frame processing throughput, take a look at the technique I describe in the next section.

Using threading to buffer frames with OpenCV

To improve the FPS processing rate of frames read from video files with OpenCV we are going to utilize *threading* and the **queue data structure (https://en.wikipedia.org/wiki/Queue_(abstract_data_type))**:

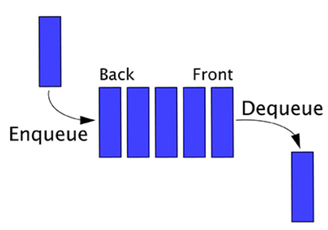


Figure 2: An example of the queue data structure. New data is enqueued to the back of the list while older data is dequeued from the front of the list. (source: **Wikipedia (https://en.wikipedia.org/wiki/Queue_(abstract_data_type))**)

Since the `.read` method of `cv2.VideoCapture` is a blocking I/O operation we can obtain a significant speedup simply by creating a *separate thread* from our main Python script that is solely responsible for reading frames from the video file and maintaining a queue.

Since **Python's Queue data structure (https://docs.python.org/3/library/queue.html)** is thread safe, much of the hard work is done for us already — we just need to put all the pieces together.

I've already implemented the **FileVideoStream class in imutils (https://github.com/jrosebr1/imutils/blob/master/imutils/video/filevideostream.py)** but we're going to review the code so you can understand what's going on under the hood:

```
Faster video file FPS with cv2.VideoCapture and OpenCV
# import the necessary packages
from threading import Thread
import sys
import cv2

# import the Queue class from Python 3
if sys.version_info >= (3, 0):
    from queue import Queue

# otherwise, import the Queue class for Python 2.7
else:
    from Queue import Queue
```

Lines 2-4 handle importing our required Python packages. The `Thread` class is used to create and start threads in the Python programming language.

We need to take special care when importing the `Queue` data structure as the name of the queue package is different based on which Python version you are using (**Lines 7-12**).

We can now define the constructor to `FileVideoStream`:

```
Faster video file FPS with cv2.VideoCapture and OpenCV
class FileVideoStream:
    def __init__(self, path, queueSize=128):
        # initialize the file video stream along with the boolean
        # used to indicate if the thread should be stopped or not
        self.stream = cv2.VideoCapture(path)
        self.stopped = False

        # initialize the queue used to store frames read from
        # the video file
        self.Q = Queue(maxsize=queueSize)
```

Our constructor takes a single required argument followed by an optional one:

- `path`: The path to our input video file.
- `queueSize`: The maximum number of frames to store in the queue. This value defaults to 128 frames, but you depending on (1) the frame dimensions of your video and (2) the amount of memory you can spare, you may want to raise/lower this value.

Line 18 instantiates our `cv2.VideoCapture` object by passing in the video `path`.

We then initialize a boolean to indicate if the threading process should be stopped (**Line 19**) along with our actual `Queue` data structure (**Line 23**).

To kick off the thread, we'll next define the `start` method:

```
Faster video file FPS with cv2.VideoCapture and OpenCV
    def start(self):
        # start a thread to read frames from the file video stream
        t = Thread(target=self.update, args=())
        t.daemon = True
        t.start()
        return self
```

This method simply starts a thread *separate* from the main thread. This thread will call the `.update` method (which we'll define in the next code block).

The `update` method is responsible for reading and decoding frames from the video file, along with maintaining the actual queue data structure:

```
Faster video file FPS with cv2.VideoCapture and OpenCV
    def update(self):
        # keep looping infinitely
        while True:
            # if the thread indicator variable is set, stop the
            # thread
            if self.stopped:
                return

            # otherwise, ensure the queue has room in it
            if not self.Q.full():
                # read the next frame from the file
                (grabbed, frame) = self.stream.read()

                # if the `grabbed` boolean is `False`, then we have
                # reached the end of the video file
                if not grabbed:
                    self.stop()
                    return

                # add the frame to the queue
                self.Q.put(frame)
```

On the surface, this code is *very similar* to our example in the *slow, naive* method detailed above.

The key takeaway here is that this code is actually running in a *separate thread* — this is where our actual FPS processing rate increase comes from.

On **Line 34** we start looping over the frames in the video file.

If the `stopped` indicator is set, we exit the thread (**Lines 37 and 38**).

If our queue is *not full* we read the next frame from the video stream, check to see if we have reached the end of the video file, and then update the queue (**Lines 41-52**).

The `read` method will handle returning the next frame in the queue:

```
Faster video file FPS with cv2.VideoCapture and OpenCV
    def read(self):
        # return next frame in the queue
        return self.Q.get()
```

We'll create a convenience function named `more` that will return `True` if there are still more frames in the queue (and `False` otherwise):

```
Faster video file FPS with cv2.VideoCapture and OpenCV
    def more(self):
        # return True if there are still frames in the queue
        return self.Q.qsize() > 0
```

And finally, the `stop` method will be called if we want to stop the thread prematurely (i.e., before we have reached the end of the video file):

```
Faster video file FPS with cv2.VideoCapture and OpenCV
    def stop(self):
        # indicate that the thread should be stopped
        self.stopped = True
```

The *faster, threaded* method to reading video frames with OpenCV

Now that we have defined our `FileVideoStream` class we can put all the pieces together and enjoy a faster, threaded video file read with OpenCV.

Open up a new file, name it `read_frames_fast.py`, and insert the following code:

```
Faster video file FPS with cv2.VideoCapture and OpenCV
# import the necessary packages
from imutils.video import FileVideoStream
from imutils.video import FPS
import numpy as np
import argparse
import imutils
import time
import cv2

# construct the argument parse and parse the arguments
ap = argparse.ArgumentParser()
ap.add_argument("-v", "--video", required=True,
    help="path to input video file")
args = vars(ap.parse_args())

# start the file video stream thread and allow the buffer to
# start to fill
print("[INFO] starting video file thread...")
fvs = FileVideoStream(args["video"]).start()
time.sleep(1.0)

# start the FPS timer
fps = FPS().start()
```

Lines 2-8 import our required Python packages. Notice how we are using the `FileVideoStream` class from the `imutils` library to facilitate faster frame reads with OpenCV.

Lines 11-14 parse our command line arguments. Just like the previous example, we only need a single switch, `--video`, the path to our input video file.

We then instantiate the `FileVideoStream` object and start the frame reading thread (**Line 19**).

Line 23 then starts the FPS timer.

Our next section handles reading frames from the `FileVideoStream`, processing them, and displaying them to our screen:

```
Faster video file FPS with cv2.VideoCapture and OpenCV
# loop over frames from the video file stream
while fvs.more():
    # grab the frame from the threaded video file stream, resize
    # it, and convert it to grayscale (while still retaining 3
    # channels)
    frame = fvs.read()
    frame = imutils.resize(frame, width=450)
    frame = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
    frame = np.dstack([frame, frame, frame])

    # display the size of the queue on the frame
    cv2.putText(frame, "Queue Size: {}".format(fvs.Q.qsize()),
        (10, 30), cv2.FONT_HERSHEY_SIMPLEX, 0.6, (0, 255, 0), 2)

    # show the frame and update the FPS counter
    cv2.imshow("Frame", frame)
    cv2.waitKey(1)
    fps.update()
```

We start a `while` loop on **Line 26** that will keep grabbing frames from the `FileVideoStream` queue until the queue is empty.

For each of these frames we'll apply the same image processing operations, including: resizing, conversion to grayscale, and displaying text on the frame (in this case, our text will be the number of frames in the queue).

The processed frame is displayed to our screen on **Lines 40-42**.

The last code block computes our FPS throughput rate and performs a bit of cleanup:

```
Faster video file FPS with cv2.VideoCapture and OpenCV
# stop the timer and display FPS information
fps.stop()
print("[INFO] elasped time: {:.2f}".format(fps.elapsed()))
print("[INFO] approx. FPS: {:.2f}".format(fps.fps()))

# do a bit of cleanup
cv2.destroyAllWindows()
```

```
51. | fvs.stop()
```

To see the results of the `read_frames_fast.py` script, make sure you download the source code + example video using the ***"Downloads"*** section at the bottom of this tutorial.

From there, execute the following command:

```
Faster video file FPS with cv2.VideoCapture and OpenCV
1. | $ python read_frames_fast.py --video videos/jurassic_park_intro.mp4
```

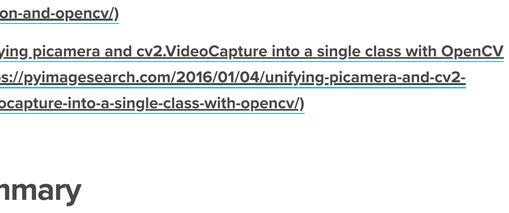


Figure 3: Utilizing threading with *cv2.VideoCapture* and OpenCV leads to higher FPS and a larger throughput rate.

As we can see from the results we were able to process the entire 31 second video clip in ***31.09 seconds* — that's an improvement of *34%* from the slow, naive method!**

The actual frame throughput processing rate is much faster, **clocking in at *30.75 frames per second*, an improvement of *52.15%*.**

Threading can dramatically improve the speed of your video processing pipeline — use it whenever you can.

What about built-in webcams, USB cameras, and the Raspberry Pi? What do I do then?

This post has focused on using threading to improve the frame processing rate of *video files*.

If you're instead interested in speeding up the FPS of your built-in webcam, USB camera, or Raspberry Pi camera module, please refer to these blog posts:

- **Increasing webcam FPS with Python and OpenCV (https://pyimagesearch.com/2015/12/21/increasing-webcam-fps-with-python-and-opencv/)**
- **Increasing Raspberry Pi FPS with Python and OpenCV (https://pyimagesearch.com/2015/12/28/increasing-raspberry-pi-fps-with-python-and-opencv/)**
- **Unifying picamera and cv2.VideoCapture into a single class with OpenCV (https://pyimagesearch.com/2016/01/04/unifying-picamera-and-cv2-videocapture-into-a-single-class-with-opencv/)**

Summary

In today's tutorial I demonstrated how to use threading and a queue data structure to improve the FPS throughput rate of your video processing pipeline.

By placing the call to `.read` of a `cv2.VideoCapture` object in a thread *separate* from the main Python script we can avoid blocking I/O operations that would otherwise dramatically slow down our pipeline.

Finally, I provided an example comparing *threading* with *no threading*. **The results show that by using threading we can improve our processing pipeline by up to 52%.**

However, keep in mind that the more steps (i.e., function calls) you make inside your `while` loop, the more computation needs to be done — therefore, your actual frames per second rate will drop, but you'll still be processing faster than the non-threaded version.

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About the Author

Hi there, I'm Adrian Rosebrock, PhD. All too often I see developers, students, and researchers wasting their time, studying the wrong things, and generally struggling to get started with Computer Vision, Deep Learning, and OpenCV. I created this website to show you what I believe is the best possible way to get your start.

Previous Article:
A day in the life of a Adrian Rosebrock: computer vision researcher, developer, and entrepreneur.
(https://www.pyimagesearch.com/2017/01/30/a-day-in-the-life-of-a-adrian-rosebrock-computer-vision-researcher-developer-and-entrepreneur/)

Next Article:
Recognizing digits with OpenCV and Python
(https://www.pyimagesearch.com/2017/02/13/recognizing-digits-with-opencv-and-python/)

146 responses to: Faster video file FPS with cv2.VideoCapture and OpenCV

Steve Goldsmith (https://github.com/sgjava) Reply
February 6, 2017 at 11:14 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417124)

This didn't work for me using a CHIP SoC. I saw exactly the same frame rate. A simpler method is to move the UVC code into a separate process (mjpg-streamer) and use a simple socket based client thus removing the need for VideoCapture. I get precise FPS and better overall performance this way. See my project **https://github.com/sgjava/opencv-chip (https://github.com/sgjava/opencv-chip)** which includes the Python code and performance tests.

Adrian Rosebrock Reply
February 7, 2017 at 9:09 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417198)

Thanks for sharing Steve!

ghanendra Reply
February 6, 2017 at 12:08 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417130)

Hey Adrian, another awesome tutorial. Thanks a lot

Hey Adrian, another awesome tutorial, Thanks a lot.
I have one problem, I 'm working on getting frames from camera over network, can we use threaded frames there?
What if we are using cv2.capture in Tkinter? How to increase fps processing in Tkinter.

Adrian Rosebrock Reply
February 7, 2017 at 9:08 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417195)

I actually demonstrate how to use OpenCV and TKinter **in this blog post (https://www.pyimagesearch.com/2016/05/30/displaying-a-video-feed-with-opencv-and-tkinter/)**. The post assumes you're reading from a video stream, but you can swap it out for a file video easily.

Ghanendra Reply
February 13, 2017 at 10:11 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417613)

Hi Adrian, I think you missed my first question..

When I read frames from a video using cv2.VideoCapture, speed of reading the frames is much faster than the normal speed of the video. How to read frames from the video at constant rate?

Hi Adrian, I'm using TCP protocol over network to receive frames, fps is very low.
What can I do for that?

Adrian Rosebrock Reply
February 13, 2017 at 1:34 pm
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417638)

OpenCV doesn't actually "care" what the true FPS of the video is. The goal, in the case of OpenCV, is to read and process the frames as fast as possible. If you want to display frames at a constant rate you'll need to insert `time.sleep` calls into the main loop. Again, OpenCV isn't directly made for video playback.

As or transmitting frames over a TCP protocol, that is more network overhead which will certainly reduce your overall FPS. You should look into gstreamer and FFMPEG to speedup the streaming process.

Ghanendra
February 16, 2017 at 10:51 pm
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417944)

Thank a lot Adrian.

Luis Reply
February 6, 2017 at 1:01 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417136)

Hey Adrian, good work as always, i have implemented this in a real time application in order to achieve some LPR cameras, however, i have to stream the feed to a web server. My camera has h264 support (logitech c920) but i haven't found how to pull the raw h264 frames from camera using opencv. Do you have any experience with this? I'm sure this would increase even more my fps since no decoding-enconding would be requiered.

Adrian Rosebrock Reply
February 7, 2017 at 9:07 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417194)

Unfortunately, I do not have any direct experience with this. I would likely look into some combination of FFMPEG and gstreamer to see if you could stream the frames directly over your network.

skrtu Reply
June 3, 2017 at 9:15 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-426610)

https://mike632t.wordpress.com/2014/11/04/video-streaming-using-netcat/ (https://mike632t.wordpress.com/2014/11/04/video-streaming-using-netcat/)

Florent Reply
February 7, 2017 at 4:44 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417175)

Hi Adrian,
I think there may be a problem with the python3 implementation:

When i use python 2.7.9, i got:

python read_frames_slow.py –video videos/jurassic_park_intro.mp4
[INFO] elasped time: 8.21
[INFO] approx. FPS: 116.42

python read_frames_fast.py –video videos/jurassic_park_intro.mp4

[INFO] starting video file thread...
[INFO] elasped time: 6.59
[INFO] approx. FPS: 145.07

But with Python 3.4.2, i got:

python read_frames_slow.py –video videos/jurassic_park_intro.mp4
[INFO] elasped time: 8.20
[INFO] approx. FPS: 116.62

python read_frames_fast.py –video videos/jurassic_park_intro.mp4

[INFO] starting video file thread...
[INFO] elasped time: 31.33
[INFO] approx. FPS: 30.51

Adrian Rosebrock Reply
February 7, 2017 at 9:38 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417217)

Hi Florent — I just double-checked on my system. My Python 2.7 "fast" method does seem to be slightly faster than the Python 3.5 "fast" method. Perhaps there is a difference in the `Queue` data structure between Python versions that I am not aware of (or maybe the threading?).

However, I am not able to replicate your slower method being substantially speedier than the fast, threaded method (Python 3.5):

$ python read_frames_slow.py –video
videos/jurassic_park_intro.mp4
[INFO] elasped time: 44.06

[INFO] approx. FPS: 21.70

$ python read_frames_fast.py –video videos/jurassic_park_intro.mp4
[INFO] starting video file thread...
[INFO] elasped time: 38.52
[INFO] approx. FPS: 24.82

Regardless, it does seem like the Python 3 version is slower. This might be due to the Python 3 + OpenCV 3 bindings on a difference in the `Queue` data structure that I am not aware of.

Frederik Kratzert (http://kratzert.github.io) **Reply**
February 9, 2017 at 9:42 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417327)

Hey Adrian and Florent,

I tried the same on two different environments (Ubuntu 16.04 with python 3.5, Windows 10 with python 3.5) and got comparable results as Florent.

read_frames_fast.py needs approx 4 times as long as the slow version. The numbers are pretty comparable to the ones of Florent.

I noticed, that once the video has reached the end and the Queue function is not loading more images, the fps rate increases dramatically (like i suppose it should be normally with the threading).

Any other thoughts?

Adrian Rosebrock **Reply**
February 10, 2017 at 12:21 pm
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417449)

This must be a Python 3 versioning difference then. I'll have to do some research and see if there was a change in how Python 3 handles either the Queue data structure or threading.

Matheus **Reply**
March 28, 2017 at 11:38 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-421363)

Same thing here:
Python 3.6.0
OpenCV 3.2.0-dev

python3 read_frames_fast.py –video videos/jurassic_park_intro.mp4
[INFO] starting video file thread...
[INFO] elasped time: 64.48
[INFO] approx. FPS: 14.83

python3 read_frames_slow.py –video videos/jurassic_park_intro.mp4
[INFO] elasped time: 29.66
[INFO] approx. FPS: 32.23

That is very weird. The "slow" version is more than 2x faster. Quite Ironic!

Adrian Rosebrock **Reply**
March 28, 2017 at 12:47 pm
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-421369)

Indeed! It's certainly a Python 3 specific issue.

Wim Valcke **Reply**
April 22, 2017 at 5:39 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-423428)

Hi Adrian,

I have a solution to the problem with python3.
The reason is that the stream reader in the thread is continuously trying to push something into the queue in a direct tight while loop. On the other side the main thread is trying to get data from the queue. As locking is necessary, or the video thread or the main thread can access the queue.
As the video thread has less work then the main thread it's continuously trying to push the data if at any moment we a free slot in the queue. But this limits the access from the main thread to get data out of it.
Just adding a small time.sleep(0.001) inside the while loop at the beginning gives a little breathing room for the main thread to get data of the queue.
Now we have a different story. On my system the slow version

[INFO] elasped time: 11.11
[INFO] approx. FPS: 86.03

fast version before the change

[INFO] elasped time: 48.18
[INFO] approx. FPS: 19.84

The fast version after the change
[INFO] elasped time: 8.13
[INFO] approx. FPS: 102.72

It's a bit faster than the non thread version, reason is the overlapping time of reading a frame and processing a frame in different threads.

Moral of the story is that tight while loops are never a good idea when using threading.
This solution should work also for python 2.7.

I just have another remark. The main thread assumes that if the queue is empty, the video is at the end. If we would have a faster consumer than a producer this is a problem.
My suggestion is to add a method to FileVideoStream

```
def running(self):
# indicate that the thread is still running
return(not(self.stopped))
```

The current implementation changes self.stopped to True is the video file is at the end.

In the main application can be changed like this. Also the sleep of 1 second at the beginning (which was there to let the queue fill up) can be left out.
You nicely see the video showing and you see the queue size filling up in a few secs to max.

```
while fvs.running():
# grab the frame from the threaded video file stream, resize
```

```
# it, and convert it to grayscale (while still retaining 3
# channels)
frame = fvs.read()
frame = imutils.resize(frame, width=450)
frame = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
frame = np.dstack([frame, frame, frame])
```

All the best,

\Wim.

Adrian Rosebrock
April 24, 2017 at 9:46 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-423584)

Hi Wim — thanks for sharing. I would like to point out that the `Queue` data structure is thread safe in both Python 2.7 and Python 3. It's also strange that the slowdown doesn't happen with Python 2.7 — it only seems to happen with Python 3. Your `time.sleep` call seems to do the trick as it likely prevents the semaphores from constantly being polled, but again, it still seems to be Python 3 specific.

Richard Gao
January 10, 2018 at 2:26 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-446110)

Hi Wim,
If we have a fast producer and slow consumer, the main thread will missed some frames to process.
So my suggestion is:
while fvs.running or fvs.more():
# get the frame and process them

Jon Reply
February 7, 2017 at 2:00 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417227)

Hi Adrian,

Would there be a way to use this technique to process videos much quicker? Say I had a video that was 1 hour long, could I then use threading to process the video in less than an hour? What happens if I try to use the VideoWriter to save the frames from the thread? Will the resulting video file play at a much faster speed than the original input video?

Adrian Rosebrock Reply
February 10, 2017 at 2:18 pm
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417487)

I would suggest using 1 *thread* to read the frames from a video file and store them in a queue. Then, create as many *processes* as you have cores on your CPU and have them process the frames in parallel. This will dramatically speedup your throughput.

As for using `cv2.VideoWriter`, **please refer to this blog post (https://www.pyimagesearch.com/2016/02/22/writing-to-video-with-opencv/)**.

Marc (http://i%20don't%20have) Reply
March 13, 2018 at 3:59 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-452955)

Hello guys.

I put in the "filevideostream.py" the "queueSize=1024" instead of "queueSize=128" and for me the fast version has a considerable increase of fps.I don't test it so much until now to find if is a suitable solution ,but i want to see your point of view ☺ .

Kenny Reply
February 8, 2017 at 11:26 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417285)

Thanks Adrian! As always, there's always something new to learn from you and fellow enthusiasts on your web! ☺

Adrian Rosebrock Reply
February 10, 2017 at 12:21 pm
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417450)

Thanks Kenny!

TomKom Reply
February 9, 2017 at 8:52 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417326)

Hi Adrian,
Do you think it's feasible to change queue length dynamically?
I've got a script that does detection (1st frame) and then tracking (remaining 24 frames), in an endless loop, taking images from camera.
The problem I'm facing is that during detection some frames are 'lost' and the tracker is not able to pick up the object.
When using the queue it's a bit more random as queue fills up quickly (quicker than the script takes them away from the front/bottom of the queue) so it's constantly full. When detection happens, new frames are not added to the queue so they're lost, though in a more random order now.
Do you have any recommendations for this issue?
Thank you,
Tom

Adrian Rosebrock Reply
February 10, 2017 at 2:04 pm
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417473)

You can certainly change the queue length dynamically, but you would have to implement a thread-safe queue with a dynamic size yourself. Actually, I'm not sure about this, but if you instantiate `Queue()` without any data parameters it *might* allow for the queue to shrink and expand as needed.

Peter Simonyi Reply
March 29, 2018 at 6:09 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-454543)

Hi Adrian,

I have almost the same issue:
my code is capture a RTSP stream, works fine.
The RTSP FPS is 25, but image processing approx 1-2 FPS, so the stream will be corrupted, because I use native read() function.
I'm planning to modify the code:

– first thread for capture all frame to a queue
– second stream for processing the newest frame from the queue

My question, how can I get the newest frame from the queue? Yes I know I cannot processing all frame, but I hope the RTSP stream decoding will be error free.

Adrian Rosebrock Reply
March 30, 2018 at 7:00 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-454642)

I'm a bit confused about the point of the first thread. Why are you capturing all frames to a queue if you know you won't be able to process them all since the system is running at 1-2 FPS?

Brandon Reply
February 11, 2017 at 11:38 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417534)

Great stuff as always, Adrian.
In some of my code, after I run

cap = cv2.VideoCapture(vidfile)

I then get things like file fps or number of frames using various cap.get calls, example:
fps = cap.get(cv2.CAP_PROP_FPS)

Or, to start the read at a specific frame I would run:
cap.set(cv2.CAP_PROP_POS_MSEC, startframe*1000/fps)

Is there a way to use get and set on the videoCapture object which with this method would be in FileVideoStream?
Thanks,
Brandon

Adrian Rosebrock Reply
February 13, 2017 at 1:49 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417653)

Great question Brandon. I personally don't like using the `cap.get` and `get.set` calls as they can be extremely temperamental based on your OpenCV version, codecs installed, or if you're working with a webcam versus file on disk.

That said, the best way to modify this code would be to update the construct to accept a pre-initialized `cv2.VideoCapture` object rather than having the constructor built it itself.

Gilles Reply
February 12, 2017 at 5:01 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417587)

Hi Adrian,
Good article as always ! Recently, I came up with the exact same need, separate processing and input/output for a small script.

I guess that your example has a few drawbacks that I would like to point out :

– Never use sleep function (line 20.) to synchronize your threads. It is always a source of confusion and misconception. Because you are using the queue emptiness as an exit condition, you have to fill it before. I would suggest another approach where reading is performed by the main thread and the processing by another thread. You could use the Queue.join() Queue.task_done() as a way to synchronize threads. Usually this pattern is best achieved with a last message enqueued to kill the processing thread.

– Threading in python comes with some limitations. One of them is GIL (Global Interpreter Lock) which means that even if you are using many threads only one of them is running at once. This is a major drawback using threading in python. Obviously, if you are only relying on bindings (opencv here) you can overcome it (the GIL should be released in a c/c++ bindings). As an alternative, I would recommend the multiprocessing module.

– Depending on the application, I would consider using a smaller queue but more processing threads. Obviously, you rely on a tradeoff between reading time and processing time.

Thanks,
Gilles.

Adrian Rosebrock Reply
February 13, 2017 at 1:40 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417644)

Hi Gilles, great points. I used `time.sleep` in this case as a matter of simplicity, but yes, you are right. As for threading versus multiprocessing, for I/O operations it's common to use simple threads. Is there a particular reason you're recommending multiprocessing in this case?

Gilles Reply
February 13, 2017 at 6:22 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417667)

As a rule of thumb, I would always recommend using multiprocessing rather than threading. In Python (as well as some other interpreted language), even if you are running multiple threads, only one of them goes at a time. This is called GIL (Global InterpreterLock). So, using many threads with pure Python code won't bring you the expected parallel execution.On the other hand, multiprocessing relies on separate processes and interprocess communication. Each process runs its own python interpreter, allowing for parallel execution of pure python code.
Obviously, in the example you provided, using threading for I/O is not a big issue. The I/O occurs in opencv, and GIL is released when going deep in opencv (reaching c++ native code).
Last point, using multiprocessing can ease pure Python parallel execution easily and efficiently using multiprocessing.Pool and multiprocessing.Queue (same interface as standard Queue).

Gilles.

Adrian Rosebrock Reply
February 14, 2017 at 1:27 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-417714)

Thanks for the tips Giles. I've always defaulted to threads for I/O heavy tasks and then processes for computation heavy tasks. I'll start playing around with multi-processing for other tasks as well now.

Raghav Reply
February 18, 2017 at 11:57 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-418004)

Hey Adrian! cool post as always. Just a typo though.. in the line "feeing up our main thread", freeing is misspelt

Kim Willem van Woensel Kooy Reply
February 20, 2017 at 9:00 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-418123)

Hey Adrian! I have learned much from your blog posts. I'm also looking for ways to speed up my VideoCapture-functions, so this post was excellent. But I'm wondering if it is possible to skip frames in a video file? I'm trying to detect motion with a simple pixel based matching (thresholding), and I want to make an if statement telling the program to skip the next 24 frames if no motion is detected. If motion is detected I want to process every frame until no motion is detected. See my problem?
I'm using VideoCapture.read() for looping through the frames.

Adrian Rosebrock Reply
February 22, 2017 at 1:48 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-418256)

Instead of using `.read()` to read and decode each frame, you could actually use `.grab` which is *much faster*. This would allow you to seek N frames into the video without having to read and decode each of the previous N – 1 frames. I've heard it's also possible to use the `.set` method as well, but I haven't personally tried this.

Chandramauli Kaushik Reply
February 28, 2017 at 2:09 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-418643)

Something strange happened in my case:
read_frames_slow was playing the video perfectly.
read_frames_fast was playing the video slowly.
But the opposite should happen, right!!!!!

Here is the Terminal OUTPUT:

(cv) Chandramaulis-MacBook-Pro:increaseFPS Mauli$ python read_frames_fast.py –video videos/jurassic_park_intro.mp4
[INFO] starting video file thread...
2017-03-01 00:32:21.473 python[43433:374316] !!! BUG: The current event queue and the main event queue are not the same. Events will not be handled correctly. This is probably because _TSGetMainThread was called for the first time off the main thread.
Terminated: 15

(cv) Chandramaulis-MacBook-Pro:increaseFPS Mauli$ python read_frames_slow.py –video videos/jurassic_park_intro.mp4
2017-03-01 00:32:43.113 python[43481:374632] !!! BUG: The current event queue and the main event queue are not the same. Events will not be handled correctly. This is probably because _TSGetMainThread was called for the first time off the main thread.
Terminated: 15

Why is this happening?

Chandramauli Kaushik Reply
February 28, 2017 at 2:11 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-418644)

BTW, I am using python 3.5.

Adrian Rosebrock Reply
March 2, 2017 at 6:57 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-418812)

As the other comments have suggested, this seems to be an issue with Python 3 only. For Python 2.7, the threaded version is much faster. I'm not sure why it's so much slower for Python 3.

Phil Birch Reply
March 6, 2017 at 10:21 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-419491)

I came across a problem with your code with my awful slow hard dive. If another application has heavy use of the hard drive the queue drops to zero and your more() method will return False prematurely, ending the video reading before the end of the file. However there's a quick fix. The get method from the Queue has a blocking option and instead of testing the queue length in more() test the self.stopped flag instead

def read(self):
# return next frame in the queue
return self.Q.get(block=True, timeout=2.0)
def more(self):
# return True if there are still frames in the queue
return not self.stopped

This also means you can remove the time.sleep(1.0) line from the main

Adrian Rosebrock Reply
March 6, 2017 at 3:35 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-419526)

Thanks for sharing Phil!

ap Reply
April 28, 2017 at 5:41 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-424056)

Python 3.5, I'm seeing same behavior as Chandramauli Kaushik, the FAST version is at least

I used a different video, here are the speeds

SLOW=60.29 FPS
FAST=16.28 FPS

Adrian Rosebrock Reply
May 1, 2017 at 1:49 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-424223)

As mentioned in previous comments, this is definitely a Python 3 specific issue. I'm not sure why it happens only for Python 3.5 + OpenCV 3, but not Python 2.7 + OpenCV 3 or Python 2.7 + OpenCV 2.4. My guess is that there was a change in how the `Queue` data structure works in Python 3, but again, I'm not entirely sure.

Dixon Dick (http://www.archethought.com) Reply
November 18, 2017 at 11:03 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-440992)

Using OpenCV 3.3.1 on a Raspberry Pi creates this exact situation.

Phil's suggestion fixes the problem. Many thanks!

Dixon Dick (http://www.archethought.com) Reply
November 18, 2017 at 11:09 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-440993)

Phil, should this be a pull request?

Adrian Rosebrock Reply
November 20, 2017 at 4:09 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-441178)

I will make sure this is updated in the next version of imutils. It may even be worthy of creating a dedicated blog post.

Igor Reply
May 1, 2017 at 2:31 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-424228)

Hi, Adrian! Any upcoming fix for python3 ? On 3.6 same behavor as everybody has… I see that “slow” version is getting 120% CPU + 290Mb RAM on my Macbook, “fast” version takes 175% CPU and 990Mb RAM (Reading .MOV container with H.264 FullHD video). So Assuming higher CPU/memory usage there should be an effect, but it plays like 30-50% slower…

Adrian Rosebrock Reply
May 3, 2017 at 6:03 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-424400)

As I mentioned in previous comments, I’m not sure what the issue is with Python 3 and why it takes so much longer than Python 2.7. I would appreciate it if another PyImageSearch reader could investigate this issue further as I’m pretty sure the issue is with the `Queue` data structure.

Igor Reply
May 1, 2017 at 2:37 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-424229)

Oh, and I have read all your posts, thanks! Very easy to read and understand for noob like me ☺
May I have advise from you about this questions:

1. What is the best way to detect traffic signals? (I am using color tracking through HSV threshold and then detecting shape through HoughCircles . But I am getting a lot of false positives when red car is crossing or someone brake lights is on ☺
2. What is the best way to detect standing/moving cars? Train Haar?

Thank you!

Adrian Rosebrock Reply
May 3, 2017 at 6:02 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-424399)

1. To detect traffic signals I would train a **custom object detector (https://www.pyimagesearch.com/2014/11/10/histogram-oriented-gradients-object-detection/)** to recognize the traffic signal. From there you could apply color thresholding to determine which light is “on”.

2. This really depends on the data that you are working with. HOG + Linear SVM detectors might work here if the video is fixed and non-moving, but it will be harder to generalize across datasets. In that case you might consider a more advanced approach such as deep learning.

Cooper Reply
June 21, 2017 at 8:41 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-427837)

I switched my script over from the usual VideoCapture to your threaded method and am only getting a 1-2% better FPS : /

Adrian Rosebrock Reply
June 22, 2017 at 9:27 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-427868)

Which version of OpenCV and Python are oyu using?

Daniel (http://dayrev.com) Reply
June 23, 2017 at 6:01 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-427924)

I was able to replicate the performance improvements with the demo script for Python 2.7. However, not within my own custom app code for some reason.

I ended up playing with a few file formats instead and learned the following from benchmarking via the FPS class.

Test Files:
101MB 1080p .mp4 (Drone raw file)
26MB 1080p .mov (Quicktime re-export from raw file)
18MB 1080p .m4v (Quicktime re-export from raw file)

Learnings:
– The smaller .mov file processed just as slowly as the raw .mp4 file.
– The smallest .m4v file processed 2x faster than the raw .mp4 file.

Frank Reply
July 3, 2017 at 7:05 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-428847)

Hi, Adrian Rosebrock, very good works! I would like to asking you one question, is cv2.videocapture.read( ) method I/O bound or CPU bound? As far we know, decoding video is slow, so the read( ) method is blocked. If it is CPU bound, should we use multiprocessing?

Lee Reply
July 15, 2017 at 10:31 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-429977)

Hi, Adrian! I am trying to use collections.deque to cache frames, because I don’t need to check if it is full, but when it run, I always get this: “IndexError: pop from an empty deque‘’. Maybe deque cache object slower than queue.Queue. I am not sure whether my program has problem.(Python: 3.5.2, Opencv: 3.2.0)

Adrian Rosebrock Reply
July 18, 2017 at 10:02 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-430118)

Hi Lee — I’m not exactly sure what the issue is there. The error message states that the dequeue is empty. I would suggest checking your logic in the code to ensure the frame is getting added to the dequeue.

Sohaib (http://github.com/ArifSohaib) Reply
September 18, 2017 at 3:25 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-435135)

I am not sure what is happening but the slow script is giving me an FPS of 105.07 while the threaded one gives 20.63.

Did a newer version of opencv make a better implementation of .read()?

Adrian Rosebrock Reply
September 20, 2017 at 7:24 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-435247)

I assume you're using Python 3? If so, check the rest of the comments on this page. It appears that Python 3 uses a different implementation of the `Queue` class which dramatically slows down the frame reads. I'm not sure why this is and would request PyImageSearch readers with experience in Python 2.7 and Python 3 differences as well as multi-threading to investigate this.

David Reply
September 23, 2017 at 4:07 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-435493)

Hi Adrian,
I use your code with a little robot to overlay gps position, date, time, .. on camera video.
It works fine.
I just modified the class to include videowriter to record video on a USB3 stick.
I saw the difference between read() method in an another thread and in the main one. Well done.
Problem begins when I want to play the recorded video. For example, a 10s video is played in 7s... The overlayed time runs too faster regardless of fps set on videowriter().
Can you explain why ?

Thanks.

Adrian Rosebrock Reply
September 24, 2017 at 8:47 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-435552)

Hi David — I actually discuss the **cv2.VideoWriter class in more detail over here (https://www.pyimagesearch.com/2016/02/22/writing-to-video-with-opencv/)**. While OpenCV does a really great job reading frames from video files it can be problematic writing the frames back out to disk. The short version is that I'm not really sure why this is happening even if you are adjusting your FPS parameters. I'm sorry I couldn't be of more help here, but I would suggest looking into the video I/O libraries you have installed and see if there are any known issues with OpenCV.

Reza Ghoddoosian Reply
October 13, 2017 at 4:14 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-437451)

Hi Adrian
I was wondering why you did not use queue for reading from a webcam with the same method in one of your tutorials
A i have understood, using a queue will make you use every single frame while, in contrast, without using queue you may lose a couple frames in between. maybe in a live stream your dont care about this but in a video file with a limited frame number you do. right?

Adrian Rosebrock Reply
October 14, 2017 at 10:38 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-437562)

Yes, a queue will make you read every single frame, but that's desirable for real-time applications. You could easily lag behind if your video processing pipeline is complex. Instead, you read the most recent frame from the camera buffer.

rahman Reply
November 19, 2017 at 7:16 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-441023)

Hey Adrian
I encounter something odd. I work on a project that I want to read all frames and add it to a buffer. then I process buffer at once. when I use your fast code, it just read a few frames (between 140-145). can you suggest any solution?

Adrian Rosebrock Reply
November 20, 2017 at 4:03 pm
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-441174)

Hi Rahman — this method is intended to always keep the buffer full. If you pull a frame from it a new one will be added. It sounds like you are reaching a balance where new frames cannot be read faster than they are processed.

Rahman (http://ryz.ir) Reply
November 21, 2017 at 5:02 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-441225)

Dear Adrian, Thank you for the answer
I found the reason why i encounter this issue. when the consumer is much faster than producer the queue becomes empty very soon and " more() " function thinks all frames are used and there is no frame to return. so the procedure ends. I do a little modification in code in order to fix this issue and solve it.
unfortunately for my application the fast and slow procedure finish in the same time but for applications that consumer(the algorithm that process frames) has a lot to do, this method can decrease the processing time .
Ps: I think if you want to have a fair compassion, you have to add initial (1) second- for sleep after defining an instance from filevideostram class- to the processing time in fast code

Sergei Reply
January 24, 2018 at 5:48 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-447432)

I think if consumer is faster than producer,
you can modify mode function

def more(self):
# return True if there are still frames in the queue
return self.Q.qsize() > 0 or not self.stopped

but that can lead to race condition (more is called when stop is False and then we'll try to get next frame stop becomes True because it was the last frame) so you can

add dummy None to your queue as an indicator for end of the video, and when you'll get None in your consumer you can say it's the end

```
def stop(self):
# indicate that the thread should be stopped
self.Q.put(None)
self.stopped = True
```

Carl.C **Reply**
November 22, 2017 at 2:40 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-441297)

Hi, Adrian!

Good article!
It's so excited to find out there is a faster way to capture video. But I find the "fast version" is twice slower than the "slow version".

I've saw the comments, it seems to be python3's special problem?

To fix this problem, I changed the queueSize from 128 to 1280, and here's the result.
(A different mp4 video, not Jurassic park)
(All this tests ran on SSD drive)

Slow Version
[INFO] elasped time: 5.93
[INFO] approx. FPS: 57.36

Fast Version
[INFO] elasped time: 12.86
[INFO] approx. FPS: 26.45

Fast Version with 1280 queueSize
[INFO] elasped time: 5.52
[INFO] approx. FPS: 61.63

It seems 128 frames queueSize is too small and when I run the altered version, max queueSize can achieve 300+.

Based on so repeated tests' result, I just believe the "fast version" is definitely faster than the "slow version" regardless of python version, as long as it's queueSize was unlimited.

But for low-end devices, like rasp pi, there is no faster way to capture video on python3?

Adrian Rosebrock **Reply**
November 22, 2017 at 9:52 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-441338)

The slow down is due to Python 3's queuing. I think I may have found a solution though! I need to test it further and if it works I'll publish a separate post since this is a common question.

David **Reply**
November 30, 2017 at 3:35 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-442023)

It's a great news Adrian. Please, publish ASAP the solution ! ☺
I hope you got the solution. I tried to cath frames faster with multiprocessing class, but the road is very dark for a none great python user.

David

Tyler A **Reply**
January 23, 2018 at 2:48 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-447366)

I'm very much looking forward to the python3 queuing solution! I've built a fairly complex motion detection and video recording script using a few of your tutorials. The script runs at 15 fps on my mac mini (which matches the output of the ip cam), but when I tested on my raspberry pi that dropped to 2 fps.

Smitha **Reply**
April 20, 2018 at 9:15 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-457613)

Hi Adrain, were you able to find the solution for python 3

Adrian Rosebrock **Reply**
April 20, 2018 at 9:32 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-457615)

I have not been able to work on the Python 3 solution despite my best efforts. I would really appreciate others in the PyImageSearch community working on it as well if they are having problems with the script ☺ I'd be happy to merge the solution into the "imutils" library as well!

Bodet **Reply**
January 9, 2018 at 2:41 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-446063)

Hi
Do you have a script to send image from raspberry pi to PC or other raspberry PI, via socket library ?
Raspberry pi = server
PC or Raspberry pi = client

The image source is processed with opencv from picamera source before sent to the client.
The client must use opencv to modifiy the received image/frame.

Ludo

Adrian Rosebrock **Reply**
January 10, 2018 at 12:51 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-446153)

Hey Bodet, I do not have a script on hand that does that. I will try to cover this in a future PyImageSearch tutorial.

Fatima **Reply**
January 30, 2018 at 2:39 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-448284)

Hy Adrian .I am quite beginner. I am not getting that what is the meant by that line of code.

frame = np.dstack([frame, frame, frame])

Please slightly shed light on that.

Adrian Rosebrock **Reply**
January 31, 2018 at 6:48 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-

videocapture-and-opencv/#comment-448378)

Our “frame” is grayscale (single channel). But we would like a RGB representation of a grayscale image, so we stack the image, depth-wise, three times. If you’re new to the world of computer vision and image processing be sure to take a look at my introductory book, **Practical Python and OpenCV (https://www.pyimagesearch.com/practical-python-opencv/)**, where I teach the fundamentals. Using this book you’ll be able to get up to speed quickly 🙂

Aanaya Fatima Reply
February 2, 2018 at 6:24 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-448620)

Hy Adrian,
I am just using your code from the file “read_frames_fast”. But I am getting error, which says

[usage: read_frames_fast.py [-h] -v VIDEO
read_frames_fast.py: error: the following arguments are required: -v/–video]

I am using exact your code.
I am not getting what does it mean.Please help me to get rid out of that.
Waiting for your reply.

Adrian Rosebrock Reply
February 3, 2018 at 10:37 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-448821)

You are receiving this error because you are not supplying the command line arguments to the script.

1. Make sure you **read up on command line arguments (https://www.pyimagesearch.com/2018/03/12/python-argparse-command-line-arguments/)** before continuing.

2. And afterwards, notice how I am supplying the `--video` argument via the command line when executing the script:

```
python read_frames_fast.py --video
videos/jurassic_park_intro.mp4
```

Aanaya Fatima Reply
February 3, 2018 at 1:38 pm
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-448869)

I am doing passing the path like that: (i places that video at desktop)

ap = argparse.ArgumentParser()
ap.add_argument(“-v”, “–video
C:\\Users\\Admin\\Desktop\\videos\\jurassic_park_intro.mp4”,
required=True,help=”path to input video file”)
args = vars(ap.parse_args())
fvs = FileVideoStream(args[“video”]).start()
time.sleep(1.0)

Please rectify me where I am missing.
Is it possible to directly pass the video path to FileVideoStream ???

Please help me.
[Extremely sorry for basic questions, as I am new to that field and trying best to learn things]

Adrian Rosebrock Reply
February 3, 2018 at 2:52 pm
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-448880)

The code does not need to be edited at all. There are zero changes required to the code. You supply the command line arguments via your terminal/command line when you execute the script.

Aanaya Fatima
February 3, 2018 at 3:20 pm
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-448883)

If I am interested to pass the file path to FileVideoStream directly, then how I can do that?

I am trying to search on google that how to pas parameter to FileVideoStream, really i am unable to find satisfactory explanation.
I am interested to pass the file path directly to FileVideoStream, i dont wanna use argument parser. How I can do that?

Thanks in anticipation for your kindness and cooperation.

Adrian Rosebrock
February 6, 2018 at 10:34 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-449268)

You just supply the via a string:

```
fvs =
FileVideoStream("path/to/your/video.mp4
").start()
```

hassan Reply
February 6, 2018 at 3:13 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-449312)

Hy Adrain,
I am also facing same problem, and really unable to get rid of it. I am directly passing the path to FileVideoStream, but my code is not entering in the while loop. (I am following exactly your code). For the sake of testing I printed (“hello word”) in while loop, which does not get print, when code is run. What can be the possible issue.

fvs = FileVideoStream(“O:/FYP/Final_Year/video.mp4”).start()
fps = FPS().start()
while fvs.more():

#Just for the sake of testing, I printed hello word here.
print(“hello word”)
frame = fvs.read()

Kindly help me to get understand that.
Thanks

Adrian Rosebrock Reply

February 8, 2018 at 8:41 am
(https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-449529)

Hey Hassan — how did you install OpenCV on your system? It sounds

Hey Hassan — how did you install OpenCV on your system? It sounds like OpenCV was compiled without video support.

Phil Reply
March 3, 2018 at 12:34 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-451839)

Hi Adrian, thanks for all your excellent tutorials! I'm using the imutils.VideoStream to capture from webcam, do cv2.absdiff and dilate, and output to imshow. I noticed that when I do this with VideoStream, it'll drop one frame out of five or so. So the output is always "flickering". But when I use the built in OpenCV.VideoCapture, the frame rate is much lower, but I don't get any dropped frames. Is there some way to detect and ignore these "empty" frames coming out of VideoStream.read?

See this issue I filed: **https://github.com/jrosebr1/imutils/issues/54 (https://github.com/jrosebr1/imutils/issues/54)** . It has example gists attached that show the issue.

Adrian Rosebrock Reply
March 3, 2018 at 7:33 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-451866)

Hey Phil — we discussed the question in the GitHub Issue but I'll copy and paste my response so other readers can learn from it:

This is a feature, not a bug. The `VideoStream` object will return whatever the *current* frame is from the stream, but not necessarily the next *brand new* frame.

Our goal is to achieve as high frame throughout as possible; however, for incredibly simplistic frame processing pipelines as yours, the loop actually completes before a brand new frame is even available on the camera. The vast majority of frame processing pipelines are not as fast as yours and it's not worth the slowdown of checking if the frame is actually brand new. Instead, we return it. I hope that helps clear up the issue.

Phil Reply
March 3, 2018 at 12:33 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-451896)

That makes sense. Thanks for the response!

Yuvaraj Reply
March 18, 2018 at 11:05 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-453460)

the video which you have added tracks face faster is it a pi camera with raspberry pi. Because i run the code which you provided its very slow for me and for first time it showed rectangle on object after that i re-runned again the code there is no response of single track i kept on for 10 mins.
Do i am doing anything in wrong way or pi is slow.

Yuvaraj Reply
March 18, 2018 at 11:14 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-453462)

sorry i am asking about this link
https://www.pyimagesearch.com/2018/02/26/face-detection-with-opencv-and-deep-learning/ (https://www.pyimagesearch.com/2018/02/26/face-detection-with-opencv-and-deep-learning/)

Adrian Rosebrock Reply
March 19, 2018 at 5:11 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-453574)

OpenCV's deep learning face detector is too computationally heavy for the Raspberry Pi. If you want to use the Raspberry Pi you should use Haar cascades, as I do in **this post (https://www.pyimagesearch.com/2017/10/23/raspberry-pi-facial-landmarks-drowsiness-detection-with-opencv-and-dlib/)**. Otherwise, the face detection process will not be able to run in real-time.

shane Reply
March 23, 2018 at 6:44 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-454064)

I began using this script to improve the framerate for streaming videos from youtube. It works great on normal videos, but will only play somewhere around 110 frames of a youtube LIVE video.

I'm not sure why it won't work just as well on a Youtube LIVE video as it does on normal Youtube videos. Can anyone offer an explanation why it only grabs the first 110 or so frames?

Thanks

Selom Ofori Reply
March 28, 2018 at 12:42 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-454476)

After solving a similar (probably same problem) I think the title of your post is confusing to people who run into this issue.
Explained simply, if you want to capture a 20fps video from the camera to file, you need to capture 20 frames per second. In a single threaded python script, the process goes

capture frame
convert
write to file
repeat.

however this block will not be able to do the task 20 times in a second, so you will miss frames and instead of capturing & saving 20 frames per second, you're actually doing it at 5 frames per second.

With threading you capture the frames in a separate thread and put it in a Queue. You can significantly improve your loop to make 18-19 frames depending on the device you are running on. Of course you need another thread to empty the queue before you run out of memory.

To anyone tackling this problem, first write your video capture thread and see how many frames it can capture, if your system is underpowered you'll know this is as fast as it can go. Then add your processing thread after. The processing thread will add a performance hit to your total frame capture rate but it won't be as bad as a single threaded script

Adrian Rosebrock Reply
March 30, 2018 at 7:16 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-454648)

You're mentioning writing frames to disk in a separate file but I'm not using cv2.VideoWriter, the function responsible for writing frames to disk in OpenCV, so I'm a bit confused at the point you are making.

Could you clarify?

Jon Reply
April 6, 2018 at 12:46 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-455259)

Hi Adrian,

The code runs fine but when I've tried processing different videos and the processing time and FPS is always very similar for both methods. I have a quad core cpu and the "slow" version is processing a 1:00 25 fps video file at about 63 fps with both methods.

Any suggestions?

Adrian Rosebrock Reply
April 6, 2018 at 8:45 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-455290)

Hey Jon — thanks for the comment although I'm not sure what your question is here. Are you asking how to speed up the frame processing pipeline?

Jon Reply
April 6, 2018 at 9:02 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-455311)

Hi Adrian,

Yes, I figured I would have gotten a speed-up but is that because the "slow" version on my pc is already running at the maximum processing speed possible?

I will try it with some computationally expensive image processing operations and see if changes things between the two methods.

Adrian Rosebrock Reply
April 6, 2018 at 9:07 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-455314)

That would be my initial guess, although this might be a threading issue with Python. Which version of Python are you using? Python 2.7 or Python 3?

Jon
April 6, 2018 at 9:17 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-455315)

Hi Adrian,

Yep that was it. I just ran a bunch of various resizing operations in a while loop after grabbing the frame and now I can start to see differences in performance with the faster version having speed-ups. I'm using Python 2.7 by the way. I'm going to test on a lower-end machine and see if the effect is more profound. Thanks for your help!

Adrian Rosebrock
April 10, 2018 at 12:49 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-455983)

No problem Jon, I'm happy to help ☺

Kim Reply
May 1, 2018 at 6:51 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-459545)

What would be the most efficient video format in which the video should be stored for best reading results?

Thanks for the tut! ☺

Kim

Adrian Rosebrock Reply
May 3, 2018 at 10:06 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-459764)

That really depends on which video codecs you have installed and any hardware optimizations on your system.

Adnan Addewala Reply
May 2, 2018 at 5:38 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-459610)

hello Adrain,

Great tutorial, it significantly improved my fps on Jetson Tx2.
The place where I am stuck is working with two video simultaneously.
I am able to two load to queues with frames from two videos respectively, however, when starting the two threads (.start()) to perform the (Q.get()) in cv2.imshow, The videos run one after another rather than running simultaneously. I dont know if its because the GIL or some other reason. Is there any other way where two queues can be used to start who videos simultaneously?

Thanks,

Adrian Rosebrock Reply
May 3, 2018 at 9:35 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-459751)

As far as I understand it, OpenCV's GUI functions do not support direct threading. I'm not sure if this is an OpenCV GUI module limitation or something related to the GIL.

Guru Reply
May 29, 2018 at 5:03 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-465291)

Hi Adrian,

Also, Can I use this code to check a continuous video stream using a webcam like

fvs = FileVideoStream(0).start(), the reason to ask this question is, when I tried to use the 0, the video window was closed in few seconds, Can you please let me know, If I have to do anything else to make the webcam video faster but till the time i press Ctrl C

Thanks
Guru

Adrian Rosebrock Reply
May 31, 2018 at 5:17 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-465743)

This class expects you to pass in a valid *file path*. If you want to use an actual webcam you should be using the **VideoStream class (https://www.pyimagesearch.com/2016/01/04/unifying-picamera-and-cv2-videocapture-into-a-single-class-with-opencv/)**.

Zubair Ahmed (http://zubairahmed.net) Reply
June 4, 2018 at 3:03 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-466807)

Hi Adrian

Excellent post as usual.

I have the same problem as some of the comments above, I'm using Python 3.6 and experience slow video performance, I have time.sleep() used like this

vid = FileVideoStream(path=args["video"], queueSize=512).start()
time.sleep(1.0)

and like this

frame = vid.read()
time.sleep(0.01)

But none of this helps speed things up

Do you have any solution to this please?

Adrian Rosebrock Reply
June 5, 2018 at 7:56 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-467041)

It's a Python 3 issue. To be honest I'm not sure what the solution is. Something changed between how Python 2.7 and Python 3 handles the Queue class. I've requested that other PyImageSearch readers look into the problem as well in other comments in this post. The "time.sleep" is not the issue here, it's the actual Python 2.7 vs. Python 3 Queue implementation. I would request that you and other readers look into the issue as well. I'd love to get this post updated.

moshel Reply
May 30, 2019 at 7:47 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-519882)

Its because of the GIL (global interpreter lock). In your setup, i presume that the queue never fills so you don't have this problem. If you read the frames from a very fast source or do really heavy processing, you will hit the problem. What happens is that in the update there is a tight, cpu only loop if q is full. Because of the interpreter lock, this loop more or less prevents the main thread from doing anything. Adding time.sleep(0.0001) after the loop with the "if not self.q.full()" loop (not inside it!) will solve the problem by yielding to the main thread

dj Reply
June 8, 2018 at 3:20 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-467449)

hey , how can i make the video fast but not in gray scale , i wan tit colored only

Adrian Rosebrock Reply
June 8, 2018 at 6:48 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-467477)

You can comment out Lines 31 and 32 where the grayscale conversion takes place. From there you will have full color.

Pranav (https://techesoterica.com) Reply
July 5, 2018 at 1:05 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-470136)

Hi Adrian,
I have a bunch of IP cameras. I want to read frames from them and recognize objects in each frame. I have the object recognition working for a single camera's feed. I want to keep capturing the feed from each camera and when I switch to that camera, the recognized objects should be displayed. How should I architect this application? As of this writing, I have the capturing and recognition encapsulated into a single object. I plan to create individual instances of the class for each camera and then read the text that I get out of that class. Each instance will have its own thread. Is there a better way to do this? Do I really need a queue or can I use something else? I want only the current frame and do not need any buffering.
Note:
I have sent you an e-mail with a similar question but I have read some more and have framed my query better.
Note:
I am developing in a virtual machine on which I have installed opencv 3.4.1, python 3.6, tensor flow and keras. I am running this under ubuntu 18.04. The VM runs under the free version of vmware player version 14. My host OS is windows 10 and I have 8GB of ram all total in the host. I had tried doing this on the pi but the object recognition failed because tensor flow ran out of ram. I had tried the raspberry pi specific package so cannot tell what the problem was.

Adrian Rosebrock Reply
July 10, 2018 at 9:02 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-470624)

I'm not sure what you mean by:

"I want to keep capturing the feed from each camera and when I switch to that camera, the recognized objects should be displayed"

Perhaps you could elaborate on this a bit as I'm not understanding.

hasan Reply
July 24, 2018 at 5:04 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-471847)

Hello Dr.!
Thanks for the awsome tutorial. I stuck to a problem.

Is there a way which we can stream video file along with its audio by using opencv ?
Best Regards,

Adrian Rosebrock Reply
July 25, 2018 at 8:06 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-471980)

I don't believe OpenCV supports any audio streaming. You might need to look into a different library or tool for both audio and video.

Amit Nair Reply
August 16, 2018 at 2:41 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-474515)

I am having one issue, I am using VideoStream() to get video from RTMP stream, now in a situation if camera goes down, and then back up, VideoStream is unable to come back up, is there a known solution to how this should be handled.

Adrian Rosebrock Reply
August 17, 2018 at 7:42 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-474657)

Hey Amit, I haven't tried using the VideoStream class to handle RTSP streams. I imagine additional logic will need to added to re-create the stream. I'll try to cover RTSP in a future blog post, but as it stands currently, I do not have a solution off the top of my head. If you end up creating a solution please come back and share it with us ☺

ToughMind Reply
September 10, 2018 at 9:55 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-477362)

Hey Adrian, nice bolg. But after extracting the code zip, I only get two files and a video. There is no file containing class imutils, neither class FileVideoStream nor class FPS. What's the problem?

Adrian Rosebrock Reply
September 11, 2018 at 8:07 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-477467)

You need to install the "imutils" library via pip:

```
$ pip install imutils
```

ToughMind Reply
September 11, 2018 at 9:58 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-477612)

thanks， I will try^_^

ToughMind Reply
September 11, 2018 at 10:09 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-477614)

I want to get some frames from the video, not all of them, like 7 frames. I use the vid.set() and vid.read. I want to speed this up, do you have any advice? Thank you again.

Adrian Rosebrock Reply
September 12, 2018 at 2:08 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-477752)

You can use threading **as I do in this post (https://www.pyimagesearch.com/2016/01/04/unifying-picamera-and-cv2-videocapture-into-a-single-class-with-opencv/)** to help speedup your pipeline.

Adrie Huesman (https://www.bluetin.io/opencv/pi-camera-video-capture-opencv-python/) Reply
September 19, 2018 at 11:31 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-479031)

Hi Adrian, congrats on getting married!

I enjoyed this tutorial very much. It will help me getting the FPS up for a mobile robot running openCV. I noticed you use: python read_frames_fast.py. However for my robot I need super user privileges (for GPIO and/or I2C to control the motors) so sudo python read_frames_fast.py. However in that case the code simply doesn't do anything any more. Any idea why this is so?

BTW I noticed that others (see website below) are using your imutils Python library as well!

Adrian Rosebrock Reply
October 8, 2018 at 1:24 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-481371)

Hey Adrie — could you elaborate more on what you mean by the "code doesn't do anything anymore"? Are you getting an error of some sort?

Ladislav Reply
October 15, 2018 at 7:39 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-482623)

Hi Adrian,
I implemented your fast code into my own solution, which provides an offline motion detection from my IP cameras. In most cases it works fine, it's really faster than my "conventional" code, but sometimes (randomly) it quits after just a few seconds with this error:

Exception in thread Thread-1 (most likely raised during interpreter shutdown):
Traceback (most recent call last):
File "/usr/lib/python2.7/threading.py", line 801, in __bootstrap_inner

When I run it again on the same video file, it goes fine. Am I the only one who's getting this behavior?

Adrian Rosebrock Reply
October 16, 2018 at 8:31 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-482804)

Hey Ladislav — this is the first time I've heard of that error. It's a threading issue of some sort but unfortunately I'm not sure what's causing it.

Ladislav Reply
October 16, 2018 at 9:12 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-482827)

Hi Adrian. I figured it out – It was an "faster consumer / slower producer" issue. After changing the code as suggested by Phil Birch and Sergei, it works like a charm! Thank You! Keep up this awesome work!

Here are my benchmark results (motion detection in 15min. video 1920×1080 @ 8fps from IP cam, CPU: i7-4790 @ 3.6GHz, Ubuntu 16.04):
h264:
original code: 45.55 seconds, threading code: 39.99 seconds
h265:
original code: 58.99 seconds, threading code: 44.69 seconds

Adrian Rosebrock Reply
October 20, 2018 at 8:09 am (https://www.pyimagesearch.com/2017/02/06/faster-video-

file-fps-with-cv2-videocapture-and-opencv/#comment-483334)

Awesome, congratulations on resolving the issue Ladislav!

June **Reply**
March 27, 2019 at 5:04 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-509360)

Hi Ladislav, I am trying to save video in h.265 using Cv2.VideoWriter. May I know how did you get h265 worked? Thanks!

Sudhir **Reply**
October 19, 2018 at 9:53 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-483218)

Hi Adrian, thanks for sharing so much of what you know. I had a question regarding the python VideoCapture API. When I read a udp stream using CAP_FFMPEG backend, the API takes almost 7 to 8 seconds to return! The same API in C++ takes less than 100ms. I was wondering if you had come across this and know what could be the issue here. I am trying this on Ubuntu 16.04, opencv 3.4.3 (also tried 3.4.1), Thanks for any pointers.

Adrian Rosebrock **Reply**
October 20, 2018 at 7:30 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-483295)

Wow, 7-8 seconds? That definitely doesn't seem right. I haven't encountered that behavior before so unfortunately I'm not sure what the problem may be. Best of luck resolving it and if you do find a solution please come back and share it with us so we can all learn ☺

Sudhir **Reply**
October 23, 2018 at 7:25 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-483694)

There was a problem in how my C++ code was counting the time. Both C++ and python code takes 3-7 seconds for VideoCapture. Over udp, FFMPEG needs this time to figure out the format of the stream.

Gaby S **Reply**
December 16, 2018 at 11:25 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-492572)

Hi Adrian, I have a issue, I took your code to use it in a video, and It worked well, the FPS has increased, but now even if I use a new script with any other code like: 'Playing Video from file' example, from docs.opencv.org, withouth your code, the video run faster than I recorded. I dont know how to reproduce the video in a normal speed again :(. I'm using python 3.

Rizwan **Reply**
December 17, 2018 at 7:28 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-492738)

Hello Adrian,
You are always a life Saviour, But this time i am having oppsoite results as slow version is taking less time as compared to faster version.
I am doing some predictions on each video frame using a keras model and the slow version gives me 10fps approx , while faster version is not going above 6.5 fps.

amar **Reply**
December 26, 2018 at 12:15 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-493712)

Hi Adrian,
I need your help. why cv2.VideoCapture having buffer. suppose we want to get latest frame how we can get?

Adrian Rosebrock **Reply**
December 27, 2018 at 10:09 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-493805)

The buffer is used presuming you want to process every single frame inside the video file. Again, keep in mind that we are processing video files in this post but I get the impression you want to be working with video streams instead in which case you should refer to **this guide. (https://www.pyimagesearch.com/2016/01/04/unifying-picamera-and-cv2-videocapture-into-a-single-class-with-opencv/)**

Kaushalya Sandamali **Reply**
February 2, 2019 at 7:31 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-499150)

Hello Adrian,
Thank You Very Much this tutorial. This tutorials is very useful for me.
I have a Questions. can you please tell me why we convert frames into gray scale? what are the advantages of converting to gray.

Adrian Rosebrock **Reply**
February 5, 2019 at 9:36 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-499747)

It sounds like you are new to the world of computer vision and image processing. That's totally okay but I would recommend reading through **Practical Python and OpenCV (https://www.pyimagesearch.com/practical-python-opencv/)** to help you learn the fundamentals first (including when, how, and why to convert to grayscale).

Guru Vishnu **Reply**
February 14, 2019 at 12:10 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-501283)

Hi Adrian,

Good Day!

Can you please let me know, if there is a method to reduce video bitrate using OpenCV Python, to reduce the video stream size, Since I need to stream a live video in a 2G internet Or is there any other better methods available to stream video in a 2G internet

Thanks
Guru

Lemon **Reply**
May 9, 2019 at 11:39 pm (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-516843)

Hello Adrain!
Have you found a python3 solution? I'm particularly confused about this now, dealing with native video is very slow, if you can't do it with threads, are

there other solutions?Thank you very much!

Marco Boarettto Reply
July 11, 2019 at 9:50 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-525340)

Thank you for the awesome, post.

Just letting you guys know that by using deque from collections I got a higher FPS.

Adrian Rosebrock Reply
July 25, 2019 at 10:14 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-527303)

Thanks for sharing, Marco!

Obisandjo Reply
September 3, 2019 at 3:17 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-546584)

could you tell me the differences between cv2.Videocapture with Videostream from imutils? Thank you Adrian

Adrian Rosebrock Reply
September 5, 2019 at 10:26 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-547111)

Sure. Just read **this tutorial. (https://www.pyimagesearch.com/2016/01/04/unifying-picamera-and-cv2-videocapture-into-a-single-class-with-opencv/)**

Muhammad Maaz Reply
December 15, 2019 at 8:46 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-594563)

It seems like the slowness issue with python 3 has been solved in python 3.7.

Adrian Rosebrock Reply
December 15, 2019 at 9:36 am (https://www.pyimagesearch.com/2017/02/06/faster-video-file-fps-with-cv2-videocapture-and-opencv/#comment-594609)

Thanks for sharing, Muhammad!

Before you leave a comment...

Hey, Adrian here, author of the PyImageSearch blog. I'd love to hear from you, but before you submit a comment, **please follow these guidelines:**

- **If you have a question, read the comments first.** You should also search this page (i.e., ctrl + f) for keywords related to your question. It's likely that I have already addressed your question in the comments.
- **If you are copying and pasting code/terminal output, please don't.** Reviewing another programmers' code is a very time consuming and tedious task, and due to the volume of emails and contact requests I receive, I simply cannot do it.
- **Be respectful of the space.** I put a lot of my own personal time into creating these free weekly tutorials. On average, each tutorial takes me 15-20 hours to put together. I love offering these guides to you and I take pride in the content I create. Therefore, I will not approve comments that include large code blocks/terminal output as it destroys the formatting of the page. Kindly be respectful of this space.
- **Be patient**. I receive 200+ comments and emails per day. Due to spam, and my desire to personally answer as many questions as I can, I hand moderate all new comments (typically once per week). I try to answer as many questions as I can, but I'm only one person. Please don't be offended if I cannot get to your question
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Thank you for keeping these guidelines in mind before submitting your comment.

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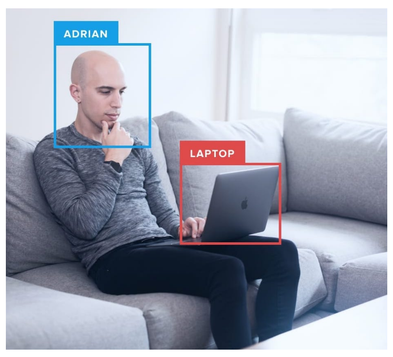

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