Hands-On 3

M. Bintang Erlangga H. (121140171)

Soal 1

Jelaskan maksud dari **list_imgs = sorted(list_imgs, key=lambda x: int(x.split('/')[-1].split('.')[0]))**

Jawaban:

Perintah ini digunakan untuk mengurutkan daftar list_imgs yang berisi path ke gambar-gambar **(misalnya, ['path/to/1.jpg', 'path/to/2.jpg', ...])** berdasarkan nama file gambar dalam urutan numerik.

- **"sorted(list_imgs, ...)"**
  Fungsi sorted() digunakan untuk mengurutkan elemen dalam daftar list_imgs berdasarkan kriteria tertentu. Hasilnya adalah daftar yang sudah diurutkan.
- **"key=lambda x: int(x.split('/')[-1].split('.')[0])"**
  key : Parameter ini menentukan fungsi yang digunakan untuk menentukan urutan elemen dalam daftar.
  lambda x : Fungsi anonim yang menerima satu argumen x, di mana x adalah satu elemen dalam list_imgs (path gambar).
  x.split('/')[-1] : Mengambil bagian terakhir dari path, yaitu nama file gambar (misalnya, 1.jpg).
  .split('.')[0] : Memisahkan nama file berdasarkan titik (.) dan mengambil bagian pertama, yang merupakan angka (misalnya, 1 dari 1.jpg).
  int() : Mengonversi string angka menjadi integer agar dapat diurutkan secara numerik.

Perintah ini memastikan bahwa gambar-gambar diurutkan berdasarkan nomor di nama file secara numerik, bukan secara alfabetis. Dalam contoh di atas, 10.jpg akan berada di akhir jika diurutkan secara alfabetis, tetapi dengan pendekatan ini, 1.jpg, 2.jpg, dan 10.jpg akan diurutkan dalam urutan numerik yang benar.

Soal 2

Jelaskan tentang bagian kode berikut:

fourcc = cv2.VideoWriter_fourcc(*'mp4v')

Apakah ada opsi lain selain **mp4v**? Jika ada, coba gunakan dan jelaskan.

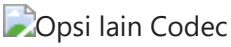
Jawaban:

- **cv2.VideoWriter_fourcc**

Digunakan untuk menentukan codec video yang akan digunakan saat menyimpan video.

- **mp4v**
  Salah satu kode FourCC (Four Character Code) yang digunakan untuk menyimpan video dalam format MP4 dengan codec MPEG-4..

Opsi Codec lain


Opsi lain Codec

Soal 3

Membuat video dengan FPS yang lebih rendah.

- Dengan menggunakan video, simpanlah frame gambar setiap 3 frame. Begini ilustrasinya, jika ada frame 1 s/d 30, maka anda hanya perlu menyimpan frame 1, 4, 7, 10, 13, 16, 19, 22, 25, 28.
- Dengan analogi ini, artinya anda mengurangi FPS-nya. Berapakah FPS yang baru?
- Untuk setiap gambar, convertlah ke dalam format grayscale dan resize menjadi 1280 x 720.
- Untuk setiap gambar, berikanlah titik merah (ukuran bebas, namun terlihat ketika video diputar). Titik tersebut bergerak dari kiri ke kanan untuk setiap frame. Titik tersebut harus sampai di ujung kanan gambar pada frame terakhir. Anda harus melakukan ini secara manual dengan memanipulasi matriks (tidak boleh pakai fungsi / library yang sudah ada)
- Ingat, karena ini titik merah, maka channel warna pada video anda haruslah RGB (walaupun gambarnya telah menjadi grayscale).
- Save video tersebut dengan nama **video_low_fps.mp4**

In [4]:
```python
import cv2
import os

current_dir = os.getcwd()
video_path = os.path.join(current_dir, 'video1.mp4')
output_dir = os.path.join(current_dir, 'frames')

os.makedirs(output_dir, exist_ok=True)

vidcap = cv2.VideoCapture(video_path)
success, image = vidcap.read()
count = 0

while success and count < 100:
    frame_filename = os.path.join(output_dir, f"frame_{count:04d}.jpg")
    cv2.imwrite(frame_filename, image)
    print(f"Frame {count:04d} is saved: {frame_filename}")
    success, image = vidcap.read()
    count += 1

vidcap.release()
print("Selesai menyimpan 100 frame di folder 'frames'.")
```

```
Frame 0000 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0000.jpg
Frame 0001 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0001.jpg
Frame 0002 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0002.jpg
Frame 0003 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0003.jpg
Frame 0004 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0004.jpg
Frame 0005 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0005.jpg
Frame 0006 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0006.jpg
Frame 0007 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0007.jpg
Frame 0008 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0008.jpg
Frame 0009 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0009.jpg
Frame 0010 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0010.jpg
Frame 0011 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0011.jpg
Frame 0012 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0012.jpg
Frame 0013 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0013.jpg
Frame 0014 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0014.jpg
Frame 0015 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0015.jpg
Frame 0016 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0016.jpg
Frame 0017 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0017.jpg
Frame 0018 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0018.jpg
Frame 0019 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0019.jpg
Frame 0020 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0020.jpg
Frame 0021 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0021.jpg
Frame 0022 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0022.jpg
Frame 0023 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0023.jpg
Frame 0024 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0024.jpg
Frame 0025 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0025.jpg
Frame 0026 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0026.jpg
Frame 0027 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0027.jpg
Frame 0028 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0028.jpg
Frame 0029 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0029.jpg
```

```
Frame 0030 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0030.jpg
Frame 0031 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0031.jpg
Frame 0032 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0032.jpg
Frame 0033 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0033.jpg
Frame 0034 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0034.jpg
Frame 0035 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0035.jpg
Frame 0036 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0036.jpg
Frame 0037 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0037.jpg
Frame 0038 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0038.jpg
Frame 0039 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0039.jpg
Frame 0040 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0040.jpg
Frame 0041 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0041.jpg
Frame 0042 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0042.jpg
Frame 0043 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0043.jpg
Frame 0044 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0044.jpg
Frame 0045 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0045.jpg
Frame 0046 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0046.jpg
Frame 0047 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0047.jpg
Frame 0048 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0048.jpg
Frame 0049 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0049.jpg
Frame 0050 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0050.jpg
Frame 0051 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0051.jpg
Frame 0052 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0052.jpg
Frame 0053 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0053.jpg
Frame 0054 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0054.jpg
Frame 0055 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0055.jpg
Frame 0056 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0056.jpg
Frame 0057 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0057.jpg
Frame 0058 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0058.jpg
Frame 0059 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0059.jpg
```

```
Frame 0060 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0060.jpg
Frame 0061 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0061.jpg
Frame 0062 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0062.jpg
Frame 0063 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0063.jpg
Frame 0064 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0064.jpg
Frame 0065 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0065.jpg
Frame 0066 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0066.jpg
Frame 0067 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0067.jpg
Frame 0068 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0068.jpg
Frame 0069 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0069.jpg
Frame 0070 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0070.jpg
Frame 0071 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0071.jpg
Frame 0072 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0072.jpg
Frame 0073 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0073.jpg
Frame 0074 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0074.jpg
Frame 0075 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0075.jpg
Frame 0076 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0076.jpg
Frame 0077 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0077.jpg
Frame 0078 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0078.jpg
Frame 0079 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0079.jpg
Frame 0080 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0080.jpg
Frame 0081 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0081.jpg
Frame 0082 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0082.jpg
Frame 0083 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0083.jpg
Frame 0084 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0084.jpg
Frame 0085 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0085.jpg
Frame 0086 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0086.jpg
Frame 0087 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0087.jpg
Frame 0088 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0088.jpg
Frame 0089 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0089.jpg
```

```
Frame 0090 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0090.jpg
Frame 0091 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0091.jpg
Frame 0092 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0092.jpg
Frame 0093 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0093.jpg
Frame 0094 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0094.jpg
Frame 0095 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0095.jpg
Frame 0096 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0096.jpg
Frame 0097 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0097.jpg
Frame 0098 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0098.jpg
Frame 0099 is saved: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\frames\fr
ame_0099.jpg
Selesai menyimpan 100 frame di folder 'frames'.
```

In [5]:

```python
import cv2
import os
import numpy as np

# Lokasi video input
video_input_path = os.path.join(os.getcwd(), 'video1.mp4')

# Inisialisasi daftar untuk menyimpan frame
processed_frames = []

# Pastikan file input adalah video
if os.path.isfile(video_input_path) and video_input_path.lower().endswith(('.mp4
    video_capture = cv2.VideoCapture(video_input_path)
    original_fps = video_capture.get(cv2.CAP_PROP_FPS)

    success, frame = video_capture.read()
    total_frames = 0

    while success:
        if total_frames % 3 == 0:  # Simpan setiap 3 frame
            # Konversi ke grayscale
            grayscale_frame = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)

            # Resize ke 1280x720
            resized_frame = cv2.resize(grayscale_frame, (1280, 720))

            # Ubah ke RGB untuk menambahkan titik merah
            rgb_frame = cv2.cvtColor(resized_frame, cv2.COLOR_GRAY2BGR)

            # Hitung posisi titik merah (bergerak dari kiri ke kanan)
            x_position = int(total_frames // 3 * (1280 / (30 if 30 > 0 else 1)))

            # Tambahkan titik merah (kanal warna)
            if 0 <= x_position < 1280 and 0 <= 360 < 720:
                rgb_frame[360, x_position, 0] = 0   # Kanal Biru
                rgb_frame[360, x_position, 1] = 0   # Kanal Hijau
                rgb_frame[360, x_position, 2] = 255 # Kanal Merah
```

```
            # Tambahkan frame yang telah diproses ke dalam list
            processed_frames.append(rgb_frame)

        # Baca frame berikutnya
        success, frame = video_capture.read()
        total_frames += 1

    # Ubah daftar menjadi array NumPy setelah selesai diproses
    processed_frames = np.array(processed_frames)

# Cetak informasi akhir
print(f"Total frame yang diproses: {len(processed_frames)}")
```

```
Total frame yang diproses: 606
```

In [6]:

```
# Menghitung FPS baru
fps_reduced = original_fps / 3

# Lokasi penyimpanan video hasil
output_video_path = os.path.join(os.getcwd(), 'video_low_fps.mp4')

# Membuat video dengan FPS baru
codec_fourcc = cv2.VideoWriter_fourcc(*'mp4v')
if len(processed_frames) > 0:  # Pastikan ada frame yang diproses
    frame_height, frame_width, frame_channels = processed_frames[0].shape
    video_writer = cv2.VideoWriter(output_video_path, codec_fourcc, fps_reduced,

    # Tulis frame yang telah diproses ke dalam video
    for frame in processed_frames:
        video_writer.write(frame)

    # Selesai menulis video
    video_writer.release()
    print(f"Video berhasil disimpan di: {output_video_path}")
else:
    print("Tidak ada frame yang tersedia untuk disimpan. processed_frames kosong

# Cetak FPS baru
print(f"FPS baru: {fps_reduced}")
```

```
Video berhasil disimpan di: C:\Users\Bintang\Documents\ITERA\IF4021\Hands-On 3\vi
deo_low_fps.mp4
FPS baru: 9.924003410009982
```

Catatan: Untuk nomor 4-6 ada di 121140171_ho3_4-6.ipynb

Sumber: https://chatgpt.com/share/6749dda6-ae20-8009-afa8-396d1d16b280