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25MML0027

Video processing Lab

```
import cv2
import numpy as np
import tensorflow as tf
from tensorflow.keras.applications import MobileNetV2
import matplotlib.pyplot as plt
from tensorflow.keras.applications.mobilenet_v2 import preprocess_input,
decode_predictions

# Load pretrained MobileNetV2
model = MobileNetV2(weights='imagenet')

import cv2
import numpy as np

def extract_frames(video_path, max_frames=20):
    cap = cv2.VideoCapture(video_path)

    if not cap.isOpened():
        print("Error: Cannot open video")
        return np.array([])

    frames = []
    total_frames = int(cap.get(cv2.CAP_PROP_FRAME_COUNT))

    # Handle videos where frame count is 0
    if total_frames > 0:
        step = max(1, total_frames // max_frames)
    else:
        step = 1

    count = 0

    while True:
        ret, frame = cap.read()
        if not ret:
            break

        if count % step == 0:
            frame = cv2.resize(frame, (224, 224))
            frame = cv2.cvtColor(frame, cv2.COLOR_BGR2RGB) # ⚡ Important fix
            frames.append(frame)
```

```

count += 1

if len(frames) >= max_frames:
    break

cap.release()
print("Extracted frames:", len(frames))
return np.array(frames)

def classify_video(video_path):
    frames = extract_frames(video_path)

    if len(frames) == 0:
        print("No frames extracted!")
        return
    print("Frames shape:", frames.shape)
    if len(frames) == 0:
        print("No frames extracted!")
        return

    print("Frames shape:", frames.shape)

    for i in range(len(frames)):
        print("\n====")
        print("Frame Index:", i)
        print("Pixel Matrix:\n")
        print(frames[i])    # Full 224x224x3 matrix

        # Display image
        plt.imshow(frames[i])
        plt.title(f"Frame {i}")
        plt.axis("off")
        plt.show()

    frames = preprocess_input(frames)
    predictions = model.predict(frames)

    # Average predictions across frames
    avg_pred = np.mean(predictions, axis=0)
    #top_pred = decode_predictions(np.expand_dims(avg_pred, axis=0), top=1)

    top_pred = decode_predictions(np.expand_dims(avg_pred, axis=0), top=5)

    for pred in top_pred[0]:
        print(pred[1], ":", round(pred[2]*100, 2), "%")

```

```
print("Final Prediction:", top_pred[0][0][1])

# Replace with your video path
video_path = "real_world_demo_video.mp4"
classify_video(video_path)

Extracted frames: 20
Frames shape: (20, 224, 224, 3)
Frames shape: (20, 224, 224, 3)

=====
Frame Index: 0
Pixel Matrix:

[[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]

 [[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]

 [[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]

 ...
 [[46 48 45]
 [46 48 45]
 [46 48 45]
 ...
 [46 48 45]
 [46 48 45]
 [46 48 45]]]
```

```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
```

```
...
```

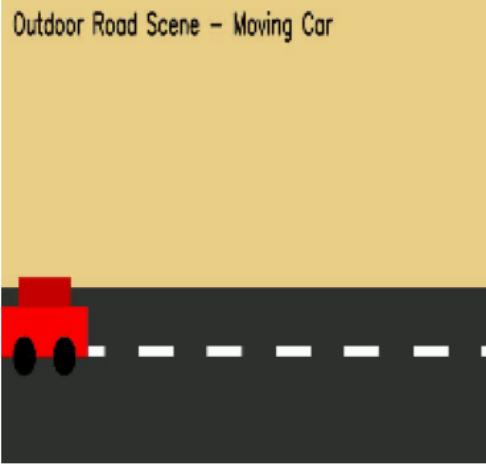
```
[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]
```

```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
```

```
...
```

```
[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]]
```

Frame 0



```
=====
```

Frame Index: 1

Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
```

```
...
```

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

```
...
```

```
[233 206 133]
 [233 206 133]
```

```
[233 206 133]]
```

```
[[233 206 133]  
[233 206 133]  
[233 206 133]
```

```
...
```

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
...
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

```
...
```

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

```
...
```

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

```
...
```

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]]
```

Frame 1

Outdoor Road Scene - Moving Car



=====

Frame Index: 2

Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
[233 206 133]
[233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
[233 206 133]
[233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
[233 206 133]
[233 206 133]]
```

...

```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...
 [ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]
```

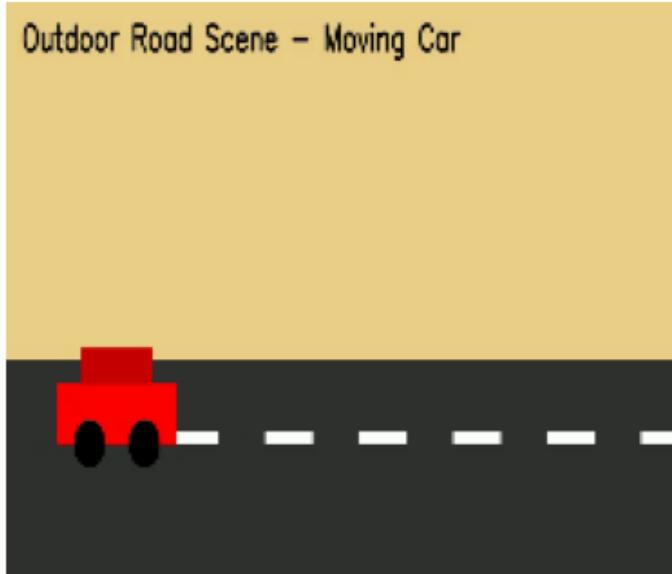


```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...
 [ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]
```



```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...
 [ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]]
```

Frame 2



=====

Frame Index: 3

Pixel Matrix:

```
[[[233 206 133]
[233 206 133]
[233 206 133]
```

```
...
```

```
[233 206 133]
[233 206 133]
[233 206 133]]
```

```
[[233 206 133]
[233 206 133]
[233 206 133]
```

```
...
```

```
[233 206 133]
[233 206 133]
[233 206 133]]
```

```
[[233 206 133]
[233 206 133]
[233 206 133]
```

```
...
```

```
[233 206 133]
[233 206 133]
[233 206 133]]
```

```
...
```

```
[[ 46 48 45]
[ 46 48 45]
[ 46 48 45]
```

```
...
```

```
[ 46 48 45]
[ 46 48 45]
[ 46 48 45]]
```

```
[[ 46 48 45]
[ 46 48 45]
[ 46 48 45]
```

```
...
```

```
[ 46 48 45]
[ 46 48 45]
[ 46 48 45]]
```

```
[[ 46 48 45]
[ 46 48 45]
[ 46 48 45]
```

```
...
```

```
[ 46 48 45]
[ 46 48 45]
[ 46 48 45]]]]
```

Frame 3

Outdoor Road Scene - Moving Car



=====

Frame Index: 4

Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]]
```

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]]
```

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]]
```

...

```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...
 [ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]
```



```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...
 [ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]
```



```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...
 [ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]]
```

Frame 4



=====

Frame Index: 5
Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]]]
```

...
[233 206 133]
[233 206 133]
[233 206 133]]

[[233 206 133]
[233 206 133]
[233 206 133]

...
[233 206 133]
[233 206 133]
[233 206 133]]

[[233 206 133]
[233 206 133]
[233 206 133]

...
[233 206 133]
[233 206 133]
[233 206 133]]

...

[[46 48 45]
[46 48 45]
[46 48 45]

...
[46 48 45]
[46 48 45]
[46 48 45]]

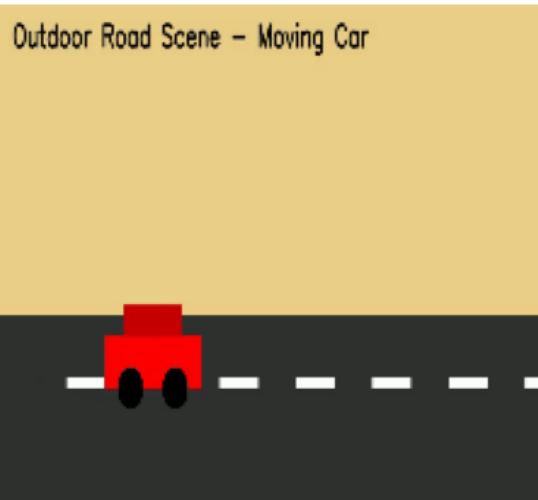
[[46 48 45]
[46 48 45]
[46 48 45]

...
[46 48 45]
[46 48 45]
[46 48 45]]

[[46 48 45]
[46 48 45]
[46 48 45]

...
[46 48 45]
[46 48 45]
[46 48 45]]]

Frame 5



=====

Frame Index: 6

Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]]
```

...

```
[[ 46  48  45]
 [ 46  48  45]]
```

```
[ 46 48 45]  
...  
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]  
  
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]  
...  
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]  
  
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]  
...  
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]
```

Frame 6



=====

Frame Index: 7
Pixel Matrix:

```
[[[233 206 133]  
[233 206 133]  
[233 206 133]  
...  
[233 206 133]  
[233 206 133]  
[233 206 133]]]
```

```
[[233 206 133]  
[233 206 133]  
[233 206 133]
```

...

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
[[233 206 133]  
[233 206 133]  
[233 206 133]
```

...

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

...

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]]
```

Frame 7



=====

Frame Index: 8

Pixel Matrix:

```
[[[233 206 133]
  [233 206 133]
  [233 206 133]
```

...

```
[233 206 133]
[233 206 133]
[233 206 133]]
```

```
[[233 206 133]
  [233 206 133]
  [233 206 133]
```

...

```
[233 206 133]
[233 206 133]
[233 206 133]]
```

```
[[233 206 133]
  [233 206 133]
  [233 206 133]
```

...

```
[233 206 133]
[233 206 133]
[233 206 133]]
```

...

```
[[ 46  48  45]
  [ 46  48  45]
  [ 46  48  45]]
```

```
[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]]
```

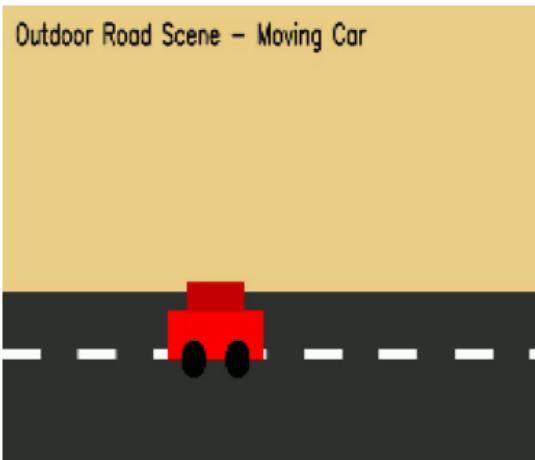
```
[[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]]
```

```
...  
[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]]
```

```
[[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]]
```

```
...  
[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]]]
```

Frame 8



=====

Frame Index: 9

Pixel Matrix:

```
[[[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
...  
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
[[233 206 133]  
[233 206 133]  
[233 206 133]
```

...

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
[[233 206 133]  
[233 206 133]  
[233 206 133]
```

...

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

...

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]]
```

Frame 9



=====

Frame Index: 10

Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

...

```
[[ 46  48  45]
```

```
[ 46  48  45]  
[ 46  48  45]  
...  
[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]]  
  
[[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]  
...  
[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]]]  
  
[[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]  
...  
[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]]]
```

Frame 10



=====

Frame Index: 11

Pixel Matrix:

```
[[[233 206 133]  
[233 206 133]  
[233 206 133]  
...  
[233 206 133]  
[233 206 133]]]
```

```
[233 206 133]]
```

```
[[233 206 133]  
[233 206 133]  
[233 206 133]
```

```
...
```

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
[[233 206 133]  
[233 206 133]  
[233 206 133]
```

```
...
```

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
...
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

```
...
```

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

```
...
```

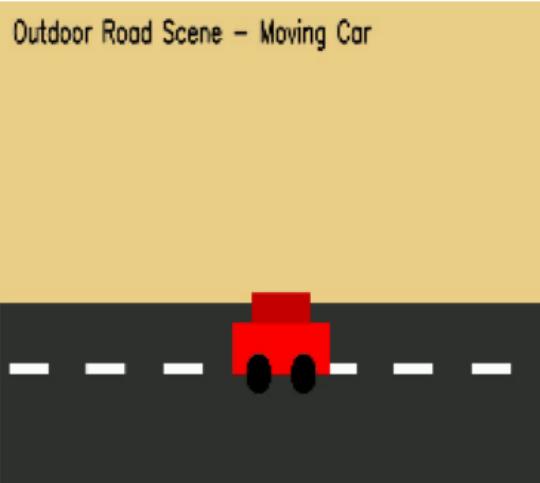
```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

```
...
```

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]]
```

Frame 11



=====

Frame Index: 12

Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]]
```

...

```
[[ 46  48  45]
 [ 46  48  45]]
```

```
[ 46 48 45]  
...  
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]  
  
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]  
...  
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]  
  
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]  
...  
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]
```

Frame 12



=====

Frame Index: 13
Pixel Matrix:

```
[[[233 206 133]  
[233 206 133]  
[233 206 133]]]
```

...
[233 206 133]
[233 206 133]
[233 206 133]]

[[233 206 133]
[233 206 133]
[233 206 133]

...
[233 206 133]
[233 206 133]
[233 206 133]]

[[233 206 133]
[233 206 133]
[233 206 133]

...
[233 206 133]
[233 206 133]
[233 206 133]]

...

[[46 48 45]
[46 48 45]
[46 48 45]

...
[46 48 45]
[46 48 45]
[46 48 45]]

[[46 48 45]
[46 48 45]
[46 48 45]

...
[46 48 45]
[46 48 45]
[46 48 45]]

[[46 48 45]
[46 48 45]
[46 48 45]

...
[46 48 45]
[46 48 45]
[46 48 45]]]

Frame 13

Outdoor Road Scene - Moving Car



=====

Frame Index: 14

Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
```

```
[233 206 133]  
[233 206 133]]
```

...

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]
```

Frame 14

Outdoor Road Scene - Moving Car



=====

Frame Index: 15

Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]]
```

```
[233 206 133]  
[233 206 133]]
```

...

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]
```

Frame 15

Outdoor Road Scene - Moving Car



=====

Frame Index: 16

Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
```

```
[233 206 133]  
[233 206 133]]
```

...

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]
```

Frame 16

Outdoor Road Scene - Moving Car



=====

Frame Index: 17

Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
```

```
[233 206 133]  
[233 206 133]]
```

...

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]
```

Frame 17

Outdoor Road Scene - Moving Car



=====

Frame Index: 18

Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
```

```
[233 206 133]  
[233 206 133]]
```

...

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

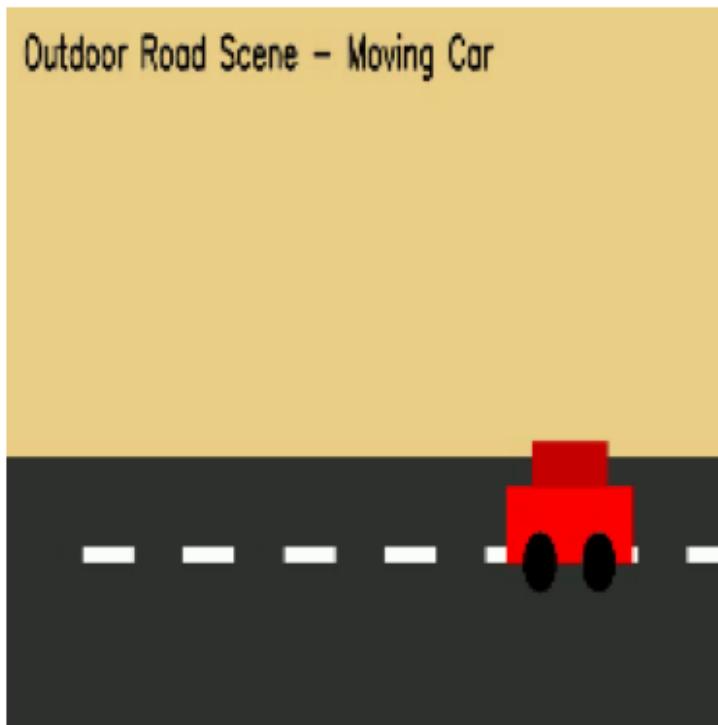
```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]
```

Frame 18

Outdoor Road Scene - Moving Car



=====

Frame Index: 19

Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
```

```
[233 206 133]  
[233 206 133]]
```

...

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]
```

Frame 19



```
=====
```

```
Frame Index: 20
```

```
Pixel Matrix:
```

```
-----  
IndexError                                     Traceback (most recent call last)  
/tmp/ipython-input-2003751610.py in <cell line: 0>()  
    93 # Replace with your video path  
    94 video_path = "real_world_demo_video.mp4"  
--> 95 classify_video(video_path)
```

```
/tmp/ipython-input-2003751610.py in classify_video(video_path)  
    68     print("Frame Index:", i)  
    69     print("Pixel Matrix:\n")  
--> 70     print(frames[i])    # Full 224x224x3 matrix  
    71  
    72     # Display image
```

```
IndexError: index 20 is out of bounds for axis 0 with size 20
```

```
import cv2
import numpy as np
import tensorflow as tf
import matplotlib.pyplot as plt
import math
from tensorflow.keras.applications import MobileNetV2
from tensorflow.keras.applications.mobilenet_v2 import preprocess_input,
decode_predictions

model = MobileNetV2(weights='imagenet')

def extract_frames(video_path, max_frames=20):
    cap = cv2.VideoCapture(video_path)

    if not cap.isOpened():
        print("Error: Cannot open video")
        return np.array([])

    frames = []
    total_frames = int(cap.get(cv2.CAP_PROP_FRAME_COUNT))

    if total_frames > 0:
        step = max(1, total_frames // max_frames)
    else:
        step = 1

    count = 0

    while True:
        ret, frame = cap.read()
        if not ret:
            break

        if count % step == 0:
            frame = cv2.resize(frame, (224, 224))
            frame = cv2.cvtColor(frame, cv2.COLOR_BGR2RGB)
            frames.append(frame)

        count += 1

        if len(frames) >= max_frames:
            break

    cap.release()
    print("Extracted frames:", len(frames))
    return np.array(frames)
```

```

def show_frames_grid(frames, cols=5):
    num_frames = len(frames)
    if num_frames == 0:
        print("No frames to display.")
        return

    rows = math.ceil(num_frames / cols)

    plt.figure(figsize=(4 * cols, 3 * rows))

    for i in range(num_frames):
        plt.subplot(rows, cols, i + 1)
        plt.imshow(frames[i])
        plt.title(f"Frame {i}")
        plt.axis("off")

    plt.tight_layout()
    plt.show()

def classify_video(video_path, max_frames=20, grid_cols=5,
print_pixel_matrices=False):
    frames = extract_frames(video_path, max_frames=max_frames)

    if len(frames) == 0:
        print("No frames extracted!")
        return

    print("Frames shape:", frames.shape)

    if print_pixel_matrices:
        for i in range(len(frames)):
            print("\n====")
            print("Frame Index:", i)
            print("Pixel Matrix:\n")
            print(frames[i])

    show_frames_grid(frames, cols=grid_cols)

    frames_pre = preprocess_input(frames.astype(np.float32))
    predictions = model.predict(frames_pre, verbose=0)

    avg_pred = np.mean(predictions, axis=0)
    top_pred = decode_predictions(np.expand_dims(avg_pred, axis=0), top=5)

    print("\nTop-5 Predictions (avg over frames):")

```

```
for pred in top_pred[0]:
    print(pred[1], ":", round(pred[2] * 100, 2), "%")

print("\nFinal Prediction:", top_pred[0][0][1])

video_path = "real_world_demo_video.mp4"
classify_video(
    video_path,
    max_frames=20,
    grid_cols=0,
    print_pixel_matrices=False
)

Extracted frames: 20
Frames shape: (20, 224, 224, 3)

-----
ZeroDivisionError                                     Traceback (most recent call last)
/tmp/ipython-input-103609295.py in <cell line: 0>()
      99
     100 video_path = "real_world_demo_video.mp4"
--> 101 classify_video(
     102     video_path,
     103     max_frames=20,

/tmp/ipython-input-103609295.py in classify_video(video_path, max_frames,
grid_cols, print_pixel_matrices)
     83         print(frames[i])
     84
--> 85     show_frames_grid(frames, cols=grid_cols)
     86
     87     frames_pre = preprocess_input(frames.astype(np.float32))

/tmp/ipython-input-103609295.py in show_frames_grid(frames, cols)
     53         return
     54
--> 55     rows = math.ceil(num_frames / cols)
     56
     57     plt.figure(figsize=(4 * cols, 3 * rows))

ZeroDivisionError: division by zero
```

Errors solved

```
import cv2
import numpy as np
import tensorflow as tf
import matplotlib.pyplot as plt
import math
from tensorflow.keras.applications import MobileNetV2
from tensorflow.keras.applications.mobilenet_v2 import preprocess_input,
decode_predictions

# Loading pretrained MobileNetV2
# This loads MobileNetV2 trained on ImageNet (1000 classes).
# So it can predict common object categories like "dog", "car", "laptop", etc.

model = MobileNetV2(weights='imagenet')

def extract_frames(video_path, max_frames=20):
    cap = cv2.VideoCapture(video_path)

    if not cap.isOpened():
        print("Error: Cannot open video")
        return np.array([])

    frames = []
    total_frames = int(cap.get(cv2.CAP_PROP_FRAME_COUNT))

    # If total_frames is known and > 0:
    # step decides how frequently to sample frames so we don't take every
    single frame.
    # Example: If total_frames=200 and max_frames=20, step=10 => take every
    10th frame.
    #
    # If total_frames is 0 (some videos return 0 for CAP_PROP_FRAME_COUNT):
    # we fall back to step=1 (try reading sequentially).
    if total_frames > 0:
        step = max(1, total_frames // max_frames)
    else:
        step = 1 # putting step=1 ensures we can still extract frames even if
frame count is unknown

    count = 0

    while True:
        ret, frame = cap.read()
        if not ret:
            break
```

```

    if count % step == 0:
        frame = cv2.resize(frame, (224, 224))
        frame = cv2.cvtColor(frame, cv2.COLOR_BGR2RGB) # BGR -> RGB
        frames.append(frame)

    count += 1

    if len(frames) >= max_frames:
        break

cap.release()
print("Extracted frames:", len(frames))
return np.array(frames)

def show_frames_grid(frames, cols=5):
    """Display frames together in a single figure as a grid."""
    num_frames = len(frames)
    if num_frames == 0:
        print("No frames to display.")
        return

    rows = math.ceil(num_frames / cols)

    plt.figure(figsize=(4 * cols, 3 * rows))

    for i in range(num_frames):
        plt.subplot(rows, cols, i + 1)
        plt.imshow(frames[i])
        plt.title(f"Frame {i}")
        plt.axis("off")

    plt.tight_layout()
    plt.show()

def classify_video(video_path, max_frames=20, grid_cols=5,
print_pixel_matrices=False): #corrected the error with frames=5
    frames = extract_frames(video_path, max_frames=max_frames)

    if len(frames) == 0:
        print("No frames extracted!")
        return

    print("Frames shape:", frames.shape)

    # Printing pixel matrices
    if print_pixel_matrices:
        for i in range(len(frames)):

```

```

print("\n====")
print("Frame Index:", i)
print("Pixel Matrix:\n")
print(frames[i])

# Showing all frames together instead of one-by-one
show_frames_grid(frames, cols=grid_cols)

# Preprocess + predict
frames_pre = preprocess_input(frames.astype(np.float32))
predictions = model.predict(frames_pre, verbose=0)

# Average predictions across frames
avg_pred = np.mean(predictions, axis=0)

# Decode top-5
top_pred = decode_predictions(np.expand_dims(avg_pred, axis=0), top=5)

print("\nTop-5 Predictions (avg over frames):")
for pred in top_pred[0]:
    print(pred[1], ":", round(pred[2] * 100, 2), "%")

print("\nFinal Prediction:", top_pred[0][0][1])

video_path = "real_world_demo_video.mp4"
classify_video(
    video_path,
    max_frames=20,           # how many frames to sample
    grid_cols=5,             # how many columns in the grid display
    print_pixel_matrices=True # set True ONLY if you really want to print
    matrices
)
Extracted frames: 20
Frames shape: (20, 224, 224, 3)

=====
Frame Index: 0
Pixel Matrix:

[[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]

 [[233 206 133]]
```

```
[233 206 133]  
[233 206 133]
```

...

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
[[233 206 133]  
[233 206 133]  
[233 206 133]]
```

...

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

...

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

...

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]]
```

=====

Frame Index: 1

Pixel Matrix:

```
[[[233 206 133]  
[233 206 133]  
[233 206 133]]
```

...

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
[[233 206 133]  
[233 206 133]  
[233 206 133]  
...  
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
[[233 206 133]  
[233 206 133]  
[233 206 133]  
...  
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
...
```

```
[[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]  
...  
[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]]
```

```
[[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]  
...  
[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]]
```

```
[[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]  
...  
[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]]]
```

```
=====
```

```
Frame Index: 2
```

```
Pixel Matrix:
```

```
[[[233 206 133]
[233 206 133]
[233 206 133]
```

```
...
```

```
[233 206 133]
[233 206 133]
[233 206 133]]
```

```
[[233 206 133]
[233 206 133]
[233 206 133]
```

```
...
```

```
[233 206 133]
[233 206 133]
[233 206 133]]
```

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[[233 206 133]
[233 206 133]
[233 206 133]
```

```
...
```

```
[233 206 133]
[233 206 133]
[233 206 133]]
```

```
...
```

```
[[ 46 48 45]
[ 46 48 45]
[ 46 48 45]
```

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...
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[ 46 48 45]
[ 46 48 45]
[ 46 48 45]]
```

```
[[ 46 48 45]
[ 46 48 45]
[ 46 48 45]
```

```
...
```

```
[ 46 48 45]
[ 46 48 45]
[ 46 48 45]]
```

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[[ 46 48 45]
[ 46 48 45]
[ 46 48 45]
```

```
...
```

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[ 46 48 45]
[ 46 48 45]
```

```
[ 46 48 45]]]
```

```
=====
```

```
Frame Index: 3
```

```
Pixel Matrix:
```

```
[[[233 206 133]
```

```
[233 206 133]
```

```
[233 206 133]
```

```
...
```

```
[233 206 133]
```

```
[233 206 133]
```

```
[233 206 133]]
```

```
[[233 206 133]
```

```
[233 206 133]
```

```
[233 206 133]
```

```
...
```

```
[233 206 133]
```

```
[233 206 133]
```

```
[233 206 133]]
```

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[[233 206 133]
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[233 206 133]
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[233 206 133]
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```
...
```

```
[233 206 133]
```

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[233 206 133]
```

```
[233 206 133]]
```

```
...
```

```
[[ 46 48 45]
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[ 46 48 45]
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[ 46 48 45]
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...
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[ 46 48 45]
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[ 46 48 45]
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[ 46 48 45]]
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[[ 46 48 45]
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[ 46 48 45]
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[ 46 48 45]
```

```
...
```

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[ 46 48 45]
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[ 46 48 45]
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[ 46 48 45]]
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[[ 46 48 45]
```

```
[ 46  48  45]
[ 46  48  45]
...
[ 46  48  45]
[ 46  48  45]
[ 46  48  45]]]

=====
Frame Index: 4
Pixel Matrix:

[[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]

[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]

[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]

[...  

[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...
 [ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]

[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...

```

```
[ 46  48  45]
[ 46  48  45]
[ 46  48  45]]
```



```
[ [ 46  48  45]
[ 46  48  45]
[ 46  48  45]
...
[ 46  48  45]
[ 46  48  45]
[ 46  48  45]]]
```



```
=====
Frame Index: 5
Pixel Matrix:
```



```
[[[233 206 133]
[233 206 133]
[233 206 133]
...
[233 206 133]
[233 206 133]
[233 206 133]]]
```



```
[ [233 206 133]
[233 206 133]
[233 206 133]
...
[233 206 133]
[233 206 133]
[233 206 133]]]
```



```
[ [233 206 133]
[233 206 133]
[233 206 133]
...
[233 206 133]
[233 206 133]
[233 206 133]]]
```



```
...
```



```
[ [ 46  48  45]
[ 46  48  45]
[ 46  48  45]
...
[ 46  48  45]
[ 46  48  45]
[ 46  48  45]]]
```

```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
```

```
...
```

```
[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]
```

```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
```

```
...
```

```
[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]]
```

```
=====
```

```
Frame Index: 6
```

```
Pixel Matrix:
```

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
...
```

```
[[ 46  48  45]
 [ 46  48  45]
```

```
[ 46 48 45]  
...  
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

```
...  
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

```
...  
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]
```

```
=====
```

Frame Index: 7

Pixel Matrix:

```
[[[233 206 133]  
[233 206 133]  
[233 206 133]
```

```
...  
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
[[233 206 133]  
[233 206 133]  
[233 206 133]
```

```
...  
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
[[233 206 133]  
[233 206 133]  
[233 206 133]
```

```
...  
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
...
[[ 46  48  45]
[ 46  48  45]
[ 46  48  45]
...
[[ 46  48  45]
[ 46  48  45]
[ 46  48  45]]
[[ 46  48  45]
[ 46  48  45]
[ 46  48  45]
...
[[ 46  48  45]
[ 46  48  45]
[ 46  48  45]]
[[ 46  48  45]
[ 46  48  45]
[ 46  48  45]
...
[[ 46  48  45]
[ 46  48  45]
[ 46  48  45]]]
```

```
=====
```

```
Frame Index: 8
```

```
Pixel Matrix:
```

```
[[[233 206 133]
[233 206 133]
[233 206 133]
...
[233 206 133]
[233 206 133]
[233 206 133]]
[[233 206 133]
[233 206 133]
[233 206 133]
...
[233 206 133]
[233 206 133]
[233 206 133]]
[[233 206 133]
[233 206 133]]
```

```
[233 206 133]
```

```
...
```

```
[233 206 133]
```

```
[233 206 133]
```

```
[233 206 133]]
```

```
...
```

```
[[ 46  48  45]
```

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[ 46  48  45]
```

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[ 46  48  45]
```

```
...
```

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[ 46  48  45]
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[ 46  48  45]
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[ 46  48  45]]
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[[ 46  48  45]
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[ 46  48  45]
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[ 46  48  45]
```

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...
```

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[ 46  48  45]
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[ 46  48  45]
```

```
[ 46  48  45]]
```

```
[[ 46  48  45]
```

```
[ 46  48  45]
```

```
[ 46  48  45]
```

```
...
```

```
[ 46  48  45]
```

```
[ 46  48  45]
```

```
[ 46  48  45]]]]
```

```
=====
```

```
Frame Index: 9
```

```
Pixel Matrix:
```

```
[[[233 206 133]
```

```
[233 206 133]
```

```
[233 206 133]
```

```
...
```

```
[233 206 133]
```

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[233 206 133]
```

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[233 206 133]]
```

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[[233 206 133]
```

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[233 206 133]
```

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[233 206 133]
```

```
...
```

```
[233 206 133]
```

```
[233 206 133]  
[233 206 133]]
```

```
[[233 206 133]  
[233 206 133]  
[233 206 133]
```

```
...
```

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
...
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

```
...
```

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

```
...
```

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]
```

```
...
```

```
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]
```

```
=====
```

```
Frame Index: 10  
Pixel Matrix:
```

```
[[[233 206 133]  
[233 206 133]  
[233 206 133]
```

```
...
```

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

...

```
[[ 46 48 45]
 [ 46 48 45]
 [ 46 48 45]
```

...

```
[ 46 48 45]
 [ 46 48 45]
 [ 46 48 45]]
```

```
[[ 46 48 45]
 [ 46 48 45]
 [ 46 48 45]
```

...

```
[ 46 48 45]
 [ 46 48 45]
 [ 46 48 45]]
```

```
[[ 46 48 45]
 [ 46 48 45]
 [ 46 48 45]
```

...

```
[ 46 48 45]
 [ 46 48 45]
 [ 46 48 45]]]
```

=====

Frame Index: 11
Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
```

...
[233 206 133]
[233 206 133]
[233 206 133]]

[[233 206 133]
[233 206 133]
[233 206 133]

...
[233 206 133]
[233 206 133]
[233 206 133]]

[[233 206 133]
[233 206 133]
[233 206 133]

...
[233 206 133]
[233 206 133]
[233 206 133]]

...

[[46 48 45]
[46 48 45]
[46 48 45]

...
[46 48 45]
[46 48 45]
[46 48 45]]

[[46 48 45]
[46 48 45]
[46 48 45]

...
[46 48 45]
[46 48 45]
[46 48 45]]

[[46 48 45]
[46 48 45]
[46 48 45]

...
[46 48 45]
[46 48 45]
[46 48 45]]]

=====

Frame Index: 12

Pixel Matrix:

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]
```

...

```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...
 [ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]
```

```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...
 [ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]
```

```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...
 [ 46  48  45]]
```

```
[ 46  48  45]
[ 46  48  45]]]
```

```
=====
```

```
Frame Index: 13
```

```
Pixel Matrix:
```

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
```

```
...
```

```
 [233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

```
...
```

```
 [233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

```
...
```

```
 [233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
...
```

```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
```

```
...
```

```
 [ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]
```

```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
```

```
...
```

```
 [ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]
```

```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...
 [ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]]
```

```
=====
```

```
Frame Index: 14
```

```
Pixel Matrix:
```

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
 [233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
...
```

```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...
 [ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]
```

```
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]
```

```
...
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]]

[[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]]]]
```

=====

```
Frame Index: 15
Pixel Matrix:
```

```
[[[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
[[233 206 133]
 [233 206 133]
 [233 206 133]]]

[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
[[233 206 133]
 [233 206 133]
 [233 206 133]]]

[[233 206 133]
 [233 206 133]
 [233 206 133]
 ...
[[233 206 133]
 [233 206 133]
 [233 206 133]]]

...
[[ 46  48  45]
 [ 46  48  45]
 [ 46  48  45]
 ...
[[ 46  48  45]
 [ 46  48  45]
```

```
[ 46 48 45]]
```

```
[[ 46 48 45]
 [ 46 48 45]
 [ 46 48 45]
```

```
...
```

```
[ 46 48 45]
 [ 46 48 45]
 [ 46 48 45]]
```

```
[[ 46 48 45]
 [ 46 48 45]
 [ 46 48 45]
```

```
...
```

```
[ 46 48 45]
 [ 46 48 45]
 [ 46 48 45]]]
```

```
=====
```

```
Frame Index: 16
```

```
Pixel Matrix:
```

```
[[[233 206 133]
 [233 206 133]
 [233 206 133]
```

```
...
```

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

```
...
```

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
[[233 206 133]
 [233 206 133]
 [233 206 133]
```

```
...
```

```
[233 206 133]
 [233 206 133]
 [233 206 133]]
```

```
...
```

```
[[ 46 48 45]
```

```
[ 46  48  45]
[ 46  48  45]
...
[ 46  48  45]
[ 46  48  45]
[ 46  48  45]]
```



```
[[ 46  48  45]
[ 46  48  45]
[ 46  48  45]
...
[ 46  48  45]
[ 46  48  45]
[ 46  48  45]]]
```



```
[[ 46  48  45]
[ 46  48  45]
[ 46  48  45]
...
[ 46  48  45]
[ 46  48  45]
[ 46  48  45]]]
```

=====

Frame Index: 17
Pixel Matrix:

```
[[[233 206 133]
[233 206 133]
[233 206 133]
...
[233 206 133]
[233 206 133]
[233 206 133]]]
```

```
[[233 206 133]
[233 206 133]
[233 206 133]
...
[233 206 133]
[233 206 133]
[233 206 133]]]
```

```
[[233 206 133]
[233 206 133]
[233 206 133]
...
[233 206 133]
[233 206 133]
```

```
[233 206 133]]
```

```
...
```

```
[[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]
```

```
...
```

```
[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]]
```

```
[[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]
```

```
...
```

```
[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]]
```

```
[[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]
```

```
...
```

```
[ 46  48  45]  
[ 46  48  45]  
[ 46  48  45]]]
```

```
=====
```

```
Frame Index: 18
```

```
Pixel Matrix:
```

```
[[[233 206 133]  
[233 206 133]  
[233 206 133]
```

```
...
```

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
[[233 206 133]  
[233 206 133]  
[233 206 133]
```

```
...
```

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

```
[[233 206 133]
```

```
[233 206 133]  
[233 206 133]  
...  
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

...

```
[[ 46 48 45]  
 [ 46 48 45]  
 [ 46 48 45]  
 ...  
 [ 46 48 45]  
 [ 46 48 45]  
 [ 46 48 45]]
```

```
[[ 46 48 45]  
 [ 46 48 45]  
 [ 46 48 45]  
 ...  
 [ 46 48 45]  
 [ 46 48 45]  
 [ 46 48 45]]
```

```
[[ 46 48 45]  
 [ 46 48 45]  
 [ 46 48 45]  
 ...  
 [ 46 48 45]  
 [ 46 48 45]  
 [ 46 48 45]]]
```

=====

Frame Index: 19

Pixel Matrix:

```
[[[233 206 133]  
 [233 206 133]  
 [233 206 133]  
 ...  
 [233 206 133]  
 [233 206 133]  
 [233 206 133]]]
```

```
[[233 206 133]  
 [233 206 133]  
 [233 206 133]  
 ...
```

```
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

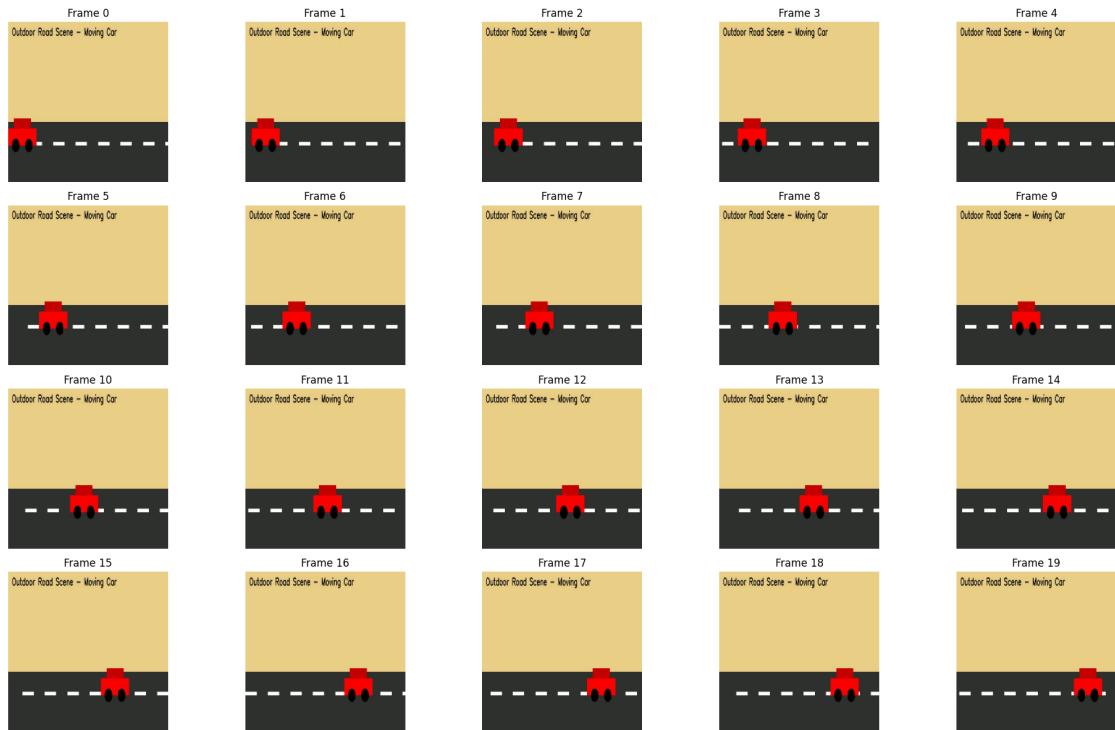
```
[[233 206 133]  
[233 206 133]  
[233 206 133]  
...  
[233 206 133]  
[233 206 133]  
[233 206 133]]
```

...

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]  
...  
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]  
...  
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]
```

```
[[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]  
...  
[ 46 48 45]  
[ 46 48 45]  
[ 46 48 45]]]
```



Top-5 Predictions (avg over frames):

digital_clock : 63.84 %
traffic_light : 9.13 %
switch : 1.43 %
computer_keyboard : 1.32 %
matchstick : 0.85 %

Final Prediction: digital_clock