



Homework10 Motion estimation

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Question

二选一：

1. 动态检测光流
2. 用光流场方法，标出前景（运动）和背景（静止）。

Answer

- 选择作业一
- 代码：

```
import numpy as np
import cv2

cap = cv2.VideoCapture("road.mp4")

# ShiTomasi 角点检测参数
feature_params = dict(maxCorners=100,
                      qualityLevel=0.3,
                      minDistance=7,
                      blockSize=7)

# lucas kanade光流法参数
lk_params = dict(winSize=(15, 15),
                 maxLevel=2,
                 criteria=(cv2.TERM_CRITERIA_EPS | cv2.TERM_CRITERIA_COUNT, 30, 0.1))

# 创建随机颜色
color = np.random.randint(0, 255, (100, 3))

# 获取第一帧，找到角点
ret, old_frame = cap.read()
# 找到原始灰度图
```

```

old_gray = cv2.cvtColor(old_frame, cv2.COLOR_BGR2GRAY)

# 获取图像中的角点, 返回到p0中
p0 = cv2.goodFeaturesToTrack(old_gray, mask=None, **feature_params)

# 创建一个蒙版用来画轨迹
mask = np.zeros_like(old_frame)

while (1):
    ret, frame = cap.read()
    frame_gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)

    # 计算光流
    p1, st, err = cv2.calcOpticalFlowPyrLK(old_gray, frame_gray, p0, None, **lk_params)
    # 选取好的跟踪点
    good_new = p1[st == 1]
    good_old = p0[st == 1]

    # 画出轨迹
    for i, (new, old) in enumerate(zip(good_new, good_old)):
        a, b = new.ravel()
        c, d = old.ravel()
        # mask = cv2.line(mask, (0,0.01),(0,0.02), color[i].tolist(), 2)
        mask = cv2.line(mask, (int(a), int(b)), (int(c), int(d)), color[i].tolist(), 2)
        frame = cv2.circle(frame, (int(a), int(b)), 5, color[i].tolist(), -1)
    img = cv2.add(frame, mask)

    cv2.imshow('frame', img)
    k = cv2.waitKey(20)
    if k == 27:
        break

    # 更新上一帧的图像和追踪点
    old_gray = frame_gray.copy()
    p0 = good_new.reshape(-1, 1, 2)

cv2.destroyAllWindows()
cap.release()

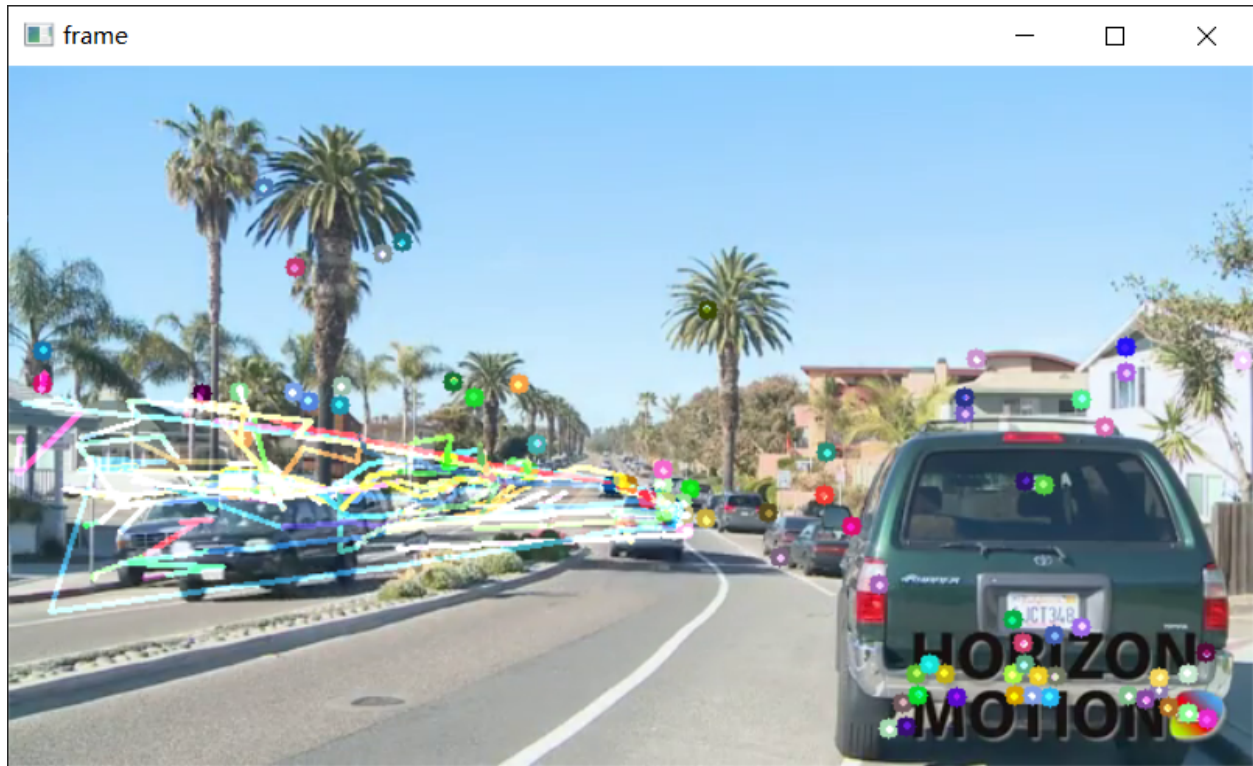
```

- 输入视频：



- 输出视频（帧）：





- 总结：光流法检测视频中的运动效果十分明显，轨迹清晰。