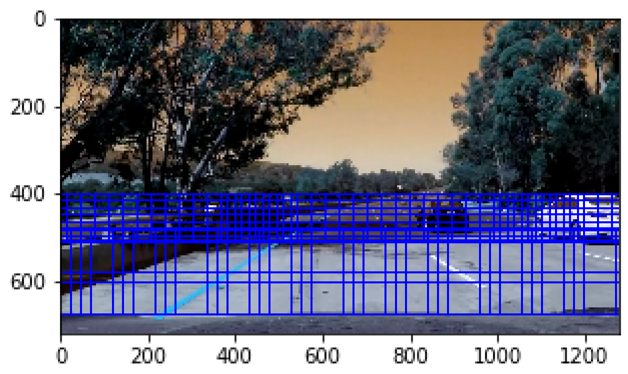
this notebook invokes VehicleProcess to detect objects(vehicles) in images

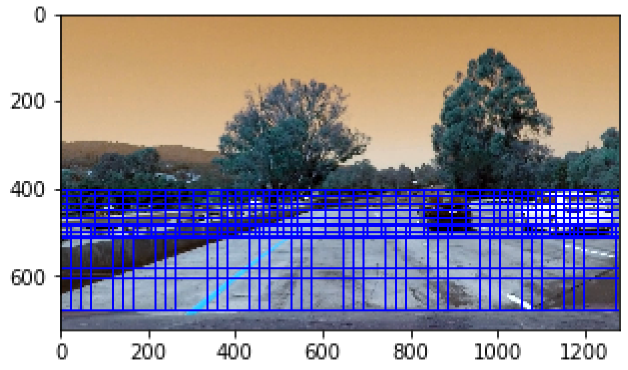
In [1]:
```
import glob
import cv2
import matplotlib.image as mpimg
import matplotlib.pyplot as plt
%matplotlib inline
from object_finder import ObjectProcess
from image_features import *
from IPython.display import HTML
```

1. Different sliding window search areas ¶

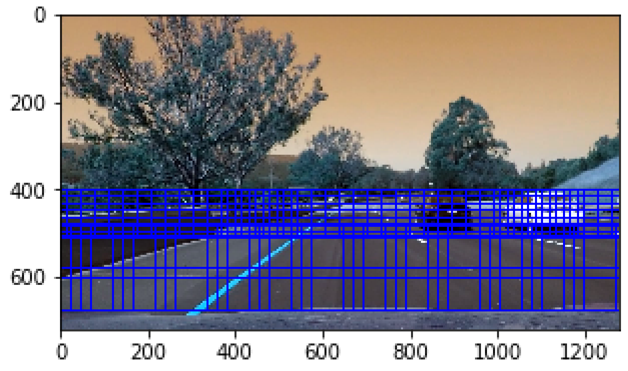
In [2]:
```
images = glob.glob('test_images/test*.jpg')

total_images = 6
plt.figure(figsize=(5,30))

for i, image in enumerate(images):

    img = cv2.imread(image)
    vehicles_detector = ObjectProcess()
    sliding_window_img = vehicles_detector.process_frame(img, show_sliding_win
dows=True)

    plt.subplot(total_images,1,i+1)
    plt.imshow(sliding_window_img)
    plt.text(1500,300,image,fontsize=15)

plt.show()
```



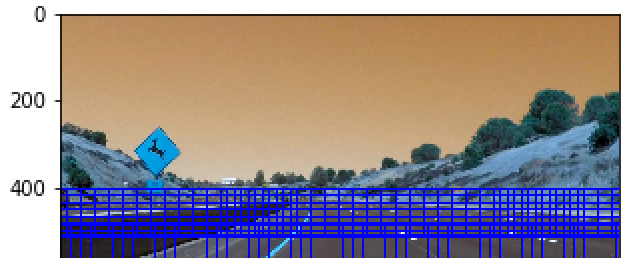
test_images/test5.jpg



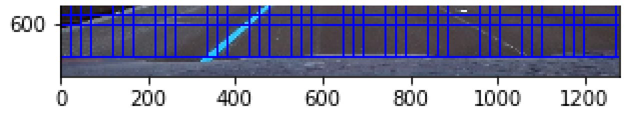
test_images/test1.jpg

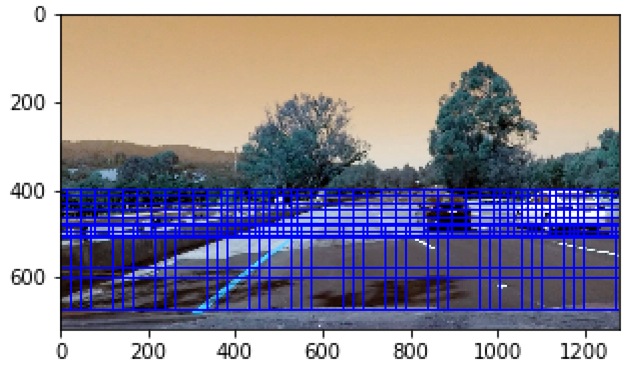


test_images/test6.jpg

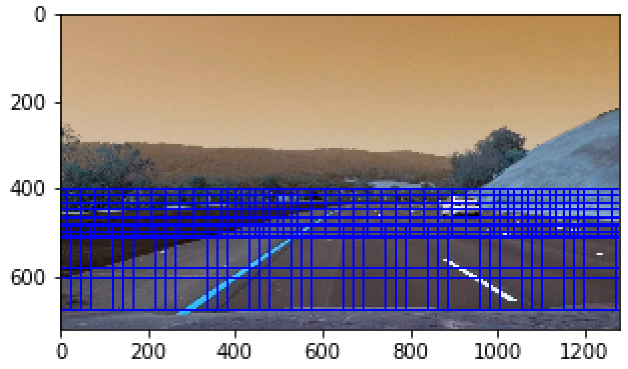


test_images/test2.jpg





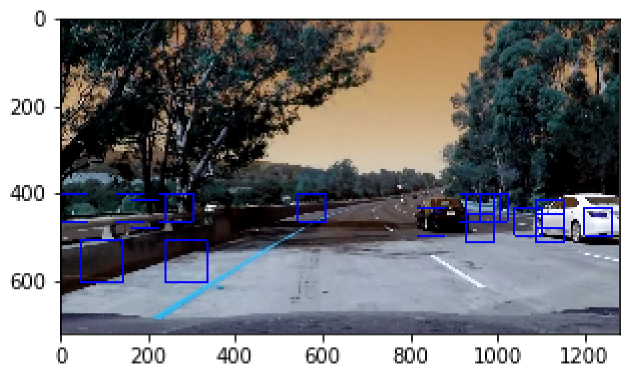
test_images/test4.jpg



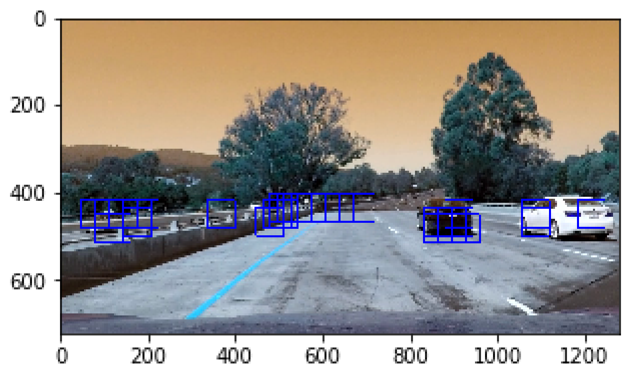
test_images/test3.jpg

2. Object/Vehicle Detection stage

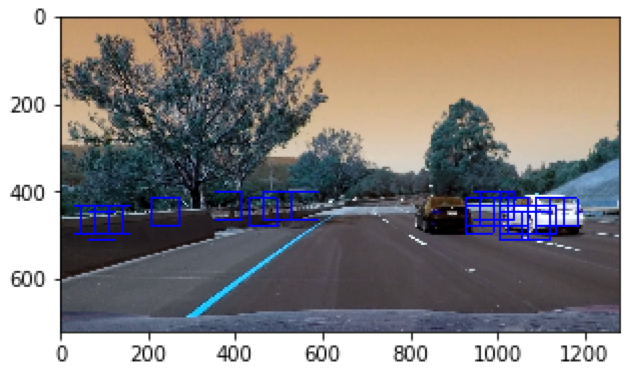
In [3]:
```
images = glob.glob('test_images/test*.jpg')

total_images = 6
plt.figure(figsize=(5,30))

for i, image in enumerate(images):

    img = cv2.imread(image)
    vehicles_detector = ObjectProcess()
    sliding_window_img = vehicles_detector.process_frame(img, show_objects=Tru
e)

    plt.subplot(total_images,1,i+1)
    plt.imshow(sliding_window_img)
    plt.text(1500,300,image,fontsize=15)

plt.show()
```



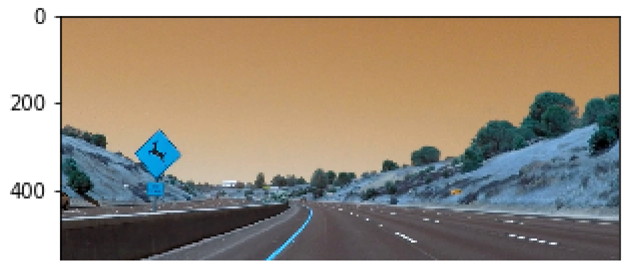
test_images/test5.jpg



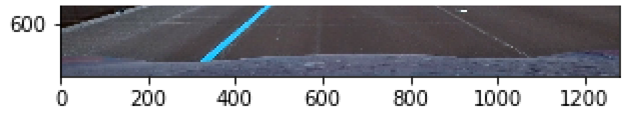
test_images/test1.jpg

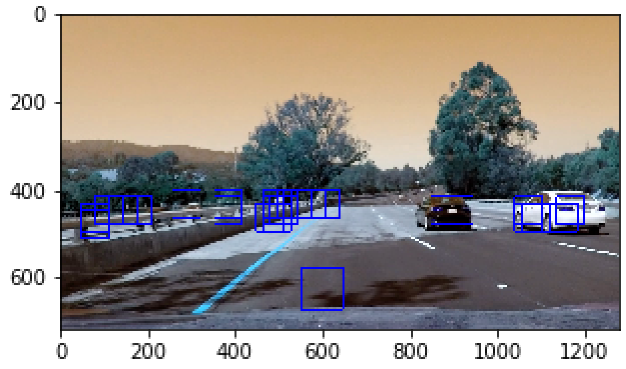


test_images/test6.jpg

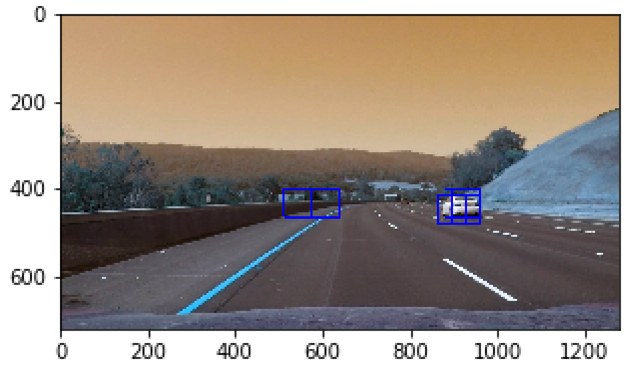


test_images/test2.jpg





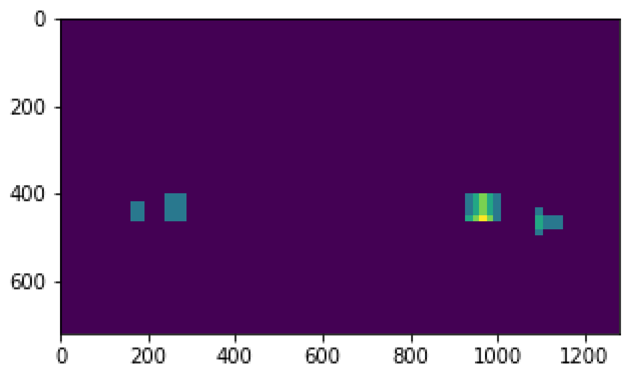
test_images/test4.jpg



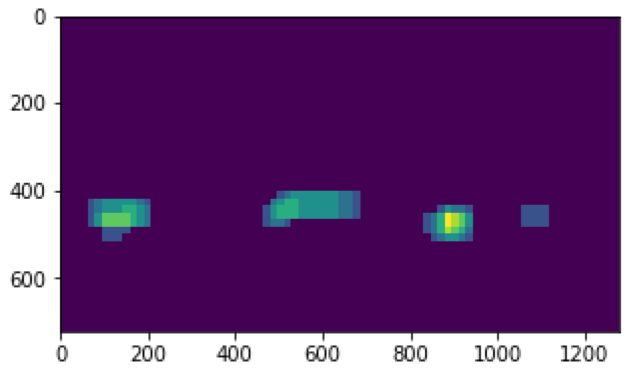
test_images/test3.jpg

3.Heatmap

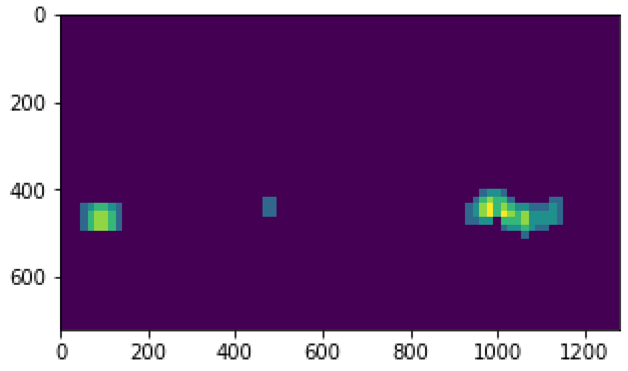
In [4]:
```
images = glob.glob('test_images/test*.jpg')

total_images = 6
plt.figure(figsize=(5,30))

for i, image in enumerate(images):

    img = cv2.imread(image)
    vehicles_detector = ObjectProcess()
    sliding_window_img = vehicles_detector.process_frame(img, show_heatmap=Tru
e)

    plt.subplot(total_images,1,i+1)
    plt.imshow(sliding_window_img)
    plt.text(1500,300,image,fontsize=15)

plt.show()
```



test_images/test5.jpg

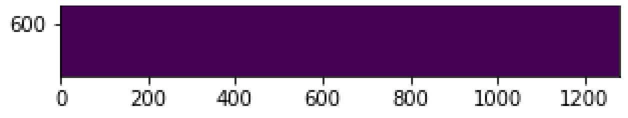


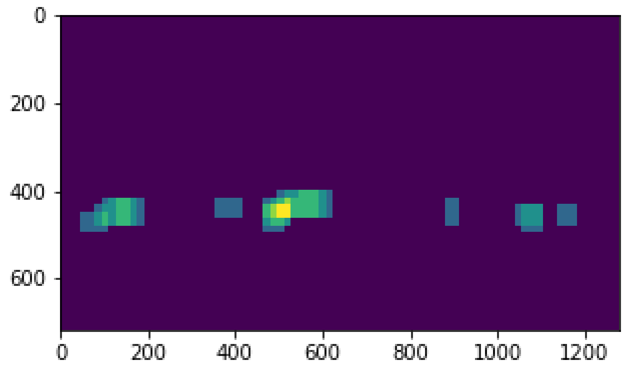
test_images/test1.jpg



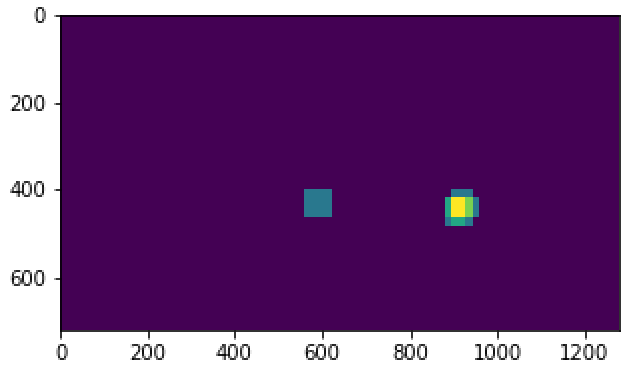
test_images/test6.jpg

test_images/test2.jpg





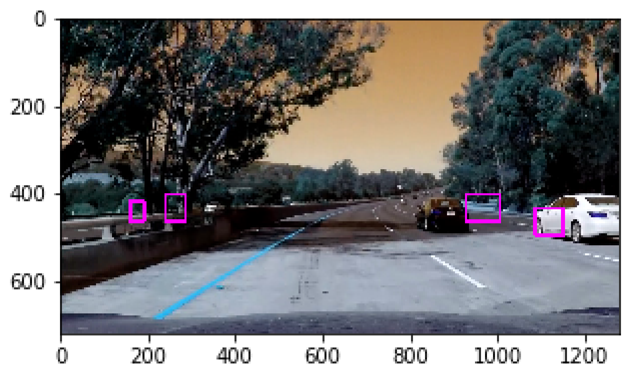
test_images/test4.jpg



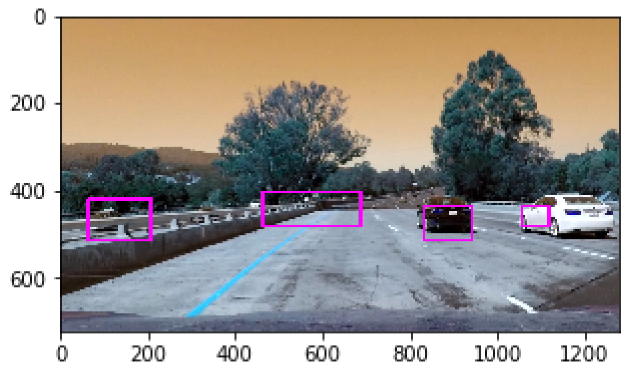
test_images/test3.jpg

4. Aggregate and show contours

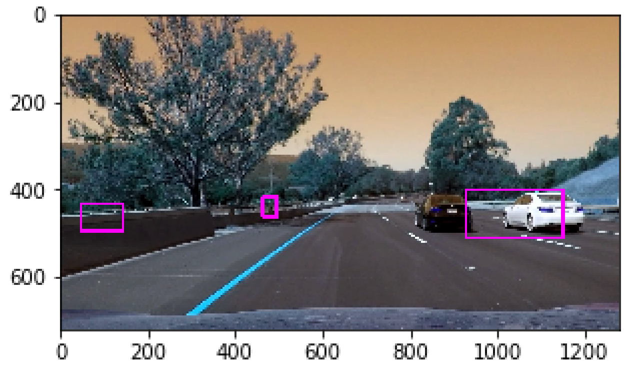
In [ ]:
```
images = glob.glob('test_images/test*.jpg')

total_images = 6
plt.figure(figsize=(5,30))

for i, image in enumerate(images):

    img = cv2.imread(image)
    vehicles_detector = ObjectProcess()
    sliding_window_img = vehicles_detector.process_frame(img, show_contours=Tr
ue)

    plt.subplot(total_images,1,i+1)
    plt.imshow(sliding_window_img)
    plt.text(1500,300,image,fontsize=15)

plt.show()
```



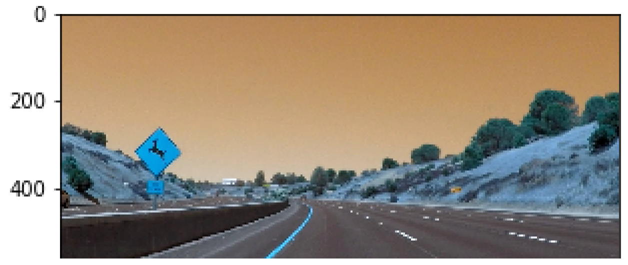
test_images/test5.jpg



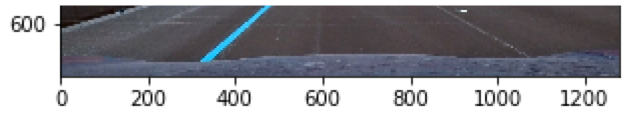
test_images/test1.jpg

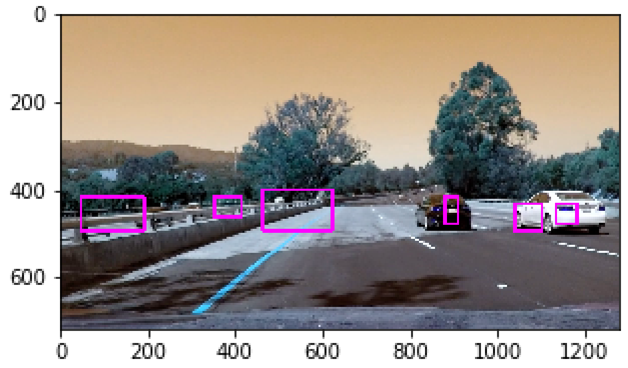


test_images/test6.jpg

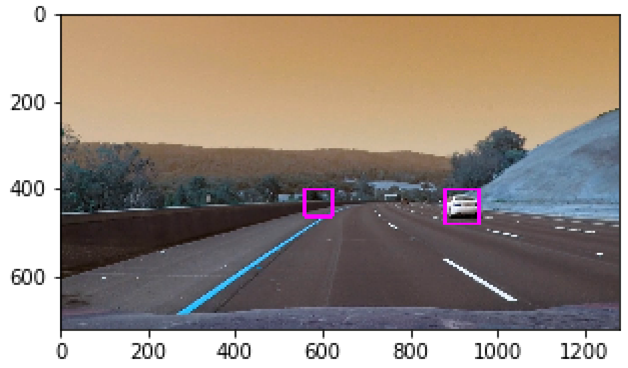


test_images/test2.jpg





test_images/test4.jpg



test_images/test3.jpg

5. Final Video processing

In [2]:
```python
from moviepy.video.io.VideoFileClip import VideoFileClip

vehicles_detector = ObjectProcess()
input_video = 'project_video.mp4'
output_video = input_video[:-4] + '_with_vehicles_detected.mp4'

video_clip = VideoFileClip(input_video)
processed_clip = video_clip.fl_image(vehicles_detector.process_frame)

# write video
processed_clip.write_videofile(output_video, audio=False)
print('Done')
```

```
[MoviePy] >>>> Building video project_video_with_vehicles_detected.mp4
[MoviePy] Writing video project_video_with_vehicles_detected.mp4

100%|██████████| 1260/1261 [1:07:27<00:03,  3.19s/it]

[MoviePy] Done.
[MoviePy] >>>> Video ready: project_video_with_vehicles_detected.mp4

Done
```

Final processed video

In [3]:
```
HTML("""
<video width="960" height="540" controls>
  <source src="{0}">
</video>
""".format(output_video))
```

Out[3]:

In [ ]: