Test_Setup

November 12, 2019

```python
[1]: import gym
     import gym_act
```

```python
[2]: import numpy as np
     import cv2
     import math
     import matplotlib.pyplot as plt
```

```python
[3]: def show_img(img):
         plt.imshow(img)
         plt.show()

     def  resize_images(images, f=3):
         big_images = []
         for img in images:
             big_images.append(cv2.resize(img, None, fx=f, fy=f))
         return big_images
```

```python
[4]: env = gym.make("Act-v1")
```

```
ACT (Anti Collision Tests) with 10 cars using cv driver model
SEED 8066259657135224412
```
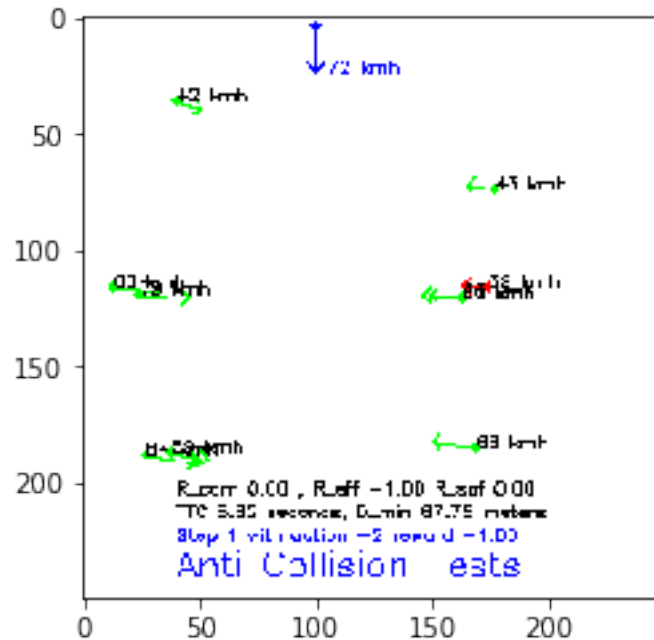
```python
[5]: print(env.action_space)
     print(env.actions)

     # 4 coords (x,y,vx,vy) per obj
     print(env.nobjs)
     print(env.observation_space)

     print(env.dt)
```

```
Discrete(5)
[-2.0, -1.0, 0.0, 1.0, 2.0]
10
Box(40,)
0.2
```

```
[6]:  action = 0
      obs, reward, done, info = env.step(action)
      img = env.render()
      show_img(img)
```



```
[7]:  import baseline
      from baseline import *
```

```
[8]:  max_episodes = 5
      max_steps = 120

      # METRICS
      metric_success = 0 # EFFICIENCY
      metric_steps_to_goal = [] # SAFETY
      metric_hardbrake = [] # COMFORT

      for episode in range(max_episodes):
          print("====> Start episode {}".format(episode))
          state = env.reset()
          cumulated_reward = 0
          images = []

          hardbrake = 0
          for n in range(max_steps):
              #action = 2 # ACHTUNG: it is an index  in[-2, -1, 0, 1, 2] array !!!
```

```
        action = getBaselineAction(state)
        #if action == 0:
        #    hardbrake += 1
        state, reward, done, info = env.step(action)
        cumulated_reward += reward
        print("Step {}: action={} reward={} done={} info={}".format(n, action,
 ↪reward, done, info))
        img = env.render()
        images.append(img)
        if done is True:
            if info == "success":
                metric_success += 1
                metric_steps_to_goal.append(n)
                metric_hardbrake.append(hardbrake)
            print("End of episode {} with cumulated_reward {}".format(episode,
 ↪cumulated_reward))
            break

print("METRICS: SAFETY %collisions = {}, COMFORT MeanHardBrake = {}, EFFICIENCY
 ↪MeanStepsToGoal = {}".format(1-metric_success/max_episodes, np.
 ↪mean(metric_hardbrake), np.mean(metric_steps_to_goal)))
```

```
====> Start episode 0
Step 0: action=0 reward=-1 done=False info={}
Step 1: action=0 reward=-1 done=False info={}
Step 2: action=0 reward=-1 done=False info={}
Step 3: action=0 reward=-1 done=False info={}
Step 4: action=0 reward=-1 done=False info={}
Step 5: action=0 reward=-1 done=False info={}
Step 6: action=0 reward=-1 done=False info={}
Step 7: action=0 reward=-1 done=False info={}
Step 8: action=0 reward=-1 done=False info={}
Step 9: action=0 reward=-1 done=False info={}
Step 10: action=0 reward=-1 done=False info={}
Step 11: action=0 reward=-1 done=False info={}
Step 12: action=0 reward=-1 done=False info={}
Step 13: action=0 reward=-1 done=False info={}
Step 14: action=0 reward=-1 done=False info={}
Step 15: action=0 reward=-1001 done=True info=fail
End of episode 0 with cumulated_reward -1016
====> Start episode 1
Step 0: action=0 reward=-1 done=False info={}
Step 1: action=0 reward=-1 done=False info={}
Step 2: action=0 reward=-1 done=False info={}
Step 3: action=0 reward=-1 done=False info={}
Step 4: action=0 reward=-1 done=False info={}
Step 5: action=0 reward=-1 done=False info={}
```

```
Step 6: action=0 reward=-1 done=False info={}
Step 7: action=0 reward=-1 done=False info={}
Step 8: action=0 reward=-1 done=False info={}
Step 9: action=0 reward=-1 done=False info={}
Step 10: action=0 reward=-1 done=False info={}
Step 11: action=0 reward=-1 done=False info={}
Step 12: action=0 reward=-1 done=False info={}
Step 13: action=0 reward=-1 done=False info={}
Step 14: action=0 reward=-1 done=False info={}
Step 15: action=0 reward=-1 done=False info={}
Step 16: action=0 reward=-1 done=False info={}
Step 17: action=0 reward=-1 done=False info={}
Step 18: action=0 reward=-1 done=False info={}
Step 19: action=0 reward=-1 done=False info={}
Step 20: action=0 reward=-1 done=False info={}
Step 21: action=0 reward=-1 done=False info={}
Step 22: action=0 reward=-1 done=False info={}
Step 23: action=0 reward=-1 done=False info={}
Step 24: action=0 reward=-1 done=False info={}
Step 25: action=0 reward=-1 done=False info={}
Step 26: action=0 reward=-1 done=False info={}
Step 27: action=0 reward=-1 done=False info={}
Step 28: action=0 reward=-1 done=False info={}
Step 29: action=0 reward=-1 done=False info={}
Step 30: action=0 reward=-1 done=False info={}
Step 31: action=0 reward=-1 done=False info={}
Step 32: action=0 reward=-1 done=False info={}
Step 33: action=0 reward=-1001 done=True info=fail
End of episode 1 with cumulated_reward -1034
====> Start episode 2
Step 0: action=0 reward=-1 done=False info={}
Step 1: action=0 reward=-1 done=False info={}
Step 2: action=0 reward=-1 done=False info={}
Step 3: action=0 reward=-1 done=False info={}
Step 4: action=0 reward=-1 done=False info={}
Step 5: action=0 reward=-1 done=False info={}
Step 6: action=0 reward=-1 done=False info={}
Step 7: action=0 reward=-1 done=False info={}
Step 8: action=0 reward=-1 done=False info={}
Step 9: action=0 reward=-1 done=False info={}
Step 10: action=0 reward=-1 done=False info={}
Step 11: action=0 reward=-1 done=False info={}
Step 12: action=0 reward=-1 done=False info={}
Step 13: action=0 reward=-1 done=False info={}
Step 14: action=0 reward=-1 done=False info={}
Step 15: action=0 reward=-1 done=False info={}
Step 16: action=0 reward=-1 done=False info={}
Step 17: action=0 reward=-1 done=False info={}
```

```
Step 18: action=0 reward=-1 done=False info={}
Step 19: action=0 reward=-1001 done=True info=fail
End of episode 2 with cumulated_reward -1020
====> Start episode 3
Step 0: action=3 reward=-1 done=False info={}
Step 1: action=3 reward=-1 done=False info={}
Step 2: action=3 reward=-1 done=False info={}
Step 3: action=3 reward=-1 done=False info={}
Step 4: action=3 reward=-1 done=False info={}
Step 5: action=3 reward=-1 done=False info={}
Step 6: action=3 reward=-1 done=False info={}
Step 7: action=3 reward=-1 done=False info={}
Step 8: action=3 reward=-1 done=False info={}
Step 9: action=3 reward=-1 done=False info={}
Step 10: action=3 reward=-1 done=False info={}
Step 11: action=3 reward=-1 done=False info={}
Step 12: action=0 reward=-1 done=False info={}
Step 13: action=3 reward=-1 done=False info={}
Step 14: action=3 reward=-1 done=False info={}
Step 15: action=3 reward=-1 done=False info={}
Step 16: action=0 reward=-1 done=False info={}
Step 17: action=3 reward=-1 done=False info={}
Step 18: action=3 reward=-1 done=False info={}
Step 19: action=0 reward=-1 done=False info={}
Step 20: action=3 reward=-1 done=False info={}
Step 21: action=3 reward=-1 done=False info={}
Step 22: action=0 reward=-1 done=False info={}
Step 23: action=3 reward=-1 done=False info={}
Step 24: action=3 reward=-1 done=False info={}
Step 25: action=0 reward=-1 done=False info={}
Step 26: action=3 reward=-1 done=False info={}
Step 27: action=3 reward=-1 done=False info={}
Step 28: action=0 reward=-1 done=False info={}
Step 29: action=3 reward=-1 done=False info={}
Step 30: action=3 reward=-1 done=False info={}
Step 31: action=0 reward=-1 done=False info={}
Step 32: action=3 reward=-1 done=False info={}
Step 33: action=3 reward=-1 done=False info={}
Step 34: action=3 reward=-1 done=False info={}
Step 35: action=3 reward=-1 done=False info={}
Step 36: action=3 reward=-1 done=False info={}
Step 37: action=3 reward=-1 done=False info={}
Step 38: action=3 reward=-1 done=False info={}
Step 39: action=3 reward=-1 done=False info={}
Step 40: action=3 reward=-1 done=False info={}
Step 41: action=3 reward=-1 done=False info={}
Step 42: action=3 reward=-1 done=False info={}
Step 43: action=3 reward=-1 done=False info={}
```

```
Step 44: action=3 reward=999 done=True info=success
End of episode 3 with cumulated_reward 955
====> Start episode 4
Step 0: action=0 reward=-1 done=False info={}
Step 1: action=0 reward=-1 done=False info={}
Step 2: action=0 reward=-1 done=False info={}
Step 3: action=0 reward=-1 done=False info={}
Step 4: action=0 reward=-1 done=False info={}
Step 5: action=0 reward=-1 done=False info={}
Step 6: action=0 reward=-1 done=False info={}
Step 7: action=0 reward=-1 done=False info={}
Step 8: action=0 reward=-1 done=False info={}
Step 9: action=0 reward=-1 done=False info={}
Step 10: action=0 reward=-1 done=False info={}
Step 11: action=0 reward=-1 done=False info={}
Step 12: action=0 reward=-1 done=False info={}
Step 13: action=0 reward=-1 done=False info={}
Step 14: action=0 reward=-1 done=False info={}
Step 15: action=0 reward=-1 done=False info={}
Step 16: action=0 reward=-1 done=False info={}
Step 17: action=0 reward=-1 done=False info={}
Step 18: action=0 reward=-1001 done=True info=fail
End of episode 4 with cumulated_reward -1019
METRICS: SAFETY %collisions = 0.8, COMFORT MeanHardBrake = 0.0, EFFICIENCY
MeanStepsToGoal = 44.0
```

[9]:
```python
print(metric_hardbrake)
print(metric_success)
print(metric_steps_to_goal)
print(max_episodes)
```
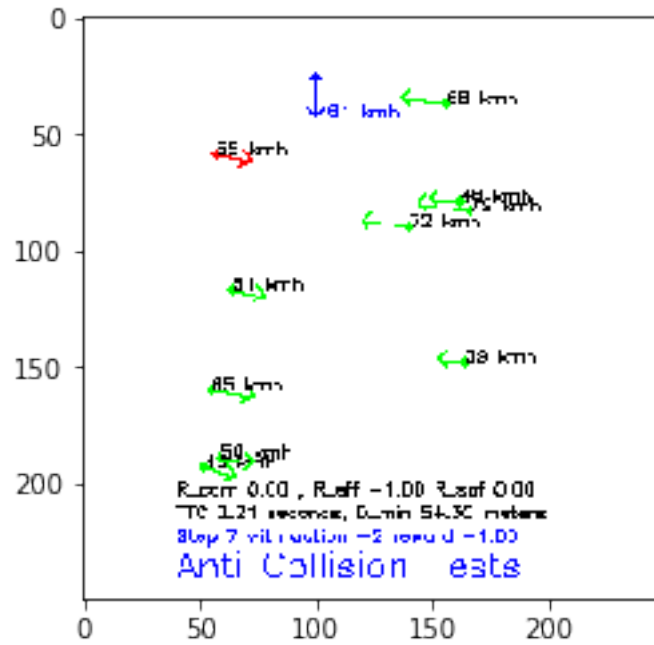
```
[0]
1
[44]
5
```

[19]:
```python
show_img(images[6])
```
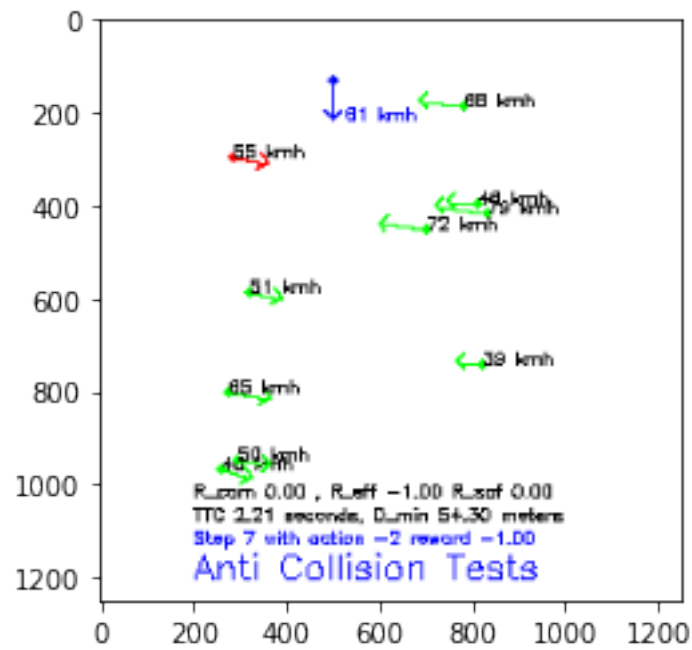
```
[24]: big_images = resize_images(images, f=5)
```

```
[25]: show_img(big_images[6])
```

1 Visualization

```python
import imageio
from IPython.core.display import HTML
```

```python
mkdir img
```

```python
imageio.mimsave('img/visu.gif', images, duration=0.2)
HTML("""<img src="img/visu.gif"/>""")
```

```python
big_images = resize_images(images, f=2)
imageio.mimsave('img/visu2.gif', big_images, duration=0.2)
HTML("""<img src="img/visu2.gif"/>""")
```

```python

```