

Debugging Slalom Location

December 16, 2016

```
In [1]: %matplotlib inline
import pandas as pd
import matplotlib.pyplot as plt
```

I suspect that my skier/slalom x-coordinate relation is off. I spent a while watching the simulation with logging of the skier's x-value, and it looks pretty accurate. It's hard to guess at the "correct" x-location of the slaloms (which I am defining as the mid-point between the flags), so I collected some data to see what the relation is when the skier goes past the slalom. What I want to see is that when the skier goes through the slalom, she is on average 0 pixels away from the mid-point of the slalom, and that when she passes to the left or the right, she passes with approximately the same differences in x values.

Here are some stats showing the difference between the skier's x-value and the slalom's x-value when:

0.0.1 She goes through the slalom

```
In [3]: df = pd.read_csv('data1.csv', index_col=0)
df[df.hit].describe()
```

```
Out[3]:
```

	x_to_flag
count	99.000000
mean	-8.636364
std	16.576788
min	-54.000000
25%	-19.250000
50%	-5.500000
75%	3.250000
max	16.500000

0.0.2 She misses the slalom to the left (my left, not hers)

```
In [9]: df[(~df.hit.values) & (df.x_to_flag < 0)].describe()
```

```
Out[9]:
```

	x_to_flag
count	245.000000
mean	-54.553061
std	20.316634
min	-93.000000

```

25%    -68.000000
50%    -53.000000
75%    -39.000000
max     -1.000000

```

0.03 She misses the slalom to the right

```
In [10]: df[(~df.hit.values) & (df.x_to_flag > 0)].describe()
```

```

Out[10]:
      x_to_flag
count  154.000000
mean    51.301948
std     23.041907
min      3.000000
25%     33.125000
50%     50.750000
75%     69.625000
max     96.000000

```

It looks like I may be a few pixels shifted to the right in my estimate of the slalom location. Let's quickly plot these values as histograms.

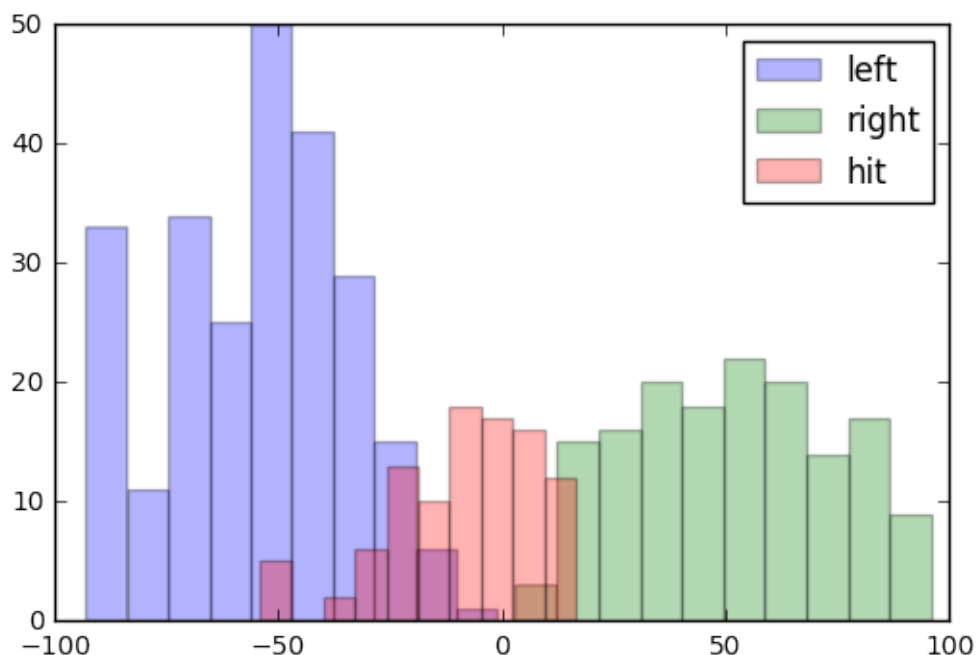
```

In [12]: hit = df[df.hit].x_to_flag.values
        left = df[(~df.hit.values) & (df.x_to_flag < 0)].x_to_flag.values
        right = df[(~df.hit.values) & (df.x_to_flag > 0)].x_to_flag.values

        plt.hold(True)
        plt.hist(left, alpha=0.3, label='left')
        plt.hist(right, alpha=0.3, label='right')
        plt.hist(hit, alpha=0.3, label='hit')
        plt.legend()

```

```
Out[12]: <matplotlib.legend.Legend at 0x7f4a77bebc10>
```



Ideally, we would see no overlap between the three distributions. We won't be that lucky because these features are fairly noisy. However, what we can see is that "hit" is overlapping much more heavily with "left" than "right".

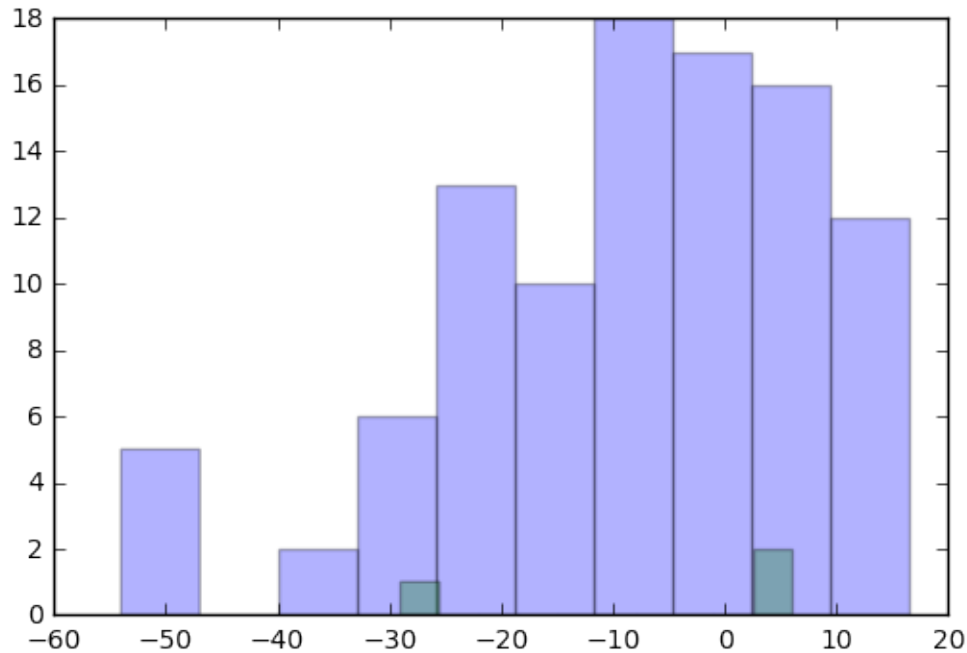
There's also an interesting issue going on with those very negative values. The distance between the flags of the slalom is approximately 32 pixels, so there is no way the skier could pass -50 pixels to the left of the slalom's midpoint and still go through the slalom.

A quick check on that second issue - is it because of the end flag being a different color?

```
In [14]: end_hits = df[df.done & df.hit].x_to_flag.values
```

```
plt.hist(hit, alpha=0.3, label='hit')
plt.hist(end_hits, alpha=0.3, label='end')
```

```
Out[14]: (array([ 1.,  0.,  0.,  0.,  0.,  0.,  0.,  0.,  0.,  2.]),
          array([-29. , -25.5, -22. , -18.5, -15. , -11.5,  -8. ,  -4.5,  -1. ,
                  2.5,   6. ]),
          <a list of 10 Patch objects>)
```



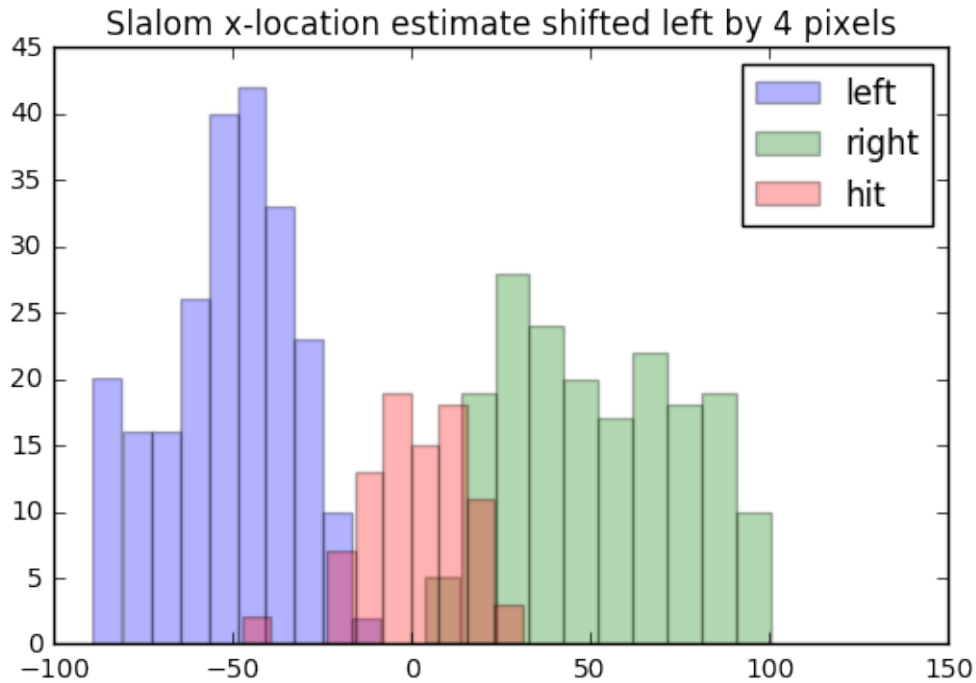
Well, that's not the cause of the extremely negative values, but that -29 is still curious.

While I think about what that means, I'm going to adjust my estimate of the slalom location by a few pixels and rerun these plots.

```
In [18]: df = pd.read_csv('data2.csv', index_col=0)
         hit = df[df.hit].x_to_flag.values
         left = df[(~df.hit.values) & (df.x_to_flag < 0)].x_to_flag.values
         right = df[(~df.hit.values) & (df.x_to_flag > 0)].x_to_flag.values

         plt.hold(True)
         plt.hist(left, alpha=0.3, label='left')
         plt.hist(right, alpha=0.3, label='right')
         plt.hist(hit, alpha=0.3, label='hit')
         plt.title('Slalom x-location estimate shifted left by 4 pixels')
         plt.legend()
```

```
Out[18]: <matplotlib.legend.Legend at 0x7f4a773de110>
```

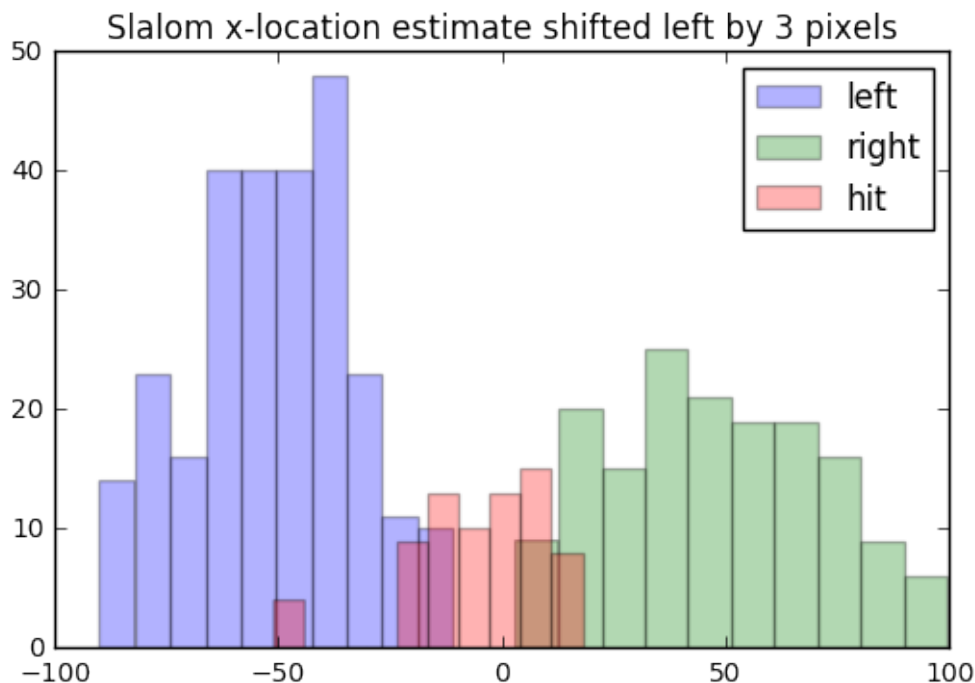


Whoops! That's too far.

```
In [20]: df = pd.read_csv('data3.csv', index_col=0)
         hit = df[df.hit].x_to_flag.values
         left = df[(~df.hit.values) & (df.x_to_flag < 0)].x_to_flag.values
         right = df[(~df.hit.values) & (df.x_to_flag > 0)].x_to_flag.values

         plt.hold(True)
         plt.hist(left, alpha=0.3, label='left')
         plt.hist(right, alpha=0.3, label='right')
         plt.hist(hit, alpha=0.3, label='hit')
         plt.title('Slalom x-location estimate shifted left by 3 pixels')
         plt.legend()
```

Out[20]: <matplotlib.legend.Legend at 0x7f4a7712dd10>



By shifting my estimate of the slalom's x-location left 3 pixels, I now have the overlapping areas somewhat balanced.

However, we're still getting a fairly bad 100-episode average, even though we can clearly learn how to ski well, as evidenced by the per-episode debug log below:

```
DEBUG:__main__:Episode 0 (1737 steps): -17750/-2750 (Sloth: -8750, Slaloms Missed: 1)
DEBUG:__main__:Episode 1 (1868 steps): -15847/-847 (Sloth: -9347, Slaloms Missed: 1)
DEBUG:__main__:Episode 2 (1678 steps): -16374/-1374 (Sloth: -8374, Slaloms Missed: 1)
DEBUG:__main__:Episode 3 (1674 steps): -14414/586 (Sloth: -8414, Slaloms Missed: 12)
DEBUG:__main__:Episode 4 (2969 steps): -20830/-5830 (Sloth: -14830, Slaloms Missed: 1)
DEBUG:__main__:Episode 5 (6023 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed: 1)
DEBUG:__main__:Episode 6 (5502 steps): -32549/-17549 (Sloth: -27549, Slaloms Missed: 1)
DEBUG:__main__:Episode 7 (976 steps): -7387/7613 (Sloth: -4887, Slaloms Missed: 5)
DEBUG:__main__:Episode 8 (1246 steps): -8227/6773 (Sloth: -6227, Slaloms Missed: 4)
DEBUG:__main__:Episode 9 (1347 steps): -11135/3865 (Sloth: -6635, Slaloms Missed: 9)
DEBUG:__main__:Episode 10 (1084 steps): -8427/6573 (Sloth: -5427, Slaloms Missed: 6)
DEBUG:__main__:Episode 11 (1181 steps): -8891/6109 (Sloth: -5891, Slaloms Missed: 6)
DEBUG:__main__:Episode 12 (1299 steps): -9962/5038 (Sloth: -6462, Slaloms Missed: 7)
DEBUG:__main__:Episode 13 (1078 steps): -7312/7688 (Sloth: -5312, Slaloms Missed: 4)
DEBUG:__main__:Episode 14 (1232 steps): -8175/6825 (Sloth: -6175, Slaloms Missed: 4)
DEBUG:__main__:Episode 15 (4170 steps): -24882/-9882 (Sloth: -20882, Slaloms Missed: 1)
DEBUG:__main__:Episode 16 (4369 steps): -25367/-10367 (Sloth: -21867, Slaloms Missed: 1)
DEBUG:__main__:Episode 17 (1343 steps): -9191/5809 (Sloth: -6691, Slaloms Missed: 5)
DEBUG:__main__:Episode 18 (1307 steps): -9045/5955 (Sloth: -6545, Slaloms Missed: 5)
DEBUG:__main__:Episode 19 (1025 steps): -7670/7330 (Sloth: -5170, Slaloms Missed: 5)
```

DEBUG:__main__:Episode 20 (2586 steps): -15382/-382 (Sloth: -12882, Slaloms Missed: 1)
DEBUG:__main__:Episode 21 (4185 steps): -25959/-10959 (Sloth: -20959, Slaloms Missed: 1)
DEBUG:__main__:Episode 22 (2206 steps): -16481/-1481 (Sloth: -10981, Slaloms Missed: 1)
DEBUG:__main__:Episode 23 (997 steps): -8961/6039 (Sloth: -4961, Slaloms Missed: 8)
DEBUG:__main__:Episode 24 (995 steps): -7534/7466 (Sloth: -5034, Slaloms Missed: 5)
DEBUG:__main__:Episode 25 (1184 steps): -6434/8566 (Sloth: -5934, Slaloms Missed: 1)
DEBUG:__main__:Episode 26 (1326 steps): -9190/5810 (Sloth: -6690, Slaloms Missed: 5)
DEBUG:__main__:Episode 27 (1049 steps): -7210/7790 (Sloth: -5210, Slaloms Missed: 4)
DEBUG:__main__:Episode 28 (1087 steps): -7882/7118 (Sloth: -5382, Slaloms Missed: 5)
DEBUG:__main__:Episode 29 (1007 steps): -6540/8460 (Sloth: -5040, Slaloms Missed: 3)
DEBUG:__main__:Episode 30 (972 steps): -7839/7161 (Sloth: -4839, Slaloms Missed: 6)
DEBUG:__main__:Episode 31 (1119 steps): -6590/8410 (Sloth: -5590, Slaloms Missed: 2)
DEBUG:__main__:Episode 32 (1291 steps): -8430/6570 (Sloth: -6430, Slaloms Missed: 4)
DEBUG:__main__:Episode 33 (5938 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed: 1)
DEBUG:__main__:Episode 34 (6019 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed: 1)
DEBUG:__main__:Episode 35 (3317 steps): -19431/-4431 (Sloth: -16431, Slaloms Missed: 1)
DEBUG:__main__:Episode 36 (2936 steps): -16747/-1747 (Sloth: -14747, Slaloms Missed: 1)
DEBUG:__main__:Episode 37 (2393 steps): -14468/532 (Sloth: -11968, Slaloms Missed: 1)
DEBUG:__main__:Episode 38 (1293 steps): -9432/5568 (Sloth: -6432, Slaloms Missed: 6)
DEBUG:__main__:Episode 39 (1149 steps): -6249/8751 (Sloth: -5749, Slaloms Missed: 1)
DEBUG:__main__:Episode 40 (1069 steps): -7337/7663 (Sloth: -5337, Slaloms Missed: 4)
DEBUG:__main__:Episode 41 (1249 steps): -9205/5795 (Sloth: -6205, Slaloms Missed: 6)
DEBUG:__main__:Episode 42 (1257 steps): -7217/7783 (Sloth: -6217, Slaloms Missed: 2)
DEBUG:__main__:Episode 43 (1127 steps): -7095/7905 (Sloth: -5595, Slaloms Missed: 3)
DEBUG:__main__:Episode 44 (1234 steps): -9155/5845 (Sloth: -6155, Slaloms Missed: 6)
DEBUG:__main__:Episode 45 (2168 steps): -13296/1704 (Sloth: -10796, Slaloms Missed: 1)
DEBUG:__main__:Episode 46 (4063 steps): -25677/-10677 (Sloth: -20177, Slaloms Missed: 1)
DEBUG:__main__:Episode 47 (1316 steps): -8055/6945 (Sloth: -6555, Slaloms Missed: 3)
DEBUG:__main__:Episode 48 (882 steps): -5928/9072 (Sloth: -4428, Slaloms Missed: 3)
DEBUG:__main__:Episode 49 (1140 steps): -7648/7352 (Sloth: -5648, Slaloms Missed: 4)
DEBUG:__main__:Episode 50 (1148 steps): -7196/7804 (Sloth: -5696, Slaloms Missed: 3)
DEBUG:__main__:Episode 51 (1173 steps): -8896/6104 (Sloth: -5896, Slaloms Missed: 6)
DEBUG:__main__:Episode 52 (1126 steps): -7633/7367 (Sloth: -5633, Slaloms Missed: 4)
DEBUG:__main__:Episode 53 (5352 steps): -32360/-17360 (Sloth: -26860, Slaloms Missed: 1)
DEBUG:__main__:Episode 54 (1088 steps): -8970/6030 (Sloth: -5470, Slaloms Missed: 7)
DEBUG:__main__:Episode 55 (999 steps): -7497/7503 (Sloth: -4997, Slaloms Missed: 5)
DEBUG:__main__:Episode 56 (2906 steps): -16451/-1451 (Sloth: -14451, Slaloms Missed: 1)
DEBUG:__main__:Episode 57 (5356 steps): -28538/-13538 (Sloth: -26538, Slaloms Missed: 1)
DEBUG:__main__:Episode 58 (3586 steps): -21362/-6362 (Sloth: -17862, Slaloms Missed: 1)
DEBUG:__main__:Episode 59 (949 steps): -6799/8201 (Sloth: -4799, Slaloms Missed: 4)
DEBUG:__main__:Episode 60 (1122 steps): -9115/5885 (Sloth: -5615, Slaloms Missed: 7)
DEBUG:__main__:Episode 61 (1098 steps): -6526/8474 (Sloth: -5526, Slaloms Missed: 2)
DEBUG:__main__:Episode 62 (1196 steps): -6912/8088 (Sloth: -5912, Slaloms Missed: 2)
DEBUG:__main__:Episode 63 (1142 steps): -8686/6314 (Sloth: -5686, Slaloms Missed: 6)
DEBUG:__main__:Episode 64 (1022 steps): -7617/7383 (Sloth: -5117, Slaloms Missed: 5)
DEBUG:__main__:Episode 65 (1266 steps): -8318/6682 (Sloth: -6318, Slaloms Missed: 4)
DEBUG:__main__:Episode 66 (6033 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed: 1)
DEBUG:__main__:Episode 67 (6026 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed: 1)

```

DEBUG:__main__:Episode 68 (6020 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed: 4)
DEBUG:__main__:Episode 69 (6027 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed: 4)
DEBUG:__main__:Episode 70 (6002 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed: 4)
DEBUG:__main__:Episode 71 (5984 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed: 4)
DEBUG:__main__:Episode 72 (5990 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed: 4)
DEBUG:__main__:Episode 73 (4263 steps): -26862/-11862 (Sloth: -21362, Slaloms Missed: 4)
DEBUG:__main__:Episode 74 (2386 steps): -14775/225 (Sloth: -11775, Slaloms Missed: 4)
DEBUG:__main__:Episode 75 (1117 steps): -7081/7919 (Sloth: -5581, Slaloms Missed: 4)
DEBUG:__main__:Episode 76 (1033 steps): -8137/6863 (Sloth: -5137, Slaloms Missed: 4)
DEBUG:__main__:Episode 77 (1881 steps): -11350/3650 (Sloth: -9350, Slaloms Missed: 4)
DEBUG:__main__:Episode 78 (5117 steps): -29100/-14100 (Sloth: -25600, Slaloms Missed: 4)
DEBUG:__main__:Episode 79 (2668 steps): -15806/-806 (Sloth: -13306, Slaloms Missed: 4)
DEBUG:__main__:Episode 80 (1051 steps): -7237/7763 (Sloth: -5237, Slaloms Missed: 4)
DEBUG:__main__:Episode 81 (1082 steps): -5922/9078 (Sloth: -5422, Slaloms Missed: 4)
DEBUG:__main__:Episode 82 (1128 steps): -6636/8364 (Sloth: -5636, Slaloms Missed: 4)
DEBUG:__main__:Episode 83 (1043 steps): -8240/6760 (Sloth: -5240, Slaloms Missed: 4)
DEBUG:__main__:Episode 84 (1109 steps): -9108/5892 (Sloth: -5608, Slaloms Missed: 4)
DEBUG:__main__:Episode 85 (906 steps): -5590/9410 (Sloth: -4590, Slaloms Missed: 2)
DEBUG:__main__:Episode 86 (1558 steps): -9296/5704 (Sloth: -7796, Slaloms Missed: 3)
DEBUG:__main__:Episode 87 (1022 steps): -8612/6388 (Sloth: -5112, Slaloms Missed: 7)
DEBUG:__main__:Episode 88 (1271 steps): -9808/5192 (Sloth: -6308, Slaloms Missed: 7)
DEBUG:__main__:Episode 89 (1188 steps): -7946/7054 (Sloth: -5946, Slaloms Missed: 4)
DEBUG:__main__:Episode 90 (1494 steps): -9410/5590 (Sloth: -7410, Slaloms Missed: 4)
DEBUG:__main__:Episode 91 (1228 steps): -8042/6958 (Sloth: -6042, Slaloms Missed: 4)
DEBUG:__main__:Episode 92 (1002 steps): -5947/9053 (Sloth: -4947, Slaloms Missed: 2)
DEBUG:__main__:Episode 93 (4827 steps): -26671/-11671 (Sloth: -24171, Slaloms Missed: 4)
DEBUG:__main__:Episode 94 (6023 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed: 4)
DEBUG:__main__:Episode 95 (6020 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed: 4)
DEBUG:__main__:Episode 96 (6012 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed: 4)
DEBUG:__main__:Episode 97 (5840 steps): -34174/-19174 (Sloth: -29174, Slaloms Missed: 4)
DEBUG:__main__:Episode 98 (1241 steps): -8160/6840 (Sloth: -6160, Slaloms Missed: 4)
DEBUG:__main__:Episode 99 (990 steps): -5477/9523 (Sloth: -4977, Slaloms Missed: 1)
INFO:__main__:Best 100-episode average reward was -14370.7

```

The format of this output is:

```

DEBUG:__main__:Episode {a} ({b} steps): {c}/{d} (Sloth: {e}, Slaloms Missed: {f}).

```

a - episode number

b - number of actions taken to complete the episode

c - total true reward

d - total true reward plus 15000 (approximately the average random reward)

e - how much of the reward was due to time taken going down the hill

f - how many slaloms the skier missed

Notice how good many of the episodes are. For a frame of reference, a very strong baseline was total true episodic reward of about -9000 with 11 slaloms missed, while the oracle was total true episodic reward of about -3400 with 0-2 slaloms missed.

Let's try and understand what happens if we manually clamp the distance values when we pass a slalom to the values used by the threshold in the feature calculation? The threshold in the

feature calculation is 16, which is half of the pixel width of the slalom.

```
DEBUG:__main__:Episode 0 (1741 steps): -17618/-2618 (Sloth:
-8618, Slaloms Missed: 18) DEBUG:__main__:Episode 1 (1776 steps):
-17956/-2956 (Sloth: -8956, Slaloms Missed: 18) DEBUG:__main__:Episode
2 (1253 steps): -13785/1215 (Sloth: -6285, Slaloms Missed: 15)
DEBUG:__main__:Episode 3 (2352 steps): -20233/-5233 (Sloth:
-11733, Slaloms Missed: 17) DEBUG:__main__:Episode 4 (1891 steps):
-15914/-914 (Sloth: -9414, Slaloms Missed: 13) DEBUG:__main__:Episode
5 (985 steps): -5471/9529 (Sloth: -4971, Slaloms Missed: 1)
DEBUG:__main__:Episode 6 (1466 steps): -11320/3680 (Sloth: -7320,
Slaloms Missed: 8) DEBUG:__main__:Episode 7 (2593 steps): -17882/-2882
(Sloth: -12882, Slaloms Missed: 10) DEBUG:__main__:Episode 8
(1101 steps): -8001/6999 (Sloth: -5501, Slaloms Missed: 5)
DEBUG:__main__:Episode 9 (1102 steps): -5951/9049 (Sloth: -5451,
Slaloms Missed: 1) DEBUG:__main__:Episode 10 (1216 steps):
-8507/6493 (Sloth: -6007, Slaloms Missed: 5) DEBUG:__main__:Episode
11 (1401 steps): -9451/5549 (Sloth: -6951, Slaloms Missed: 5)
DEBUG:__main__:Episode 12 (3505 steps): -21488/-6488 (Sloth:
-17488, Slaloms Missed: 8) DEBUG:__main__:Episode 13 (2725 steps):
-17200/-2200 (Sloth: -13700, Slaloms Missed: 7) DEBUG:__main__:Episode
14 (2788 steps): -16018/-1018 (Sloth: -14018, Slaloms Missed:
4) DEBUG:__main__:Episode 15 (998 steps): -7027/7973 (Sloth:
-5027, Slaloms Missed: 4) DEBUG:__main__:Episode 16 (1050 steps):
-8205/6795 (Sloth: -5205, Slaloms Missed: 6) DEBUG:__main__:Episode
17 (1054 steps): -7253/7747 (Sloth: -5253, Slaloms Missed:
4) DEBUG:__main__:Episode 18 (877 steps): -6890/8110 (Sloth:
-4390, Slaloms Missed: 5) DEBUG:__main__:Episode 19 (990 steps):
-7986/7014 (Sloth: -4986, Slaloms Missed: 6) DEBUG:__main__:Episode
20 (1170 steps): -9856/5144 (Sloth: -5856, Slaloms Missed: 8)
DEBUG:__main__:Episode 21 (1034 steps): -5142/9858 (Sloth: -5142,
Slaloms Missed: 0) DEBUG:__main__:Episode 22 (1959 steps):
-12741/2259 (Sloth: -9741, Slaloms Missed: 6) DEBUG:__main__:Episode
23 (2524 steps): -16155/-1155 (Sloth: -12655, Slaloms Missed:
7) DEBUG:__main__:Episode 24 (2755 steps): -15767/-767 (Sloth:
-13767, Slaloms Missed: 4) DEBUG:__main__:Episode 25 (1823 steps):
-13058/1942 (Sloth: -9058, Slaloms Missed: 8) DEBUG:__main__:Episode
26 (1103 steps): -9056/5944 (Sloth: -5556, Slaloms Missed: 7)
DEBUG:__main__:Episode 27 (931 steps): -7656/7344 (Sloth: -4656,
Slaloms Missed: 6) DEBUG:__main__:Episode 28 (1154 steps):
-7709/7291 (Sloth: -5709, Slaloms Missed: 4) DEBUG:__main__:Episode
29 (1177 steps): -8289/6711 (Sloth: -5789, Slaloms Missed: 5)
DEBUG:__main__:Episode 30 (979 steps): -6401/8599 (Sloth: -4901,
Slaloms Missed: 3) DEBUG:__main__:Episode 31 (1072 steps):
-6827/8173 (Sloth: -5327, Slaloms Missed: 3) DEBUG:__main__:Episode
32 (976 steps): -7401/7599 (Sloth: -4901, Slaloms Missed: 5)
DEBUG:__main__:Episode 33 (1186 steps): -7487/7513 (Sloth: -5987,
Slaloms Missed: 3) DEBUG:__main__:Episode 34 (1198 steps):
-7456/7544 (Sloth: -5956, Slaloms Missed: 3) DEBUG:__main__:Episode
```

35 (1128 steps): -7164/7836 (Sloth: -5664, Slaloms Missed: 3)
 DEBUG:__main__:Episode 36 (1108 steps): -7591/7409 (Sloth: -5591,
 Slaloms Missed: 4) DEBUG:__main__:Episode 37 (1761 steps):
 -12861/2139 (Sloth: -8861, Slaloms Missed: 8) DEBUG:__main__:Episode
 38 (1056 steps): -8742/6258 (Sloth: -5242, Slaloms Missed: 7)
 DEBUG:__main__:Episode 39 (1226 steps): -8152/6848 (Sloth: -6152,
 Slaloms Missed: 4) DEBUG:__main__:Episode 40 (1299 steps):
 -8418/6582 (Sloth: -6418, Slaloms Missed: 4) DEBUG:__main__:Episode
 41 (1155 steps): -7831/7169 (Sloth: -5831, Slaloms Missed: 4)
 DEBUG:__main__:Episode 42 (983 steps): -6834/8166 (Sloth: -4834,
 Slaloms Missed: 4) DEBUG:__main__:Episode 43 (1285 steps):
 -7942/7058 (Sloth: -6442, Slaloms Missed: 3) DEBUG:__main__:Episode
 44 (1079 steps): -7398/7602 (Sloth: -5398, Slaloms Missed: 4)
 DEBUG:__main__:Episode 45 (1250 steps): -7300/7700 (Sloth: -6300,
 Slaloms Missed: 2) DEBUG:__main__:Episode 46 (1120 steps):
 -8031/6969 (Sloth: -5531, Slaloms Missed: 5) DEBUG:__main__:Episode
 47 (1060 steps): -5313/9687 (Sloth: -5313, Slaloms Missed: 0)
 DEBUG:__main__:Episode 48 (2019 steps): -12043/2957 (Sloth:
 -10043, Slaloms Missed: 4) DEBUG:__main__:Episode 49 (1585 steps):
 -11369/3631 (Sloth: -7869, Slaloms Missed: 7) DEBUG:__main__:Episode
 50 (6020 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed:
 20) DEBUG:__main__:Episode 51 (2954 steps): -17810/-2810 (Sloth:
 -14810, Slaloms Missed: 6) DEBUG:__main__:Episode 52 (973 steps):
 -8429/6571 (Sloth: -4929, Slaloms Missed: 7) DEBUG:__main__:Episode
 53 (904 steps): -6040/8960 (Sloth: -4540, Slaloms Missed: 3)
 DEBUG:__main__:Episode 54 (1115 steps): -7565/7435 (Sloth: -5565,
 Slaloms Missed: 4) DEBUG:__main__:Episode 55 (3223 steps):
 -18982/-3982 (Sloth: -15982, Slaloms Missed: 6) DEBUG:__main__:Episode
 56 (1250 steps): -8214/6786 (Sloth: -6214, Slaloms Missed: 4)
 DEBUG:__main__:Episode 57 (1319 steps): -10623/4377 (Sloth:
 -6623, Slaloms Missed: 8) DEBUG:__main__:Episode 58 (1204 steps):
 -8931/6069 (Sloth: -5931, Slaloms Missed: 6) DEBUG:__main__:Episode
 59 (1140 steps): -6679/8321 (Sloth: -5679, Slaloms Missed: 2)
 DEBUG:__main__:Episode 60 (820 steps): -6609/8391 (Sloth: -4109,
 Slaloms Missed: 5) DEBUG:__main__:Episode 61 (1272 steps):
 -7828/7172 (Sloth: -6328, Slaloms Missed: 3) DEBUG:__main__:Episode
 62 (1158 steps): -7269/7731 (Sloth: -5769, Slaloms Missed: 3)
 DEBUG:__main__:Episode 63 (1008 steps): -6572/8428 (Sloth: -5072,
 Slaloms Missed: 3) DEBUG:__main__:Episode 64 (1171 steps):
 -6261/8739 (Sloth: -5761, Slaloms Missed: 1) DEBUG:__main__:Episode
 65 (1207 steps): -7467/7533 (Sloth: -5967, Slaloms Missed: 3)
 DEBUG:__main__:Episode 66 (2783 steps): -16903/-1903 (Sloth:
 -13903, Slaloms Missed: 6) DEBUG:__main__:Episode 67 (917 steps):
 -7583/7417 (Sloth: -4583, Slaloms Missed: 6) DEBUG:__main__:Episode
 68 (1291 steps): -8012/6988 (Sloth: -6512, Slaloms Missed: 3)
 DEBUG:__main__:Episode 69 (1362 steps): -8313/6687 (Sloth: -6813,
 Slaloms Missed: 3) DEBUG:__main__:Episode 70 (1078 steps):
 -7405/7595 (Sloth: -5405, Slaloms Missed: 4) DEBUG:__main__:Episode

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71 (1159 steps): -8299/6701 (Sloth: -5799, Slaloms Missed: 5)
DEBUG:__main__:Episode 72 (1033 steps): -5625/9375 (Sloth:
-5125, Slaloms Missed: 1) DEBUG:__main__:Episode 73 (997 steps):
-7545/7455 (Sloth: -5045, Slaloms Missed: 5) DEBUG:__main__:Episode
74 (1198 steps): -7492/7508 (Sloth: -5992, Slaloms Missed: 3)
DEBUG:__main__:Episode 75 (1358 steps): -8874/6126 (Sloth: -6874,
Slaloms Missed: 4) DEBUG:__main__:Episode 76 (1553 steps):
-12228/2772 (Sloth: -7728, Slaloms Missed: 9) DEBUG:__main__:Episode
77 (5377 steps): -33421/-18421 (Sloth: -26921, Slaloms Missed:
13) DEBUG:__main__:Episode 78 (1156 steps): -5703/9297 (Sloth:
-5703, Slaloms Missed: 0) DEBUG:__main__:Episode 79 (1076 steps):
-6880/8120 (Sloth: -5380, Slaloms Missed: 3) DEBUG:__main__:Episode
80 (1297 steps): -8463/6537 (Sloth: -6463, Slaloms Missed: 4)
DEBUG:__main__:Episode 81 (1024 steps): -8140/6860 (Sloth:
-5140, Slaloms Missed: 6) DEBUG:__main__:Episode 82 (917 steps):
-7191/7809 (Sloth: -4691, Slaloms Missed: 5) DEBUG:__main__:Episode
83 (1337 steps): -8666/6334 (Sloth: -6666, Slaloms Missed: 4)
DEBUG:__main__:Episode 84 (1294 steps): -8463/6537 (Sloth: -6463,
Slaloms Missed: 4) DEBUG:__main__:Episode 85 (1173 steps):
-8877/6123 (Sloth: -5877, Slaloms Missed: 6) DEBUG:__main__:Episode
86 (1083 steps): -7448/7552 (Sloth: -5448, Slaloms Missed: 4)
DEBUG:__main__:Episode 87 (1042 steps): -7682/7318 (Sloth: -5182,
Slaloms Missed: 5) DEBUG:__main__:Episode 88 (1165 steps):
-6818/8182 (Sloth: -5818, Slaloms Missed: 2) DEBUG:__main__:Episode
89 (1232 steps): -8629/6371 (Sloth: -6129, Slaloms Missed: 5)
DEBUG:__main__:Episode 90 (1199 steps): -7909/7091 (Sloth: -5909,
Slaloms Missed: 4) DEBUG:__main__:Episode 91 (1894 steps):
-10520/4480 (Sloth: -9520, Slaloms Missed: 2) DEBUG:__main__:Episode
92 (1067 steps): -7333/7667 (Sloth: -5333, Slaloms Missed: 4)
DEBUG:__main__:Episode 93 (1009 steps): -5982/9018 (Sloth: -4982,
Slaloms Missed: 2) DEBUG:__main__:Episode 94 (3789 steps): -19432/-4432
(Sloth: -18932, Slaloms Missed: 1) DEBUG:__main__:Episode 95
(6018 steps): -30000/-15000 (Sloth: -30000, Slaloms Missed: 20)
DEBUG:__main__:Episode 96 (5989 steps): -30000/-15000 (Sloth:
-30000, Slaloms Missed: 20) DEBUG:__main__:Episode 97 (3385 steps):
-19885/-4885 (Sloth: -16885, Slaloms Missed: 6) DEBUG:__main__:Episode
98 (1155 steps): -6269/8731 (Sloth: -5769, Slaloms Missed: 1)
DEBUG:__main__:Episode 99 (1146 steps): -6748/8252 (Sloth: -5748,
Slaloms Missed: 2) INFO:__main__:Best 100-episode average reward was
-10461.63

```

These results look much better! It is still getting stuck, but less often.

In []: