Homework 7

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1 Pole balancing

1.1 Task 1

Figure 1 shows the result of the normalized gradient with fixed α.

The algorithm finds the optimal weight already after about 10 iterations. I did not add the white noise term to the dynamics and just used the output of the open Ai Gym environment.

Also for iteration $k > 15$ there is I guess a numerical issue. Does that come from the limited steps the OpenAi environment takes?

```
RuntimeWarning: invalid value encountered in divide w = w
    + alpha * grad.T/np.linalg.norm(grad)
```

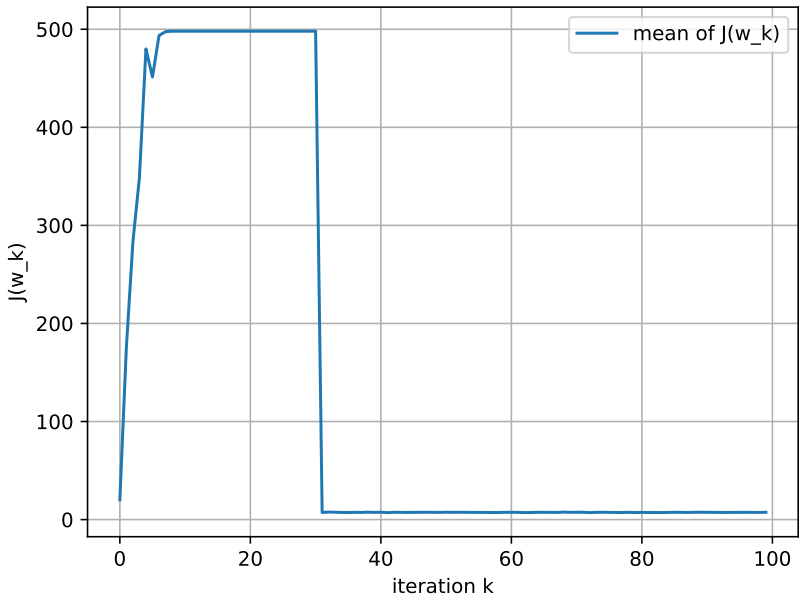

Figure 1: Running the FD algorithm for 100 steps with fixed $\alpha = 0.5$.

1.2 Task 2

Figure 2 shows the result for dynamic α.

1.3 Task 3

Figure 3 shows the result if α is calculated by the Resilient Back Propagation.

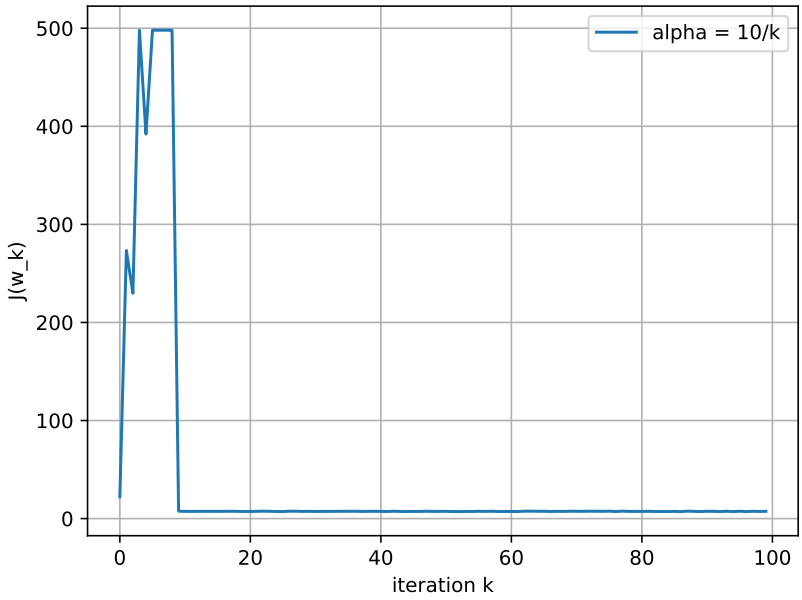

Figure 2: Running the FD algorithm for 100 steps with $\alpha = 10/k$.

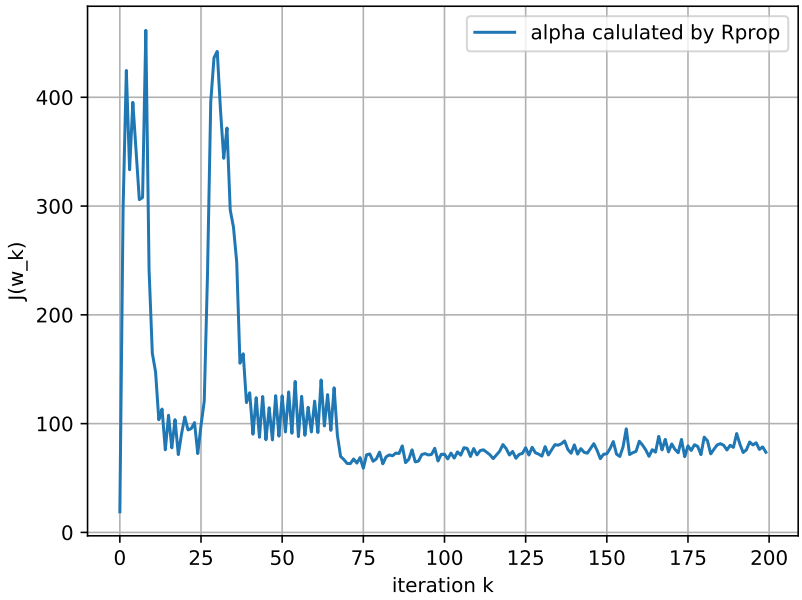

Figure 3: Running the FD algorithm for 200 steps where α is calculated by the Rprop algorithm.