Module 5.5 : Nesterov Accelerated Gradient Descent

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- Yes, let's look at Nesterov accelerated gradient

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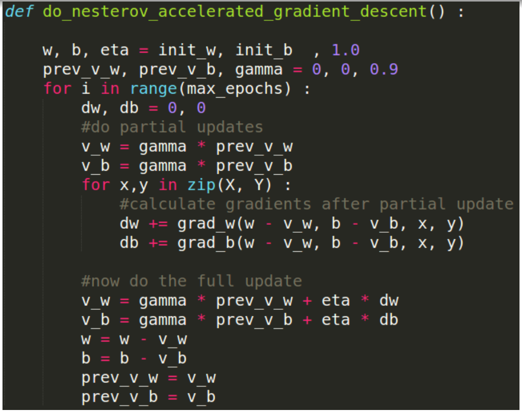
Update rule for NAG

$$\begin{aligned} w_{look\_ahead} &= w_t - \gamma \cdot update_{t-1} \\ update_t &= \gamma \cdot update_{t-1} + \eta \nabla w_{look\_ahead} \\ w_{t+1} &= w_t - update_t \end{aligned}$$

We will have similar update rule for b_t



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    prev_v_w, prev_v_b, gamma = 0, 0, 0.9
    for i in range(max_epochs) :
        dw, db = 0, 0
        #do partial updates
        v_w = gamma * prev_v_w
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        for x,y in zip(X, Y) :
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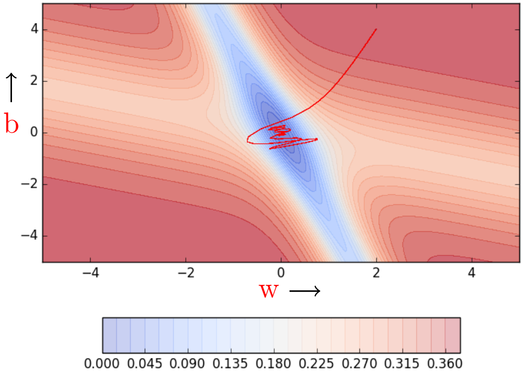

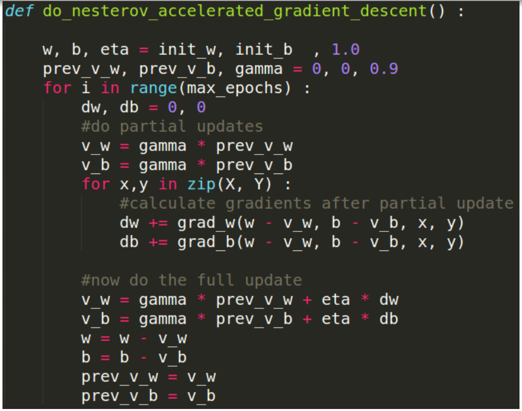

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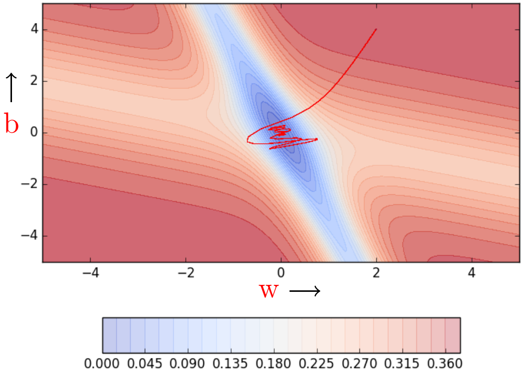

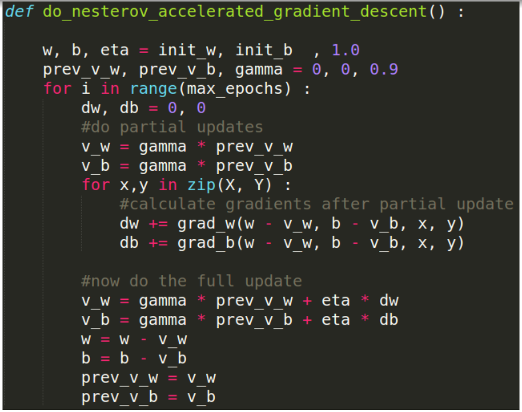

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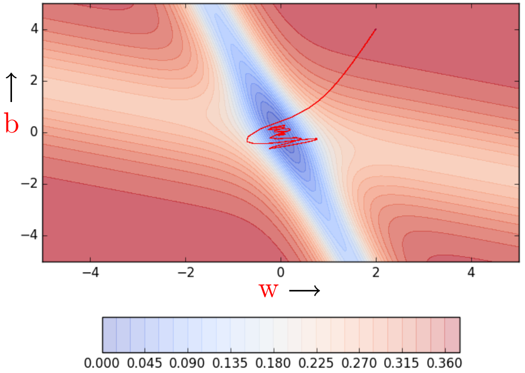

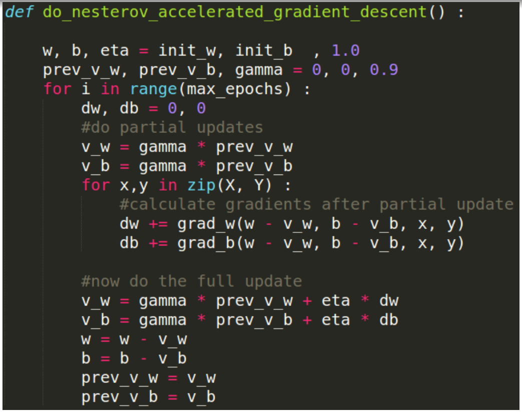

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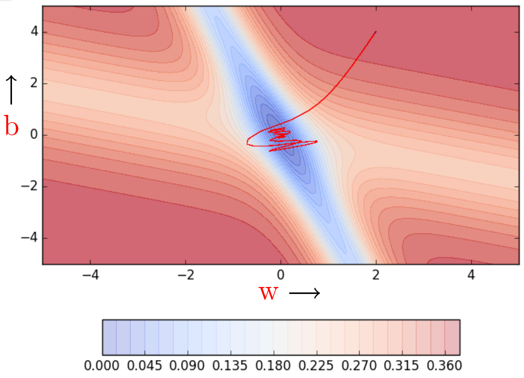

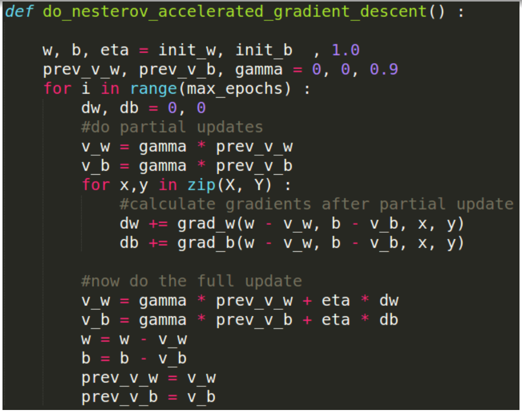

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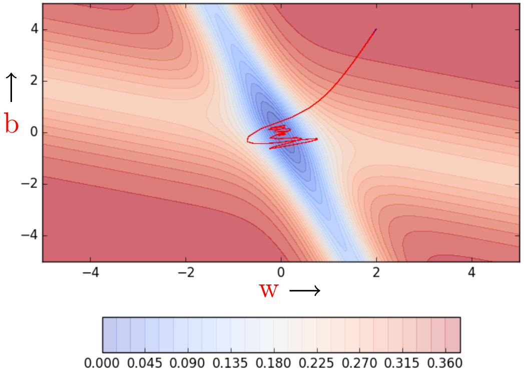

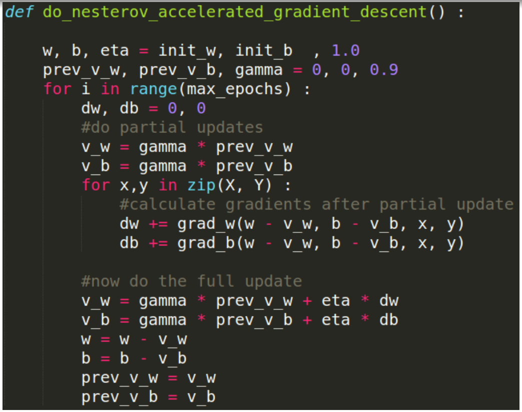

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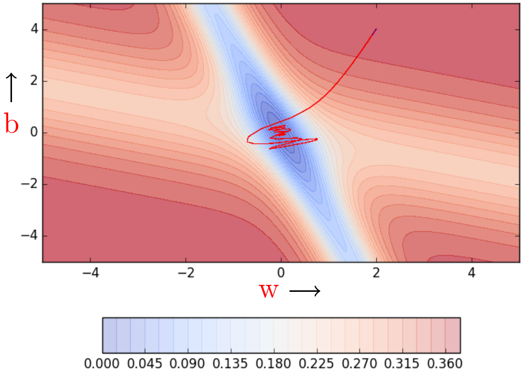

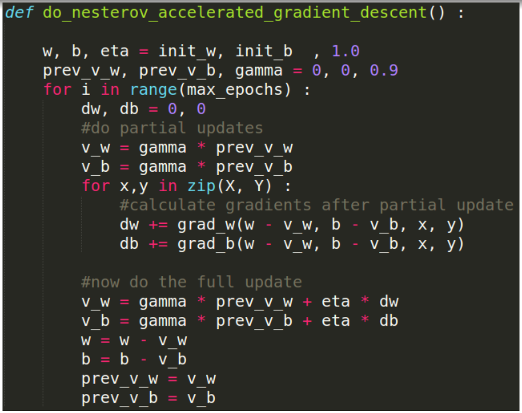

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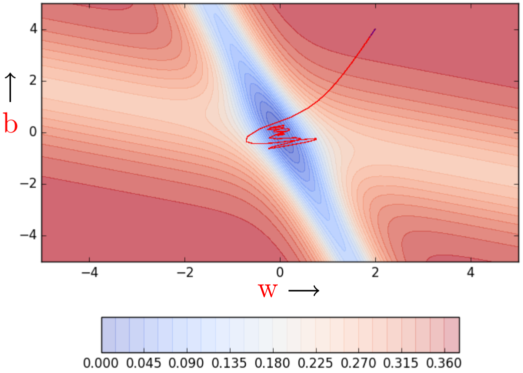

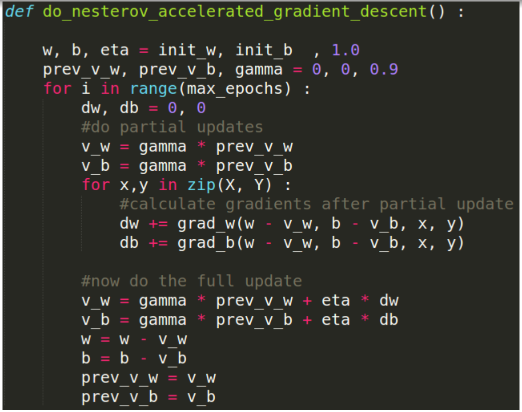

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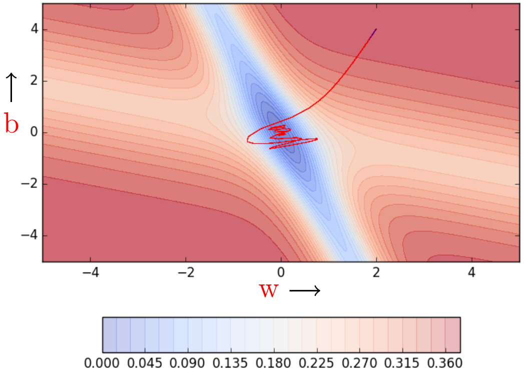

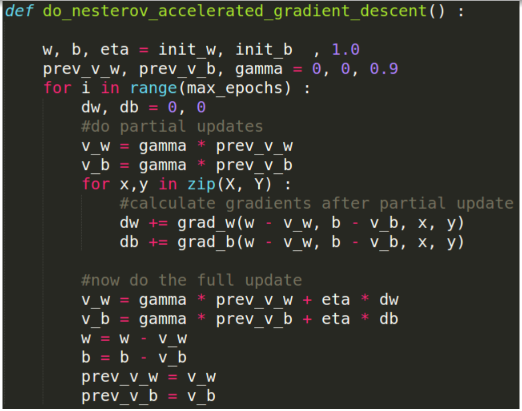

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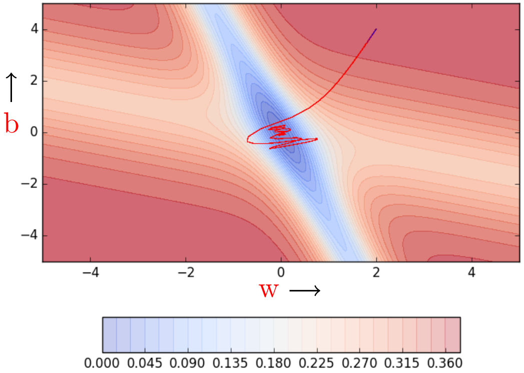

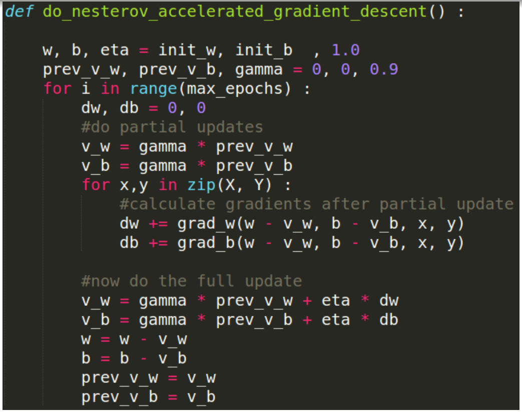

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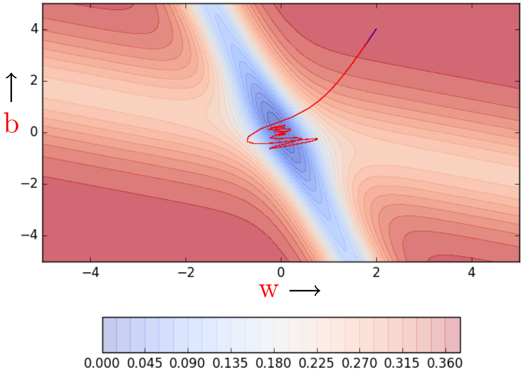

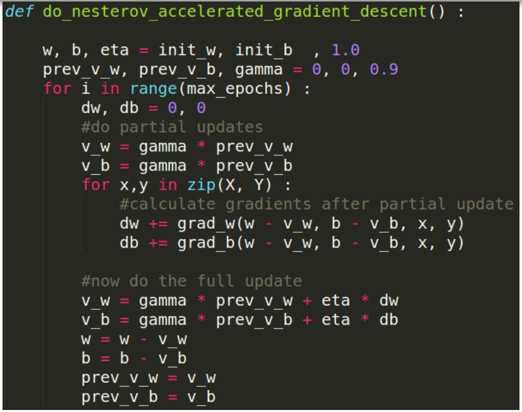

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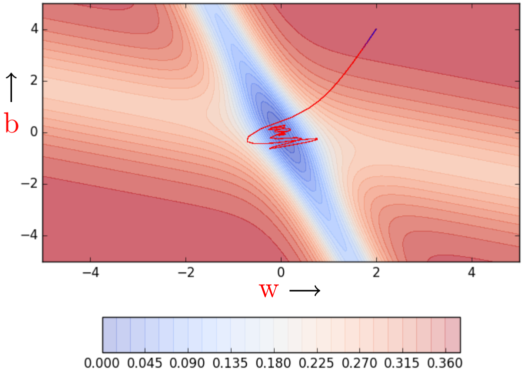

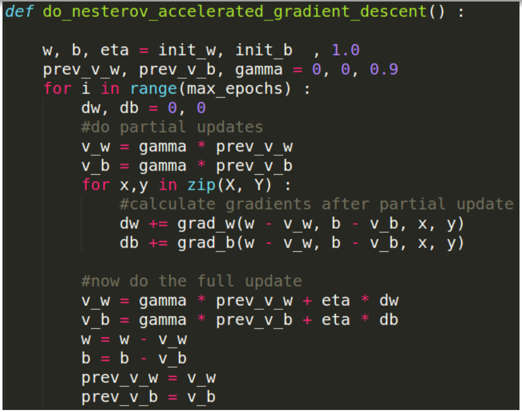

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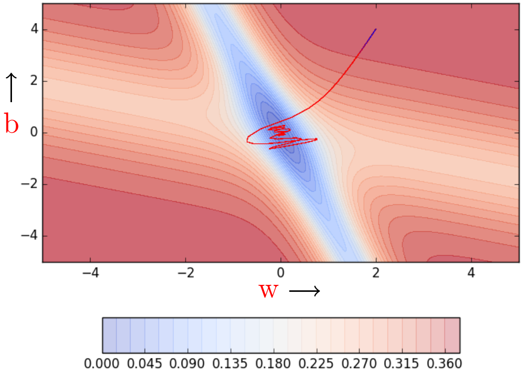

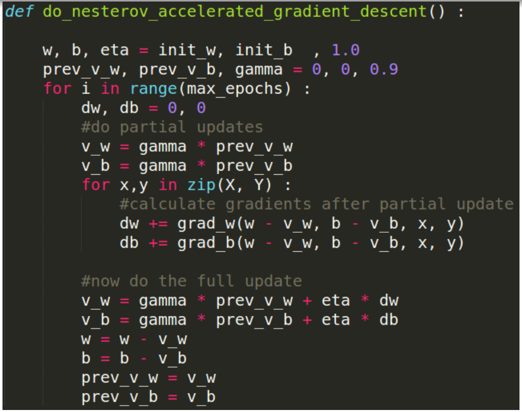

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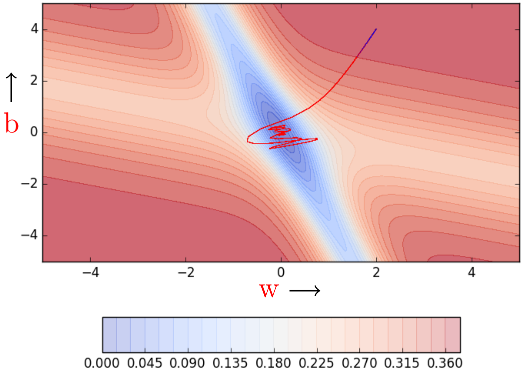

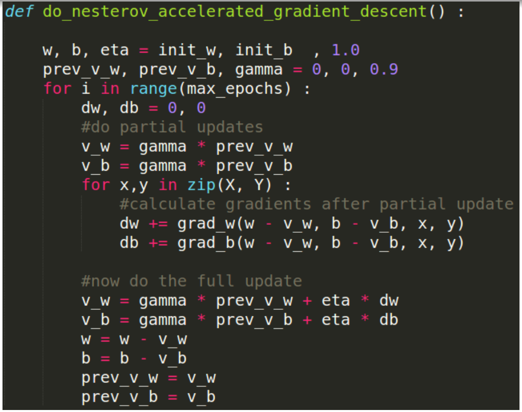

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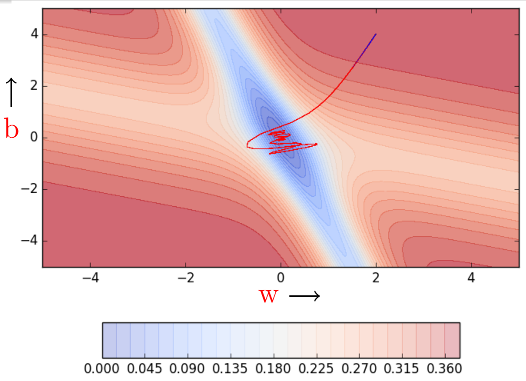

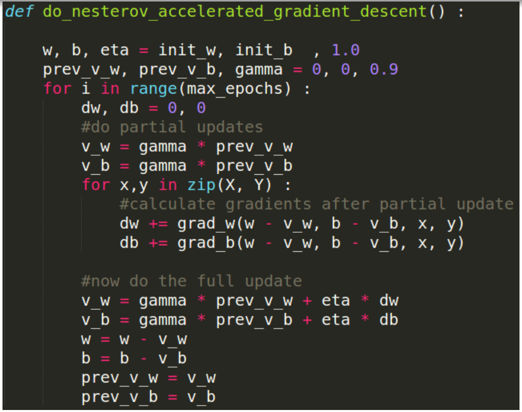

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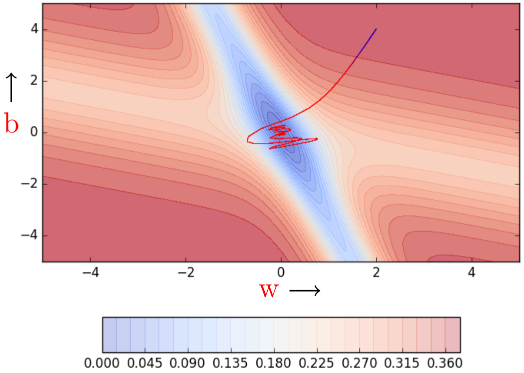

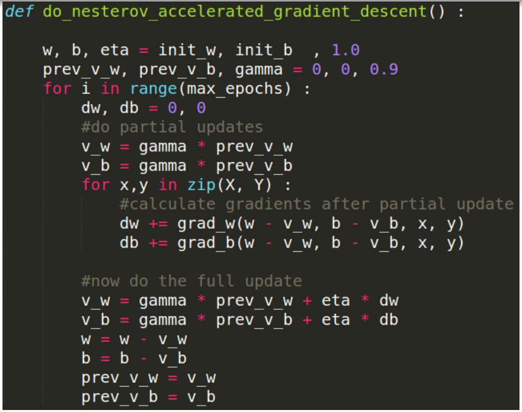

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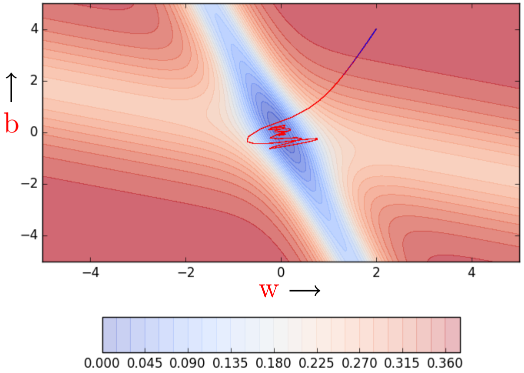

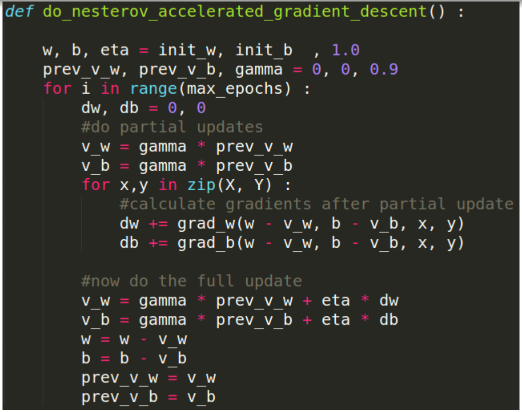

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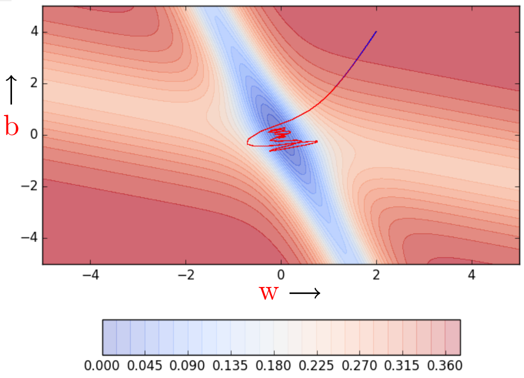

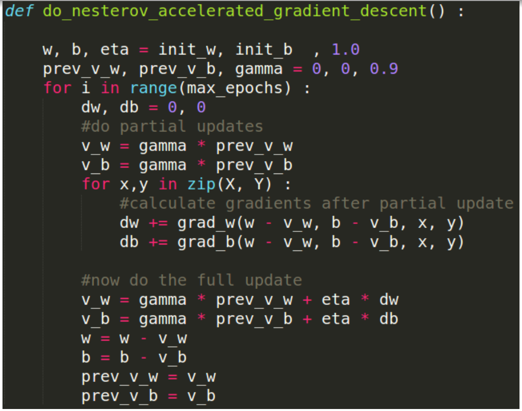

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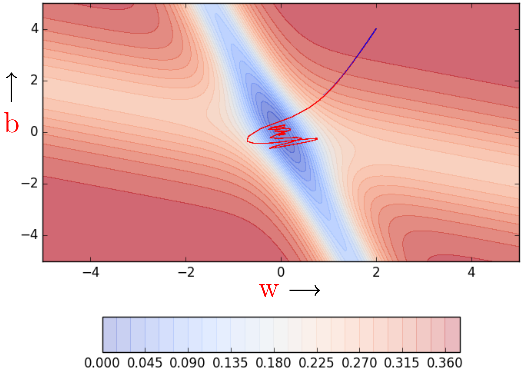

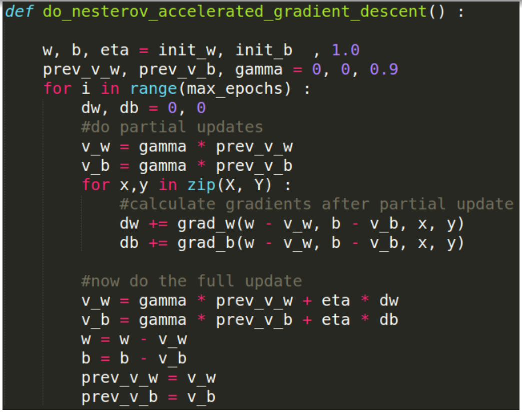

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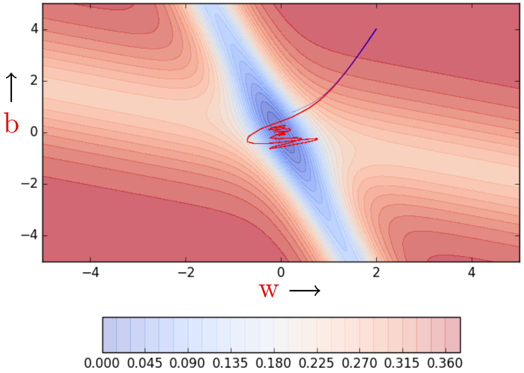

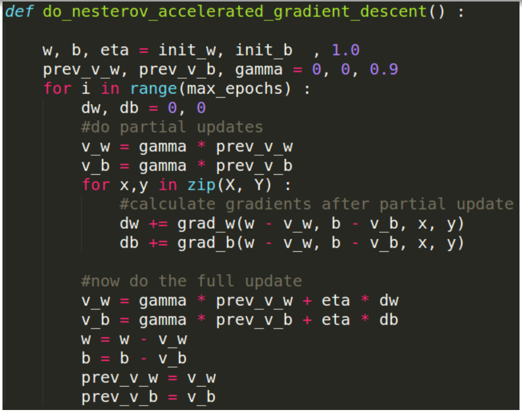

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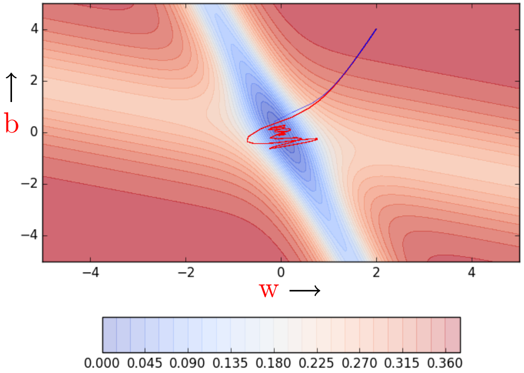

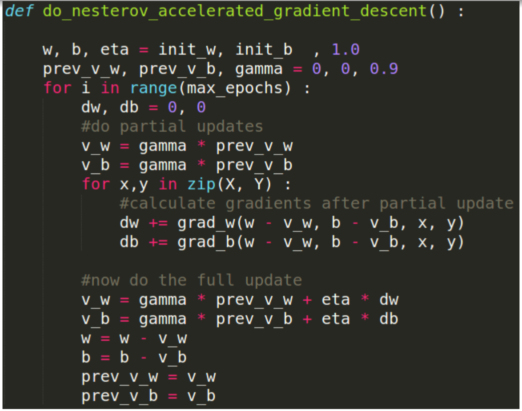

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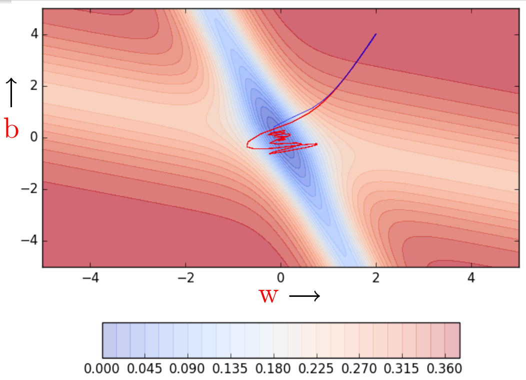

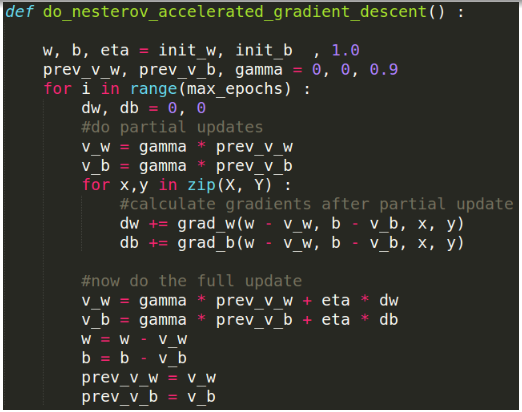

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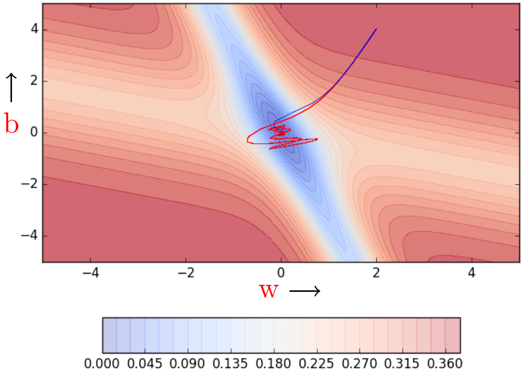

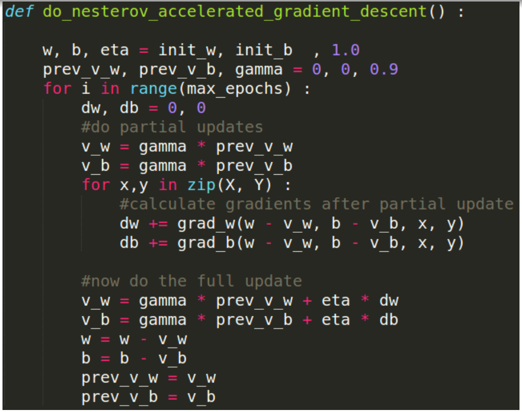

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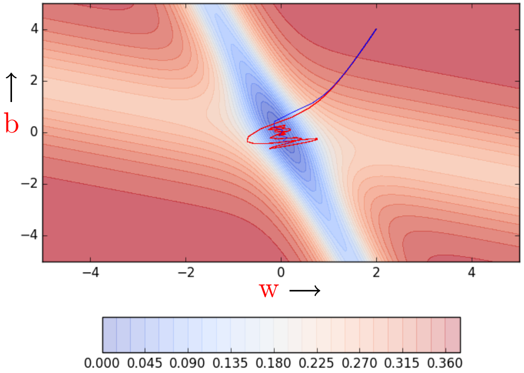

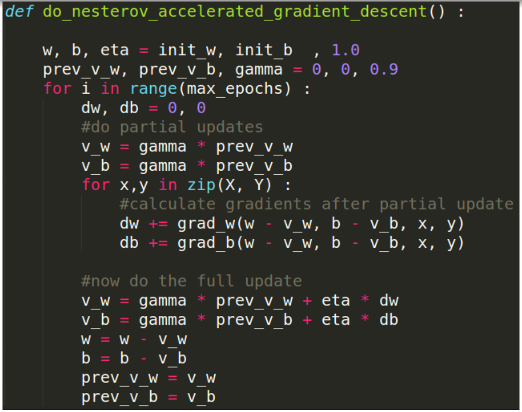
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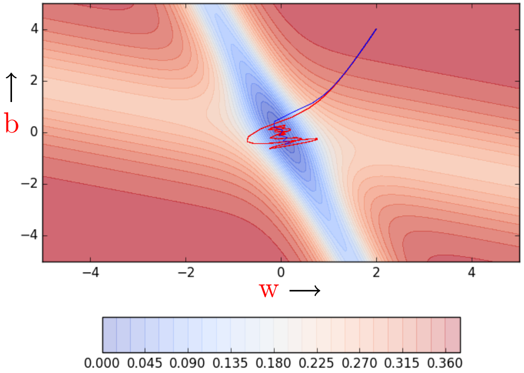

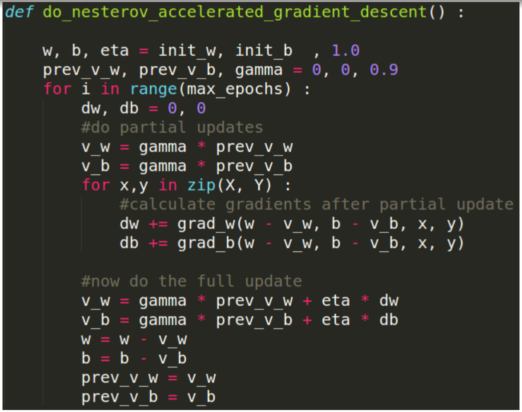

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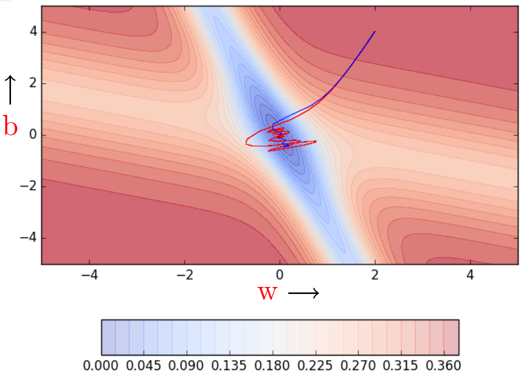

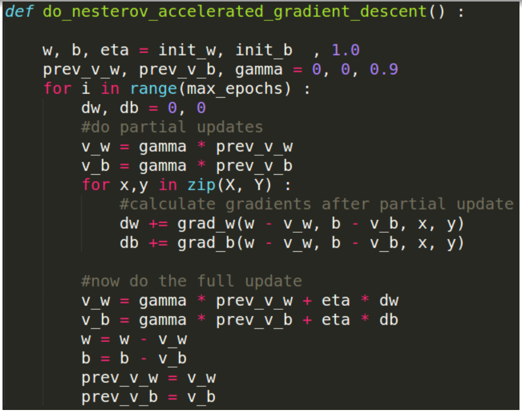

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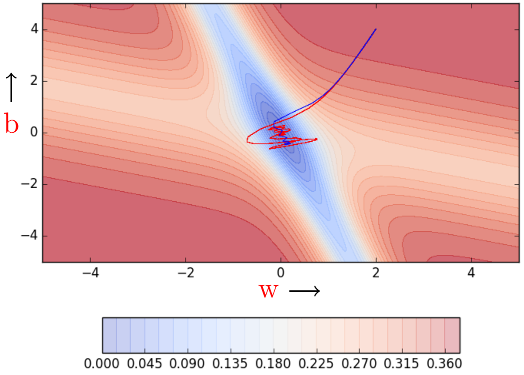

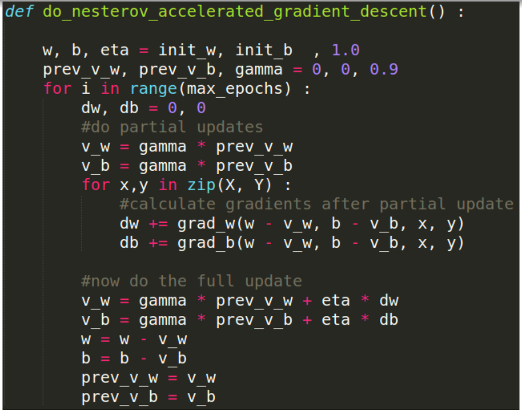

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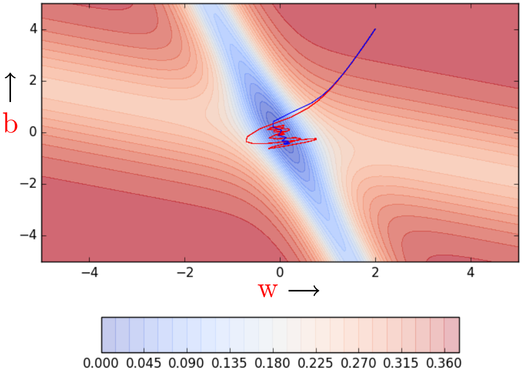

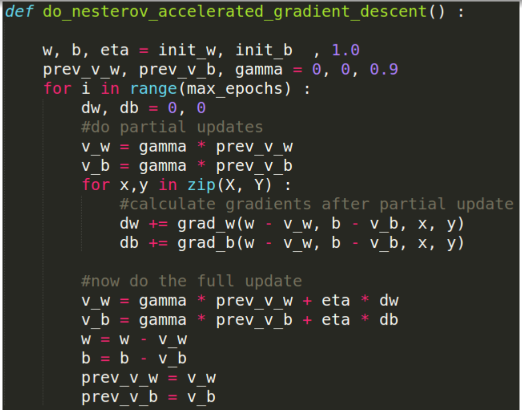

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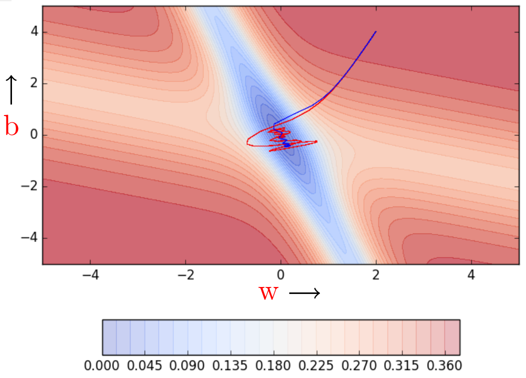

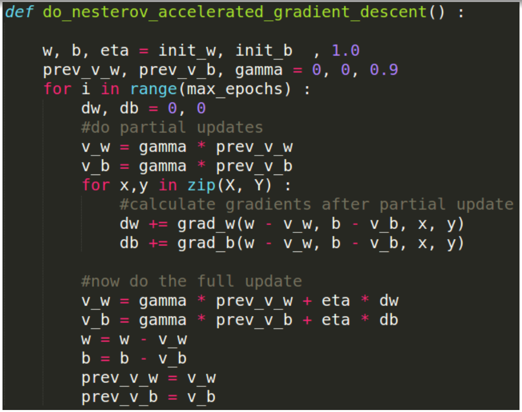

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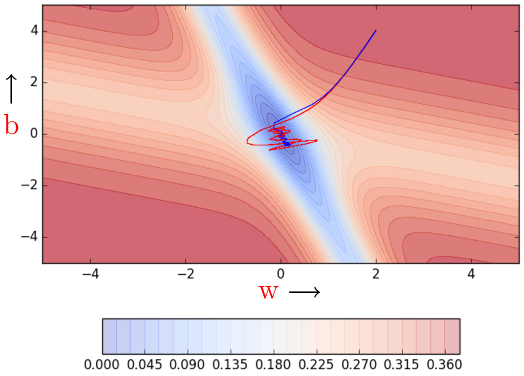

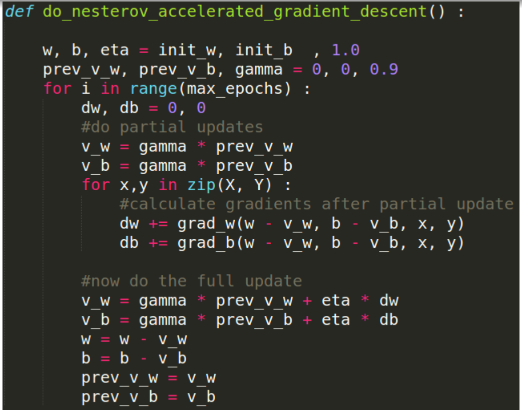

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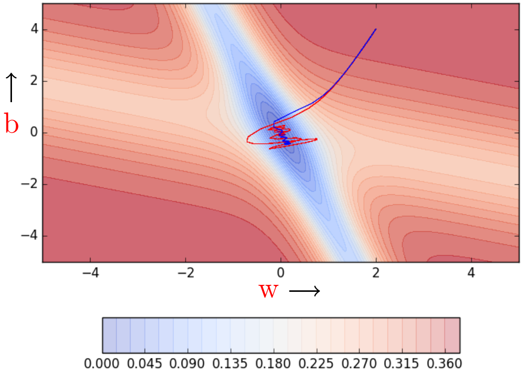

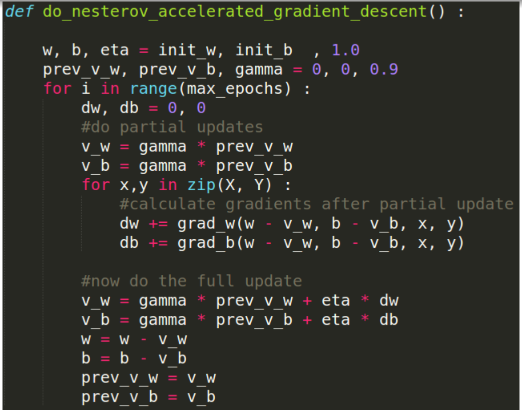

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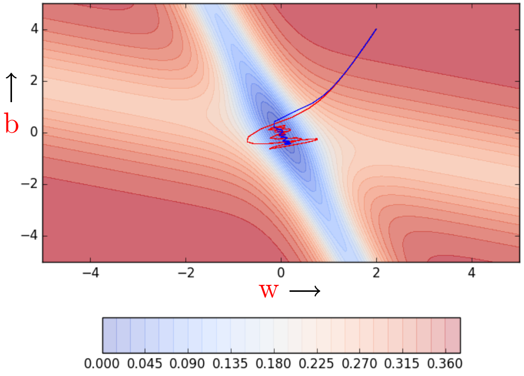

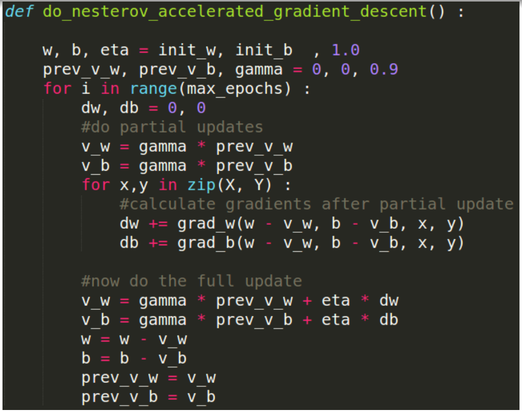

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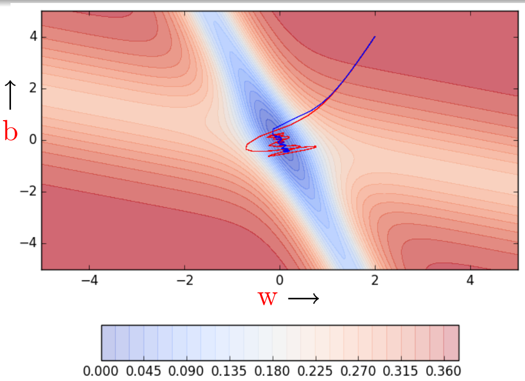

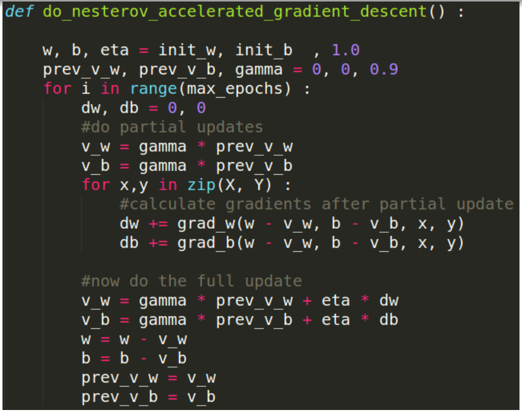

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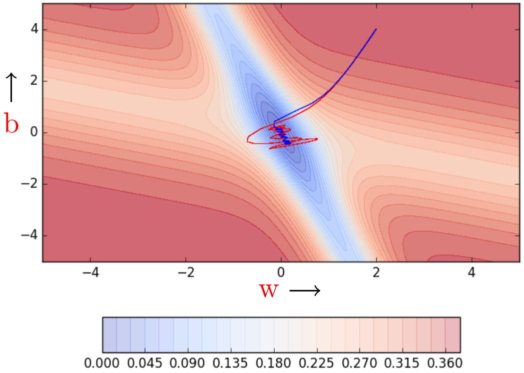

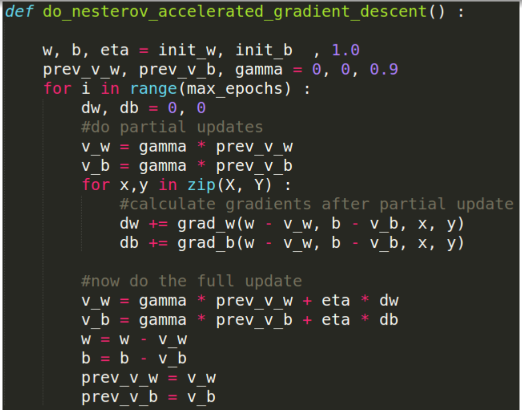

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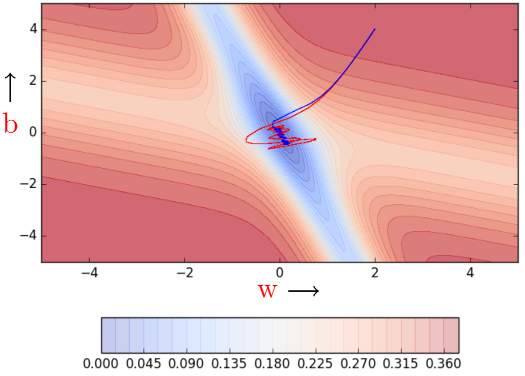

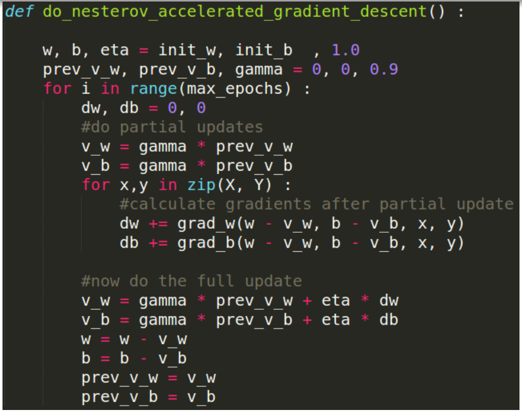

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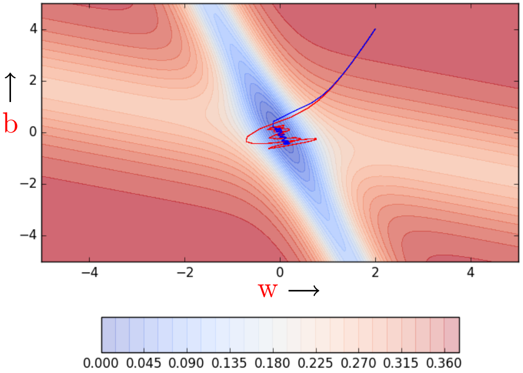

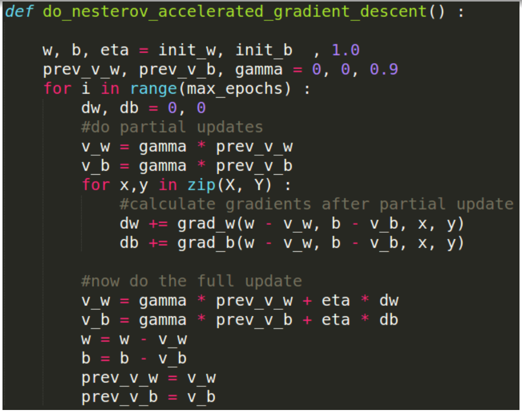

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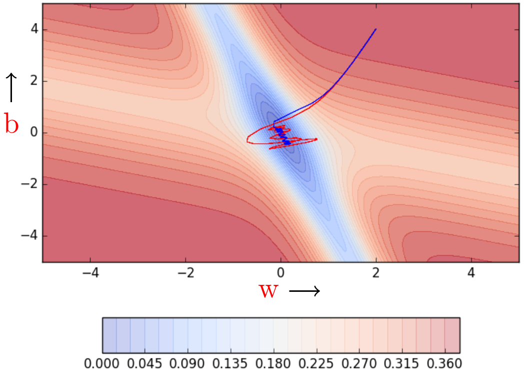

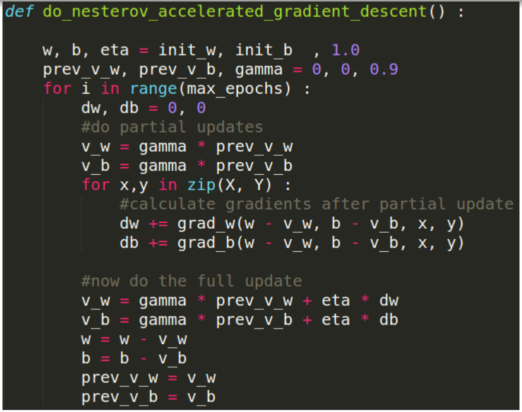

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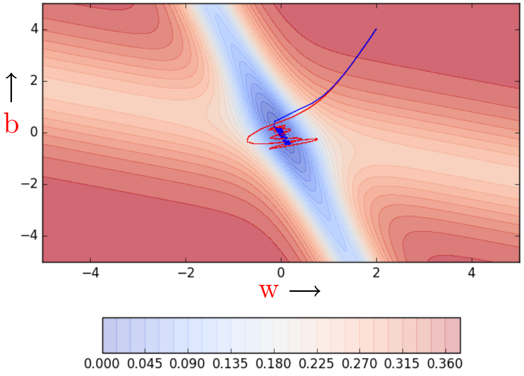

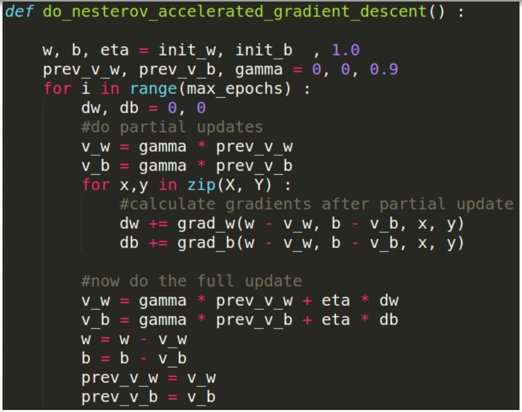

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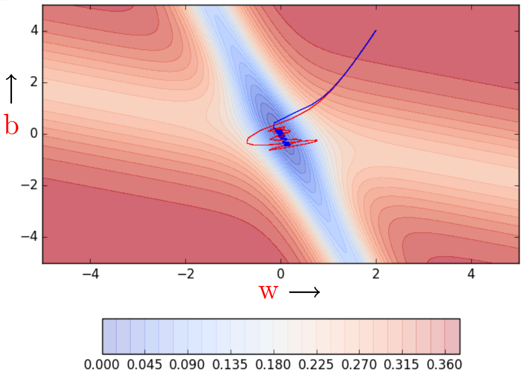

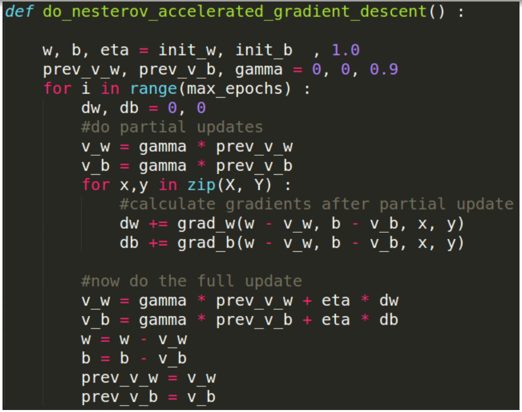

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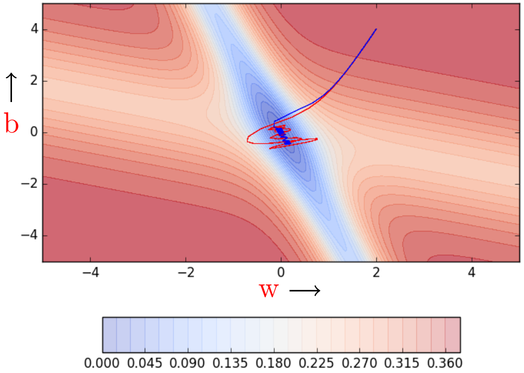

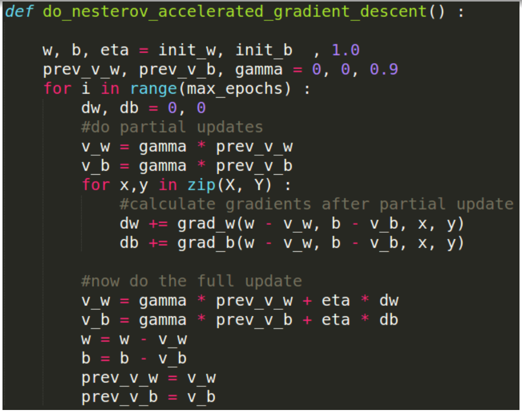

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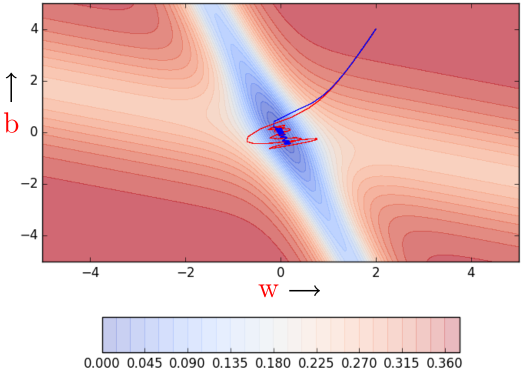

Observations about NAG

- Looking ahead helps NAG in correcting its course quicker than momentum based gradient descent

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- Looking ahead helps NAG in correcting its course quicker than momentum based gradient descent
- Hence the oscillations are smaller and the chances of escaping the minima valley also smaller