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1:  $\alpha_1 = 10^{-3}$  ▷ default
2:  $\beta_1 = 0.9, \beta_2 = 0.999, \beta_3 = 0.999$  ▷ default
3:  $c = 10$  ▷ default
4:  $\epsilon = 10^{-8}$  ▷ default

5:  $m_0 = v_0 \leftarrow 0$ 
6:  $t \leftarrow 0$ 

7: while stopping condition is not reached do
8:    $t \leftarrow t + 1$ 
9:    $g_t \leftarrow \nabla_{\theta} f(\theta_t)$ 
10:   $m_t \leftarrow \beta_1 m_{t-1} + (1 - \beta_1) g_t$ 
11:   $\hat{m}_t \leftarrow m_t / (1 - \beta_1^t)$ 
12:   $v_t \leftarrow \beta_2 v_{t-1} + (1 - \beta_2) g_t^2$ 
13:   $\hat{v}_t \leftarrow v_t / (1 - \beta_2^t)$ 

14:  if  $t > 1$  then
15:     $d_t \leftarrow \frac{|f_t - f_{t-1}|}{\min\{f_t, f_{t-1}\} - f^*}$ 
16:     $\hat{d}_t \leftarrow \text{clip}(d_t, [1/c, c])$ 
17:     $\tilde{d}_t \leftarrow \beta_3 \tilde{d}_{t-1} + (1 - \beta_3) \hat{d}_t$ 
18:  else
19:     $\tilde{d}_t \leftarrow 1$ 
20:  end if

21:   $\theta_t \leftarrow \theta_{t-1} - \frac{\alpha_1}{\tilde{d}_t} \frac{\hat{m}_t}{\sqrt{\hat{v}_t} + \epsilon}$ 
22: end while
23: return  $\theta_t$ 

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