
Algorithm 1: one pass sliding variance in linear time

Data: sliding window length L , data sequence X_1, \dots, X_N

Result: variance of sequence in sliding window v_1, \dots, v_N

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1 Initialize  $mean \leftarrow 0$ ;  
2 Initialize  $sos \leftarrow 0$ ;  
3 Since  $\sum_{i=1}^n (x_i - \bar{x})^2 = \sum_{i=1}^n x_i^2 - 2(n\bar{x}) \cdot (\bar{x}) + n \cdot \bar{x}^2 = \sum_{i=1}^n x_i^2 - n \cdot \bar{x}^2$ , we have:  
4 for  $i \leftarrow 1$  to  $N$  do  
5    $mean \leftarrow mean + \frac{X_i}{L}$ ;  
6    $sos \leftarrow sos + X_i^2$ ;  
7   if  $i > L$  then  
8      $mean \leftarrow mean - \frac{X_{i-L}}{L}$ ;  
9      $sos \leftarrow sos - X_{i-L}^2$ ;  
10  end  
11   $v_i \leftarrow sos - L \cdot mean^2$ ;  
12  yield  $v_i$ ;  
13 end
```
