$$\left(N\hat{X}_N + X_{N+1}\right)\cdot\frac{1}{N+1}$$

$$\hat{X}_{1,N} = \frac{1}{N}\sum_{i=1}^{N} X_i$$

$$\hat{X}_{1,N+1} \quad \hat{X}_{2,N+1} = \frac{1}{N}\sum_{i=2}^{N+1} X_i$$

X_{N+1}

X_1

$$+\left(X_{N+1} - X_1\right)\frac{1}{N}$$

$$\hat{X} = \frac{1}{N}\sum_{i=1}^{N} X_i$$

$$O(N)$$

$$\hat{X}_N \qquad X_{N+1}$$

$$\hat{X}_{N+1} = \frac{1}{N+1}\sum_{i=1}^{N+1} X_i =$$

$$\hat{\sigma}^2_N = \frac{1}{N}\sum_{i=1}^{N}\left(X_i - \hat{X}_N\right)^2 = \frac{1}{N+1}\left(\sum_{i=1}^{N} X_i + X_{N+1}\right) =$$

$$= \frac{1}{N+1}\left(N\cdot\left(\frac{1}{N}\sum_{i=1}^{N} X_i\right) + X_{N+1}\right)$$

$$\hat{X}_{N+1} = \frac{N}{N+1}\hat{X}_N + \frac{1}{N+1}X_{N+1}$$

$$\hat{X}_N$$