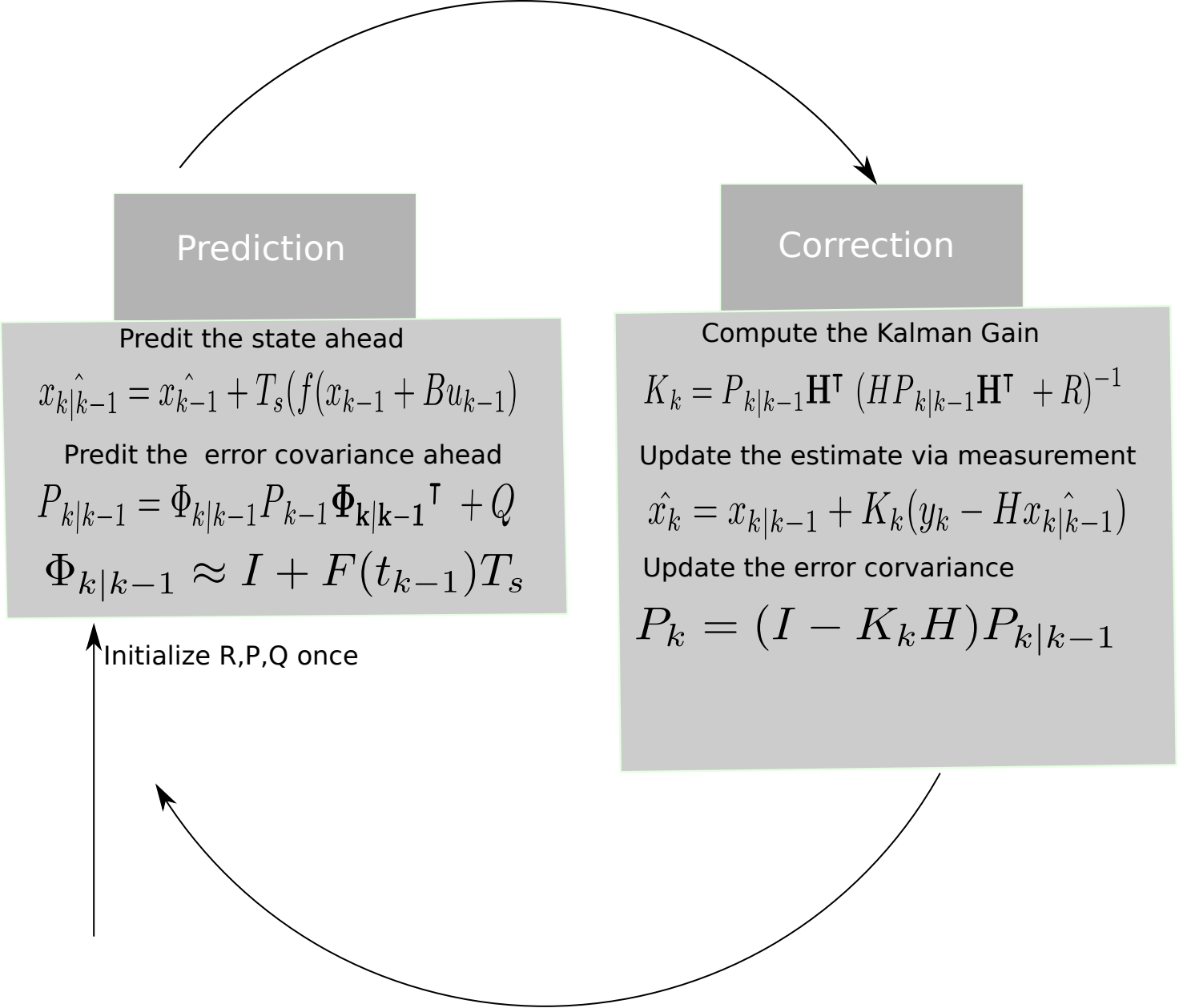
Prediction
Predit the state ahead
$x_{k|\hat{k-1}} = x_{\hat{k-1}} + T_s\left(f\left(x_{k-1} + Bu_{k-1}\right)\right.$
Predit the error covariance ahead
$P_{k|k-1} = \Phi_{k|k-1} P_{k-1} \Phi_{\mathbf{k|k-1}}{}^{\intercal} + Q$
$\Phi_{k|k-1} \approx I + F(t_{k-1}) T_s$
Initialize R,P,Q once
Correction
Compute the Kalman Gain
$K_k = P_{k|k-1} \mathbf{H}^{\intercal} \left(H P_{k|k-1} \mathbf{H}^{\intercal} + R\right)^{-1}$
Update the estimate via measurement
$\hat{x_k} = x_{k|k-1} + K_k\left(y_k - H x_{k|\hat{k-1}}\right)$
Update the error corvariance
$P_k = (I - K_k H) P_{k|k-1}$