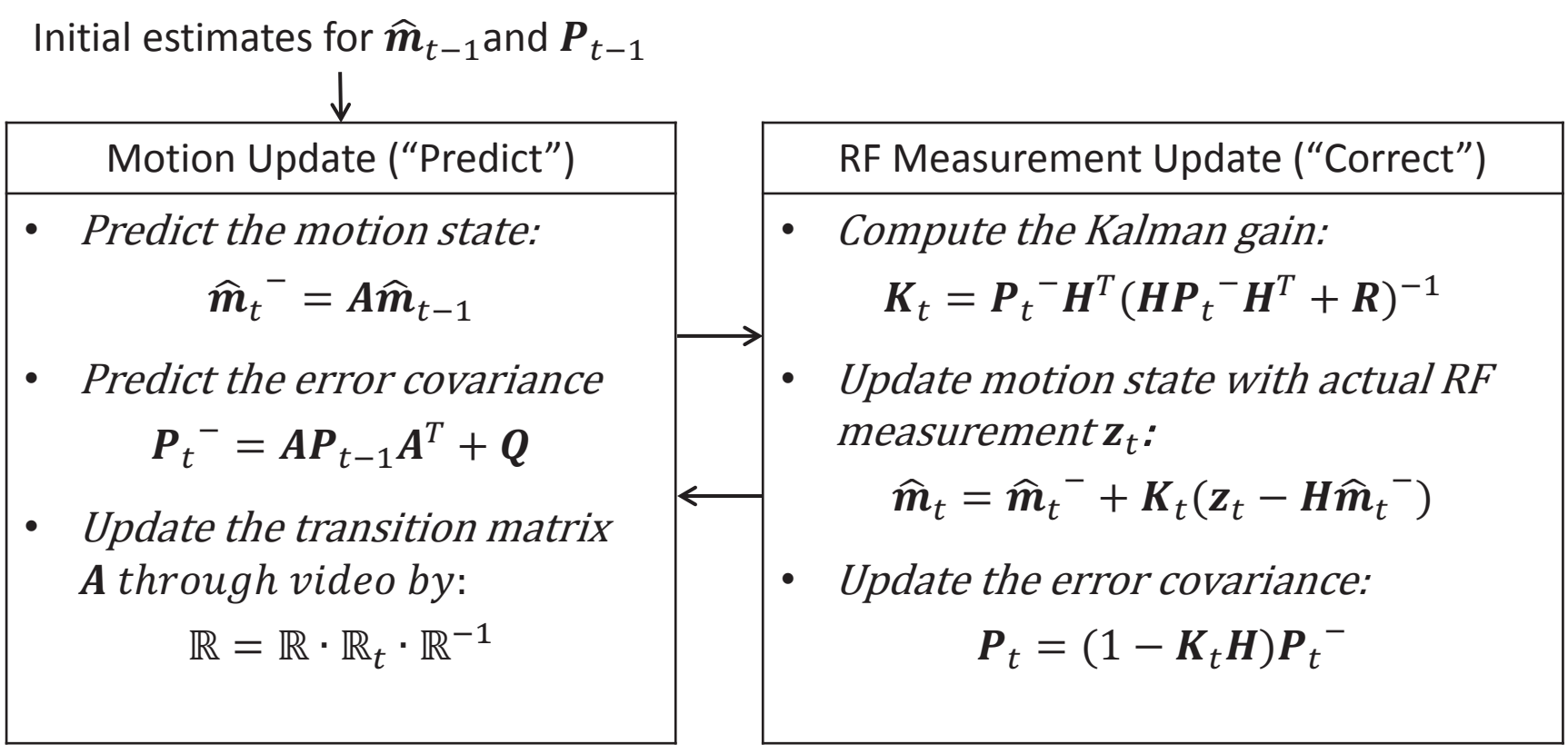
Initial estimates for $\hat{\boldsymbol{m}}_{t-1}$ and $\boldsymbol{P}_{t-1}$
Motion Update ("Predict")
• *Predict the motion state:*
$\hat{\boldsymbol{m}}_t^- = \boldsymbol{A}\hat{\boldsymbol{m}}_{t-1}$
• *Predict the error covariance*
$\boldsymbol{P}_t^- = \boldsymbol{A}\boldsymbol{P}_{t-1}\boldsymbol{A}^T + \boldsymbol{Q}$
• *Update the transition matrix* $\boldsymbol{A}$ *through video by*:
$\mathbb{R} = \mathbb{R} \cdot \mathbb{R}_t \cdot \mathbb{R}^{-1}$
RF Measurement Update ("Correct")
• *Compute the Kalman gain:*
$\boldsymbol{K}_t = \boldsymbol{P}_t^- \boldsymbol{H}^T (\boldsymbol{H}\boldsymbol{P}_t^- \boldsymbol{H}^T + \boldsymbol{R})^{-1}$
• *Update motion state with actual RF measurement* $\boldsymbol{z}_t$*:*
$\hat{\boldsymbol{m}}_t = \hat{\boldsymbol{m}}_t^- + \boldsymbol{K}_t(\boldsymbol{z}_t - \boldsymbol{H}\hat{\boldsymbol{m}}_t^-)$
• *Update the error covariance:*
$\boldsymbol{P}_t = (1 - \boldsymbol{K}_t\boldsymbol{H})\boldsymbol{P}_t^-$