Kalman Filter and Particle Filter

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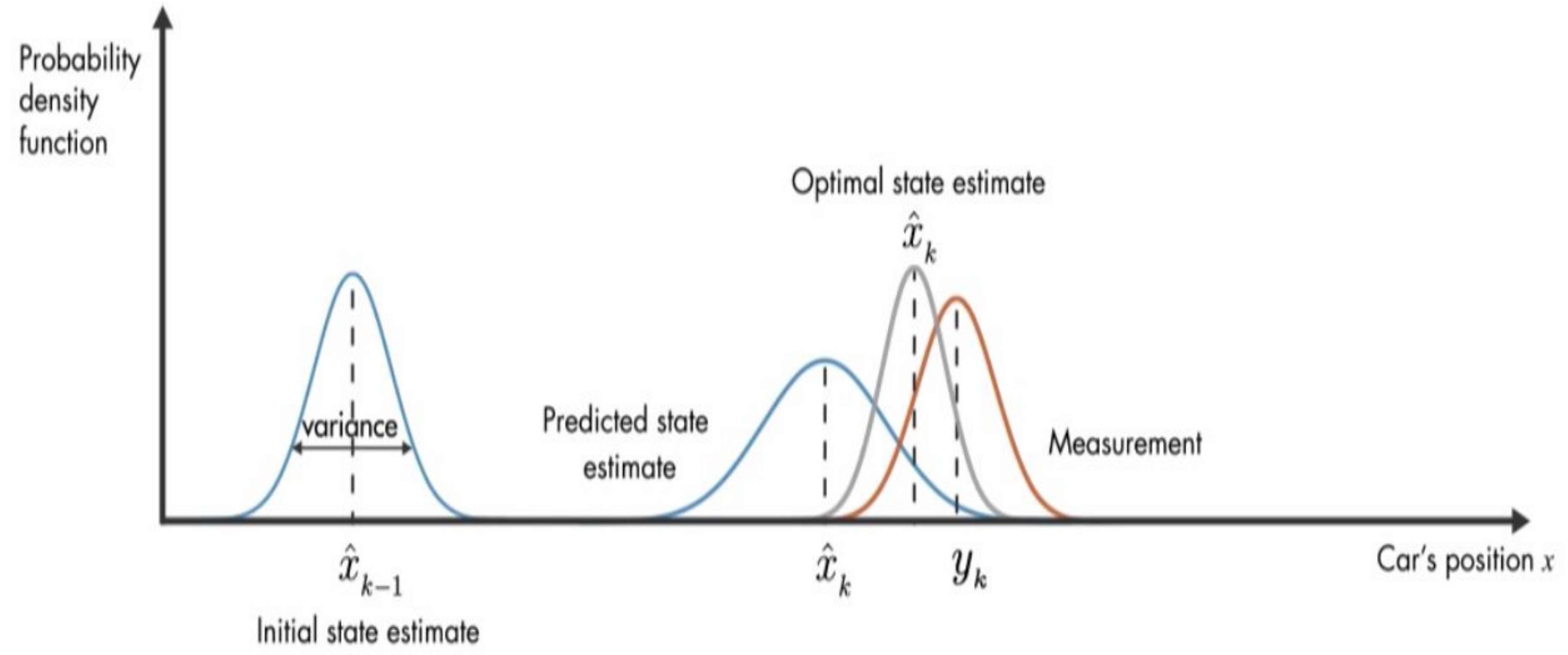
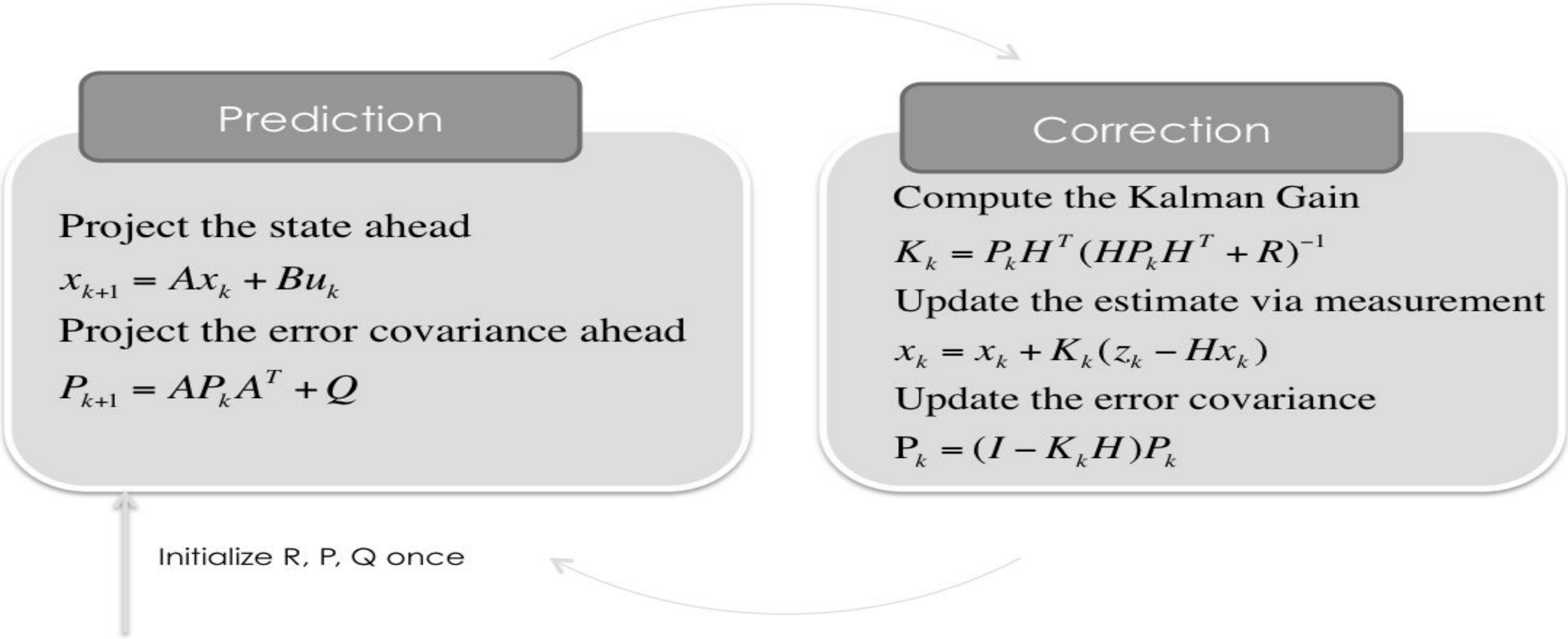
Kalman Filter



Source: https://medium.com/intro-to-artificial-intelligence/extended-kalman-filter-simplified-udacitys-self-driving-car-nanodegree-46d952fce7a3

Kalman Filter



Source: https://vimeo.com/87854542

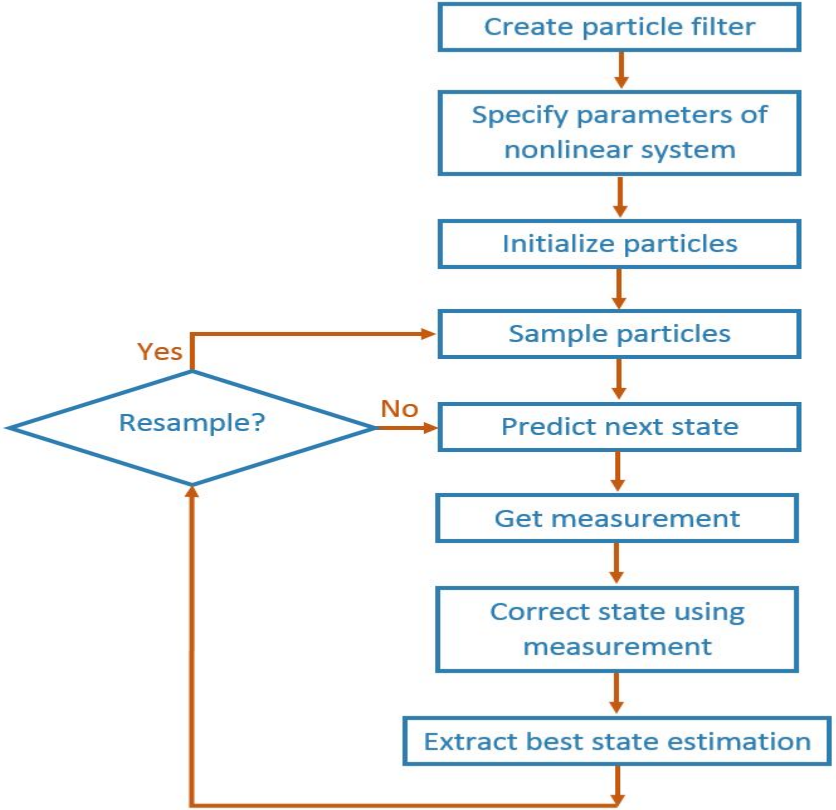
Bayesian Filter
Vs
Kalman Filter

Extended Kalman Filter

	Kalman filter	EKF
state prediction	$A_t\ \mu_{t-1} + B_t\ u_t$	$g(u_t, \mu_{t-1})$
measurement prediction	$C_t\ \bar{\mu}_t$	$h(\bar{\mu}_t)$

Source: Probabilistic Robotics (Chapter 3) by Dieter Fox, Sebastian Thrun, and Wolfram Burgard

Particle Filter



Algorithm Particle_filter$(\mathcal{X}_{t-1}, u_t, z_t)$**:**

$\bar{\mathcal{X}}_t = \mathcal{X}_t = \emptyset$

for $m = 1$ to M do

sample $x_t^{[m]} \sim p(x_t \mid u_t, x_{t-1}^{[m]})$

$w_t^{[m]} = p(z_t \mid x_t^{[m]})$

$\bar{\mathcal{X}}_t = \bar{\mathcal{X}}_t + \langle x_t^{[m]}, w_t^{[m]} \rangle$

endfor

for $m = 1$ to M do

draw i with probability $\propto w_t^{[i]}$

add $x_t^{[i]}$ to $\mathcal{X}_t$

endfor

return $\mathcal{X}_t$

Source: https://mathwork.com

Source: Probabilistic Robotics (Chapter 4) by Dieter Fox, Sebastian Thrun, and Wolfram Burgard

Particle Filter
Vs
Kalman Filter

References

- Probabilistic Robotics (Chapter 3 and 4) by Dieter Fox, Sebastian Thrun, and Wolfram Burgard
- MathWorks.com
- https://medium.com/intro-to-artificial-intelligence/extended-kalman-filter-simplified-udacitys-self-driving-car-nanodegree-46d952fce7a3

Thank You!