input : $n^u_{t|t-1}$, $(\lambda^{u,k}_{t|t-1}, \bar{x}^{u,k}_{t|t-1}, \mathbf{P}^{u,k}_{t|t-1}) \; \forall \; k \in \{1, \ldots, n^u_{t|t-1}\}$; $n_{t|t-1}, (r^i_{t|t-1}, \bar{x}^i_{t|t-1}, \mathbf{P}^i_{t|t-1}) \; \forall \; i \in \{1, \ldots, n_{t|t-1}\}$; $Z_t = \{z^1, \ldots, z^{m_t}\}$

output: $n^u_{t|t}$, $(\lambda^{u,k}_{t|t}, \bar{x}^{u,k}_{t|t}, \mathbf{P}^{u,k}_{t|t}) \; \forall \; k \in \{1, \ldots, n^u_{t|t-1}\}$; $n_{t|t}, (w^{i,a}_{t|t}, r^{i,a}_{t|t}, \bar{x}^{i,a}_{t|t}, \mathbf{P}^{i,a}_{t|t}) \; \forall \; a \in \{0, \ldots, m_t\}$ for $i \in \{1, \ldots, n_{t|t-1}\}$, and $a \in \{1\}$ for $i \in \{n_{t|t-1}, \ldots, n_{t|t-1} + m_t\}$

1 *Update existing tracks*

2 **for** $i \in \{1, \ldots, n_{t|t-1}\}$ **do**

3   *Create missed detection hypothesis*

4 $w^{i,0}_{t|t} := 1 - r^i_{t|t-1} + r^i_{t|t-1}(1 - P^{\mathrm{d}})$

5 $r^{i,0}_{t|t} := \frac{r^i_{t|t-1}(1-P^{\mathrm{d}})}{1 - r^i_{t|t-1} + r^i_{t|t-1}(1-P^{\mathrm{d}})}$

6 $\bar{x}^{i,0}_{t|t} := \bar{x}^i_{t|t-1}$; $\mathbf{P}^{i,0}_{t|t} := \mathbf{P}^i_{t|t-1}$

7   *Create hypotheses with measurement updates*

8 $\mathbf{S} := \mathbf{H}\mathbf{P}^i_{t|t-1}\mathbf{H}^T + \mathbf{R}$

9 $\mathbf{K} := \mathbf{P}^i_{t|t-1}\mathbf{H}^T\mathbf{S}^{-1}$

10 $\mathbf{P}^+ := \mathbf{P}^i_{t|t-1} - \mathbf{K}\mathbf{H}\mathbf{P}^i_{t|t-1}$

11   **for** $j \in \{1, \ldots, m_t\}$ **do**

12 $\nu := z^j - \mathbf{H}\bar{x}^i_{t|t-1}$

13 $w^{i,j}_{t|t} := r^i_{t|t-1}P^{\mathrm{d}}\mathcal{N}\{\nu; 0, \mathbf{S}\}$; $r^{i,j}_{t|t} := 1$

14 $\bar{x}^{i,j}_{t|t} := \bar{x}^i_{t|t-1} + \mathbf{K}\nu$; $\mathbf{P}^{i,j}_{t|t} := \mathbf{P}^+$

15   **end**

16 **end**

17 *Create a new track for each measurement by updating PPP with measurement*

18 **for** $k \in \{1, \ldots, n^u_{t|t-1}\}$ **do**

19 $\mathbf{S}^k := \mathbf{H}\mathbf{P}^{u,k}_{t|t-1}\mathbf{H}^T + \mathbf{R}$

20 $\mathbf{K}^k := \mathbf{P}^{u,k}_{t|t-1}\mathbf{H}^T[\mathbf{S}^k]^{-1}$

21 $\mathbf{P}^k := \mathbf{P}^{u,k}_{t|t-1} - \mathbf{K}^k\mathbf{H}\mathbf{P}^{u,k}_{t|t-1}$

22 **end**

23 **for** $j \in \{1, \ldots, m_t\}$ **do**

24 $i := n_{t|t-1} + j$

25   **for** $k \in \{1, \ldots, n^u_{t|t-1}\}$ **do**

26 $\nu := z^j - \mathbf{H}\bar{x}^{u,k}_{t|t-1}$

27 $c^k := \lambda^{u,k}_{t|t-1}P^{\mathrm{d}}\mathcal{N}\{\nu; 0, \mathbf{S}^k\}$

28 $y^k := \bar{x}^{u,k}_{t|t-1} + \mathbf{K}^k\nu$

29   **end**

30 $C := \sum_{k=1}^{n^u_{t|t-1}} c^k$; $w^{i,1}_{t|t} := C + \lambda^{\mathrm{fa}}(z^j)$; $r^{i,1}_{t|t} := C/w^{i,1}_{t|t}$ $\bar{x}^{i,1}_{t|t} := \frac{1}{C}\sum_{k=1}^{n^u_{t|t-1}} c^k y^k$

31 $\mathbf{P}^{i,1}_{t|t} := \frac{1}{C}\sum_{k=1}^{n^u_{t|t-1}} c^k[\mathbf{P}^k + (\bar{x}^{i,1}_{t|t} - y^k)(\bar{x}^{i,1}_{t|t} - y^k)^T]$

32 **end**

33 *Update (i.e., thin) intensity of unknown targets*

34 $n^u_{t|t} = n^u_{t|t-1}$

35 **for** $k \in \{1, \ldots, n^u_{t|t-1}\}$ **do**

36 $\lambda^{u,k}_{t|t} := (1 - P^{\mathrm{d}})\lambda^{u,k}_{t|t-1}$

37 $\bar{x}^{u,k}_{t|t} := \bar{x}^{u,k}_{t|t-1}$; $\mathbf{P}^{u,k}_{t|t} := \mathbf{P}^{u,k}_{t|t-1}$

38 **end**