

## Appendix B. Pseudocode of the workflow blocks

### Algorithm B1. Dynamic Loss Weighting

---

Input:  $T$  tasks and parameter  $\alpha$

Output: Re-weighted loss  $L_B$  and updated network weights  $W$

---

```
01  INITIALIZE neural network weights  $W$ 
02  FOR each epoch  $i$  DO
03    FOR each batch  $B$  DO
04      GET the loss on each task  $L_B \in R^T$ 
05      STORE the first batch loss as  $L_{(0,i)} \in R^T$ 
06      FOR each task  $t$  DO
07        SET the task weight  $w_t = \left(\frac{L_{(B,t)}}{L_{(0,t,t)}}\right)^\alpha$ 
08        UPDATE weighted loss  $L_{(B,t)} = L_{(B,t)} \times w_t$ 
09      END FOR
10      UPDATE  $W$  with respect to  $L_B$ 
11    END FOR
12  END FOR
```

---

### Algorithm B2. Segmenter

---

Input: Lung mask  $M$

Output: Coordinate  $y_{mid}$  optimally splitting a lung into segments

---

```
01  SET  $h$  and  $w$  equal to the height and width of a lung mask  $M$ 
02  SET a lower coordinate  $y_{low} = 0$ 
03  SET an upper coordinate  $y_{top} = h$ 
04  COMPUTE the desired area  $S' = \frac{1}{3} \times \sum_{i=1}^w \sum_{j=1}^h M_{ij}$ 
05  WHILE  $y_{low} \leq y_{top}$  DO
06    SET a middle coordinate  $y_{mid} = \frac{y_{low} + y_{top}}{2}$ 
07    COMPUTE a segment area  $A = \sum_{i=1}^w \sum_{j=1}^{y_{mid}} M_{ij}$ 
08    IF  $A \leq S'$  DO
09      UPDATE the lower coordinate  $y_{low} = y_{mid} + 1$ 
10    IF  $A > S'$  DO
11      UPDATE the upper coordinate  $y_{top} = y_{mid} - 1$ 
12  RETURN  $y_{mid}$ 
```

---

### Algorithm B3. Segment and severity score estimator

---

Input: Lung mask  $M$ , disease mask  $D$ , threshold  $T$

Output: Total severity score  $N$

---

```
01  SET  $h$  and  $w$  equal to the height and width of the lung mask  $M$ 
02  INITIALIZE the sum of pixel values  $S = \sum_{i=1}^w \sum_{j=1}^h M_{ij}$ 
03  RUN Algorithm 2 to divide  $M$  into three segments
04  SET  $N = 0$ 
05  FOR each lung segment  $s$  DO
06      SET  $M_i = s \cap D$ 
07      IF  $M_i \geq T$  DO
08          UPDATE  $N = N + 1$ 
09  END FOR
10  RETURN  $N$ 
```

---