Advanced Balanced Search Tree

Interval Tree

Construction

08-XC2

邓俊辉

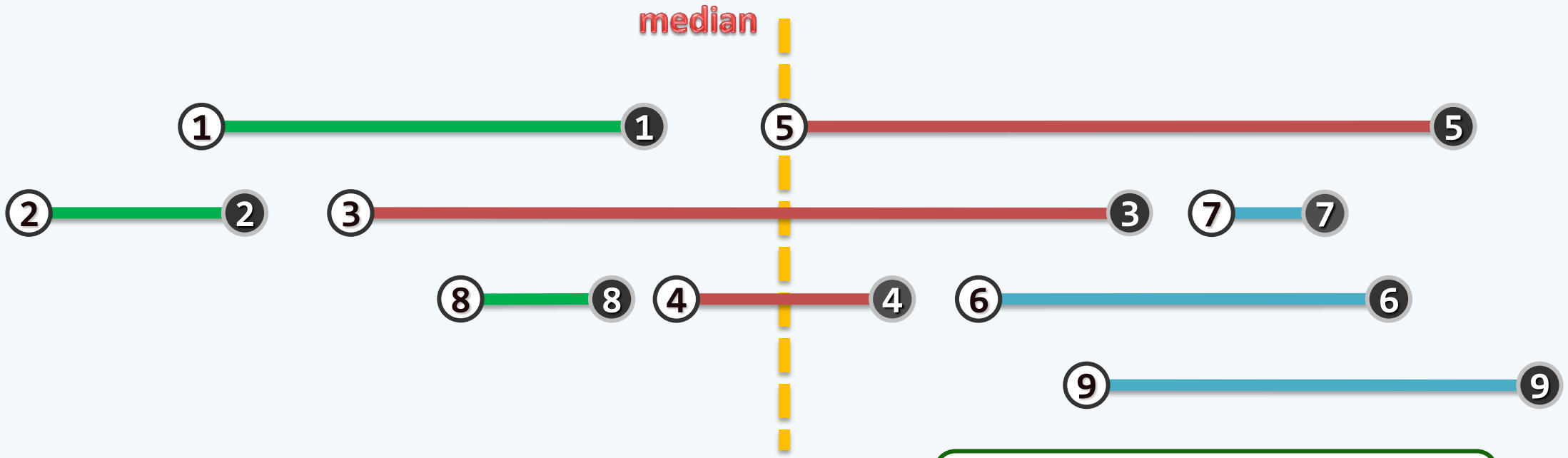
deng@tsinghua.edu.cn

Median

- Let $S = \{ s_1, \ldots, s_n \}$ be the set of intervals
- Let $P = \partial S$ be the set of all endpoints

  // by general position assumption, $|P| = 2n$

- Let $median(P) = x_{mid}$ be the median of P



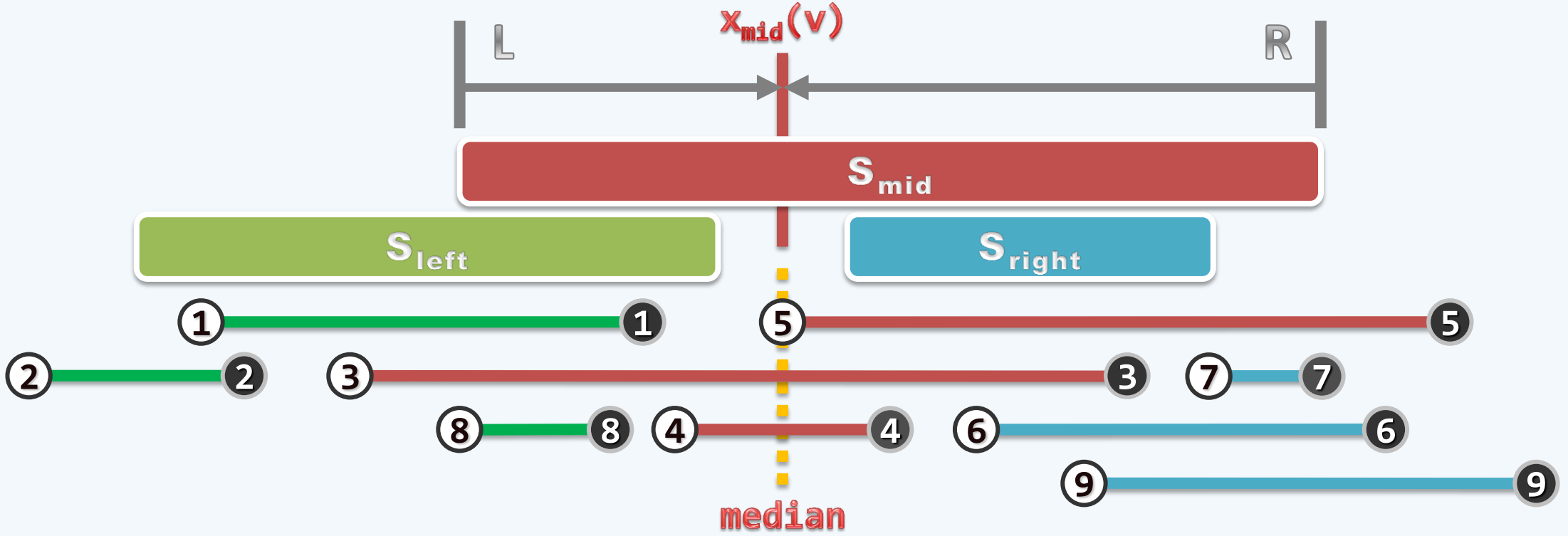
Partitioning (1)

❖ All intervals can be then categorized into 3 subsets

$S_{left} = \{ S_i \mid x_{i\prime} < x_{mid} \}$ //intervals lying entirely **left** to x_{mid}

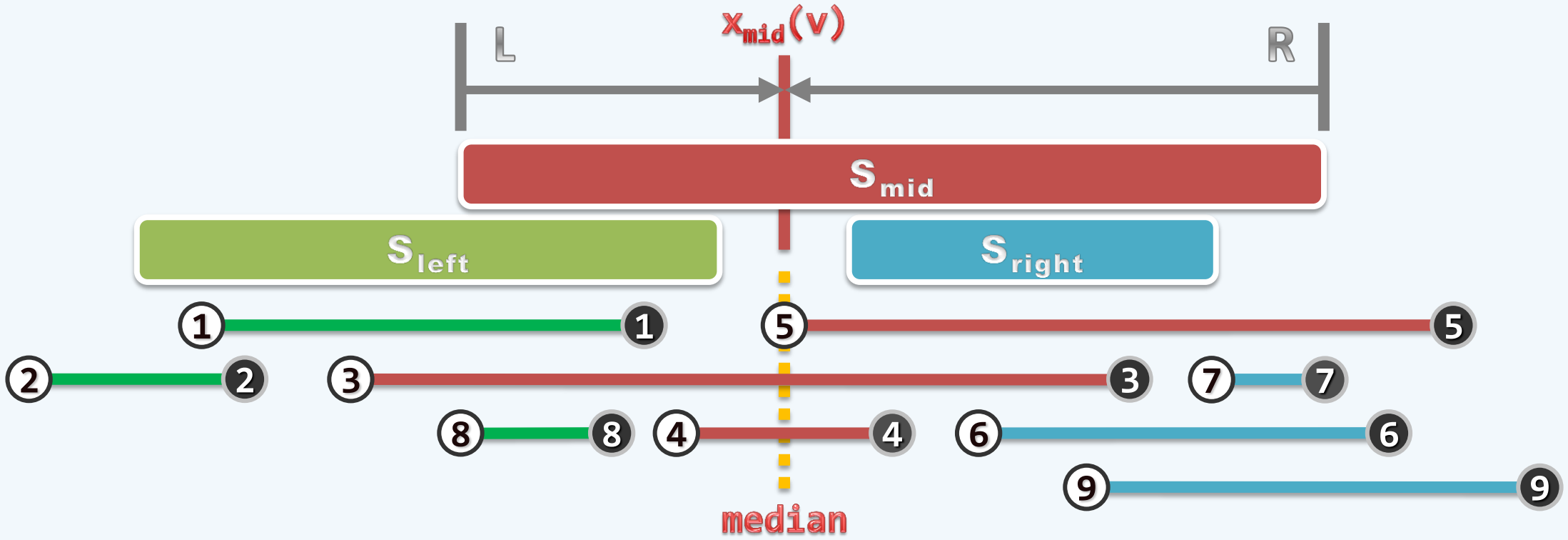
$S_{right} = \{ S_i \mid x_{mid} < x_i \}$ //intervals lying entirely **right** to x_{mid}

$S_{mid} = \{ S_i \mid x_i \leq x_{mid} \leq x_{i\prime} \}$ //intervals that **contain** x_{mid}



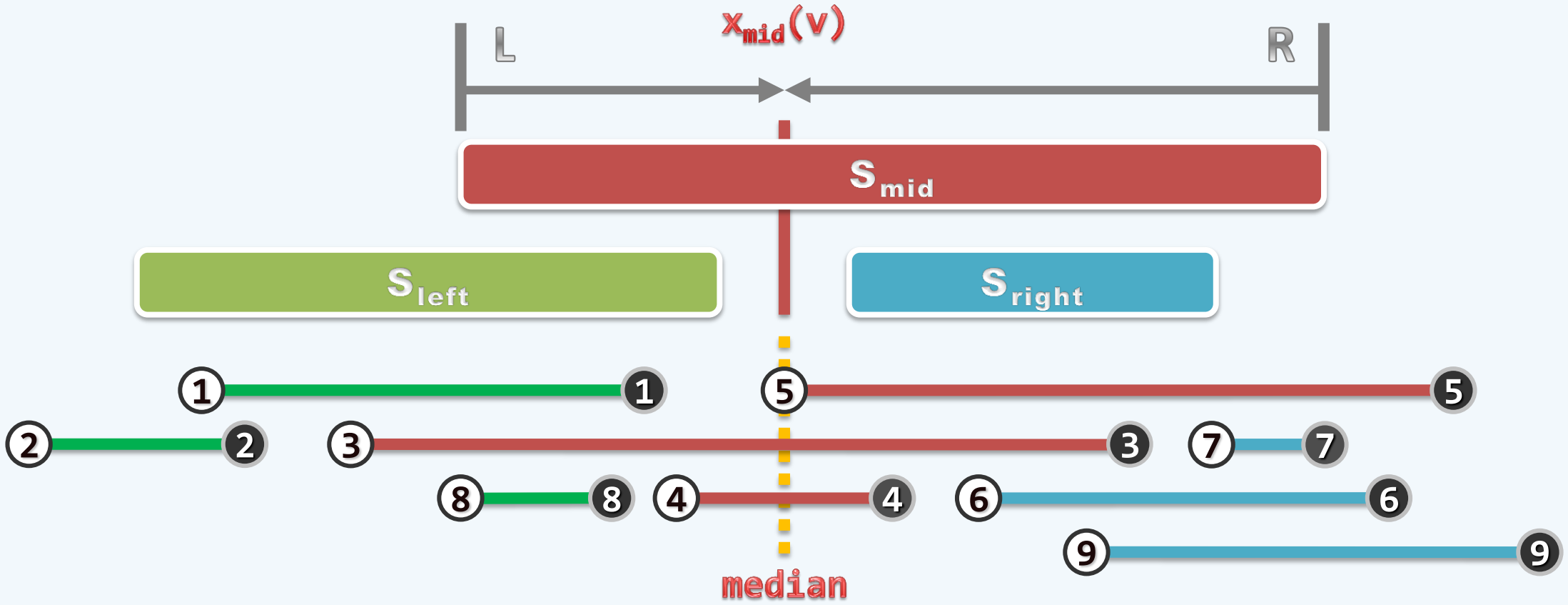
Partitioning (2)

❖ $S_{left/right}$ will be recursively partitioned until they are empty (leaves)



Balance

- $\max \{ |S_{left}|, |S_{right}| \} \leq n/2$
- Best/worst case: $|S_{mid}| = n/1$



Associative Lists

❖ $L_{left/right}$ = all intervals of S_{mid} sorted by the left/right endpoints