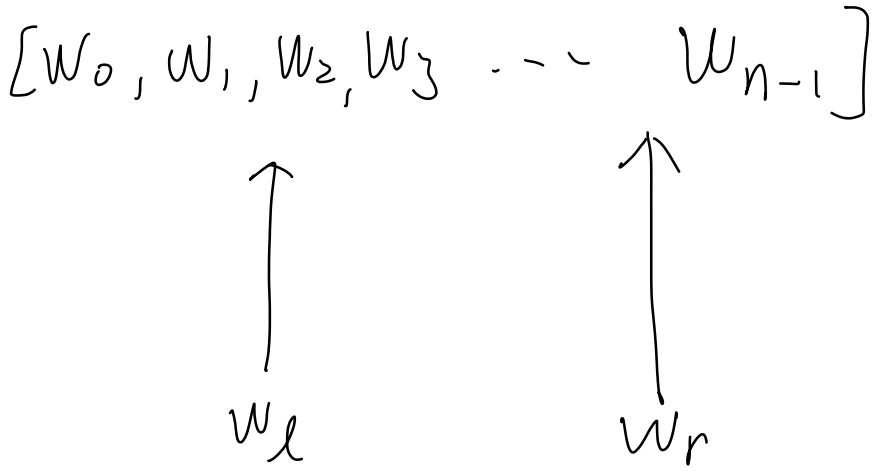

Naive: use hashmap [w] = a list of indices

$\Rightarrow O(n^2)$ at worst

Ex.

[A, B, A, B, A, B, A, B]

hashmap[W_l] → sorted

hashmap[W_r] → sorted

Ex. [1, 3, 5, 7]

[0, 2, 4, 6]

or

hashmap[W_l] = [i_1, i_2, i_3, i_4 - - -]

hashmap[W_r] = [j_1, j_2, j_3, - - -]

Observe that:

for j_1, i minimize $abs(i - j_1)$

can only be the $\max(i)$ $i < j_1$

and $\min(i)$ $i > j_1$

Visualization

Thus, when we encounter $i > j_1$,
we know that every i later in the
array will never give us smaller
abs($i - j_1$)

Thus, we should move j_1 to j_2,

$\Rightarrow O(n)$!