P3924：康娜的线段树

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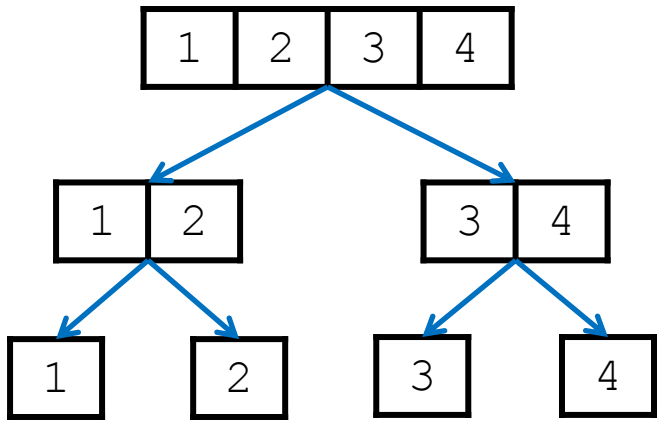
初航我带你，远航靠自己

一、理解题目



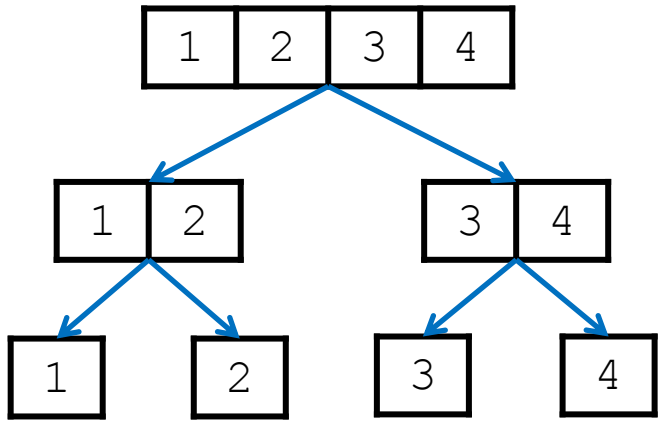
$$\frac{1}{2^0} * \ (1+2+3+4)$$

$$\frac{1}{2^1} * \ (1+2) \qquad \frac{1}{2^1} * \ (3+4)$$

$$\frac{1}{2^2} * 1 \qquad \frac{1}{2^2} * 2 \qquad \frac{1}{2^2} * 3 \qquad \frac{1}{2^2} * 4$$

一、理解题目

$$\frac{1}{2^0} * (1+2+3+4) + \frac{1}{2^1} * (1+2) + \frac{1}{2^1} * (3+4) + \frac{1}{2^2} * 1 + \frac{1}{2^2} * 2 + \frac{1}{2^2} * 3 + \frac{1}{2^2} * 4$$



二、变换公式

$$\frac{1}{2^0} * (1+2+3+4) + \frac{1}{2^1} * (1+2) + \frac{1}{2^1} * (3+4) + \frac{1}{2^2} * 1 + \frac{1}{2^2} * 2 + \frac{1}{2^2} * 3 + \frac{1}{2^2} * 4$$

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$$1 * (\frac{1}{2^0}+\frac{1}{2^1}+\frac{1}{2^2}) + 2 * (\frac{1}{2^0}+\frac{1}{2^1}+\frac{1}{2^2}) + 3 * (\frac{1}{2^0}+\frac{1}{2^1}+\frac{1}{2^2}) + 4 * (\frac{1}{2^0}+\frac{1}{2^1}+\frac{1}{2^2})$$

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$$1 * (\frac{1}{2^0}+\frac{1}{2^1}+\frac{1}{2^2}) + 2 * (\frac{1}{2^0}+\frac{1}{2^1}+\frac{1}{2^2}) + 3 * (\frac{1}{2^0}+\frac{1}{2^1}+\frac{1}{2^2}) + 4 * (\frac{1}{2^0}+\frac{1}{2^1}+\frac{1}{2^2})$$

$$\sum_{i=1}^{n} a_i * (2 - \frac{1}{2^{d_i}})$$

三、区间修改

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$$\sum_{i=1}^{n} a_i * (2 - \frac{1}{2^{d_i}})$$

$$a_1 * s_1 + a_2 * s_2 + a_3 * s_3 + a_4 * s_4 + \cdots + a_l * s_l + \cdots + a_r * s_r + \cdots + \cdots + a_n * s_n$$

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$$a_1 * s_1 + a_2 * s_2 + a_3 * s_3 + a_4 * s_4 + \cdots + a_l * s_l + \cdots + a_r * s_r + \cdots + \cdots + a_n * s_n$$

+x

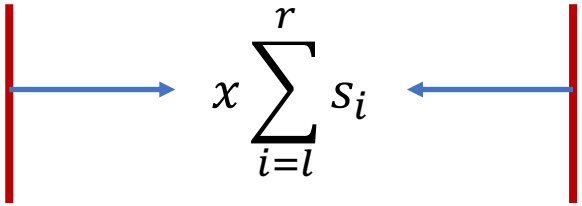
三、区间修改

$$\sum_{i=1}^{n} a_i * (2 - \frac{1}{2^{d_i}})$$

$$a_1 * s_1 + a_2 * s_2 + a_3 * s_3 + a_4 * s_4 + \cdots + a_l * s_l + \cdots + a_r * s_r + \cdots + \cdots + a_n * s_n$$

$$x \sum_{i=l}^{r} s_i$$

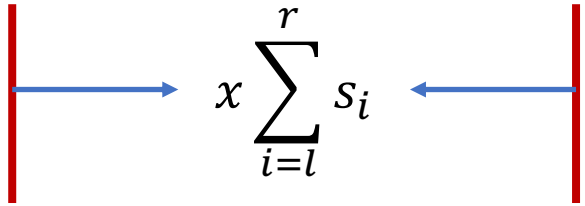
四、最终解法



$$a_1 * s_1 + a_2 * s_2 + a_3 * s_3 + a_4 * s_4 + \cdots + a_l * s_l + \cdots + a_r * s_r + \cdots + \cdots + a_n * s_n$$

1. 计算 $s_1 \sim s_n$ 的值
2. 初始化 ans = $a_1 * s_1 + a_2 * s_2 + a_3 * s_3 + \cdots$
3. 维护 S 数组，为 s 数组的前缀和
4. 面对区间修改 [l, r] -> x，修改 $ans \mathrel{+}= x * (s_r + s_{l-1})$

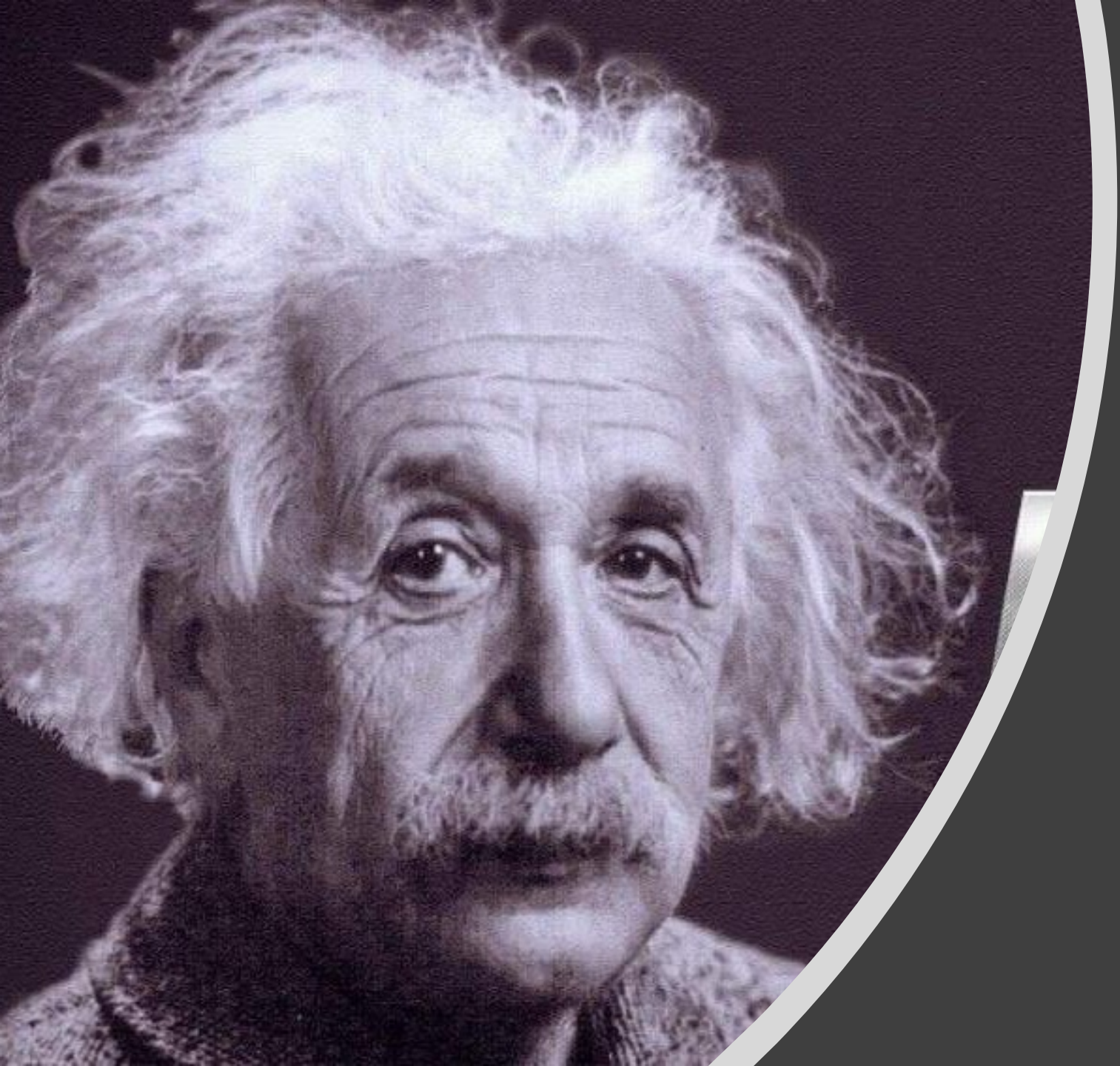
五、写在最后



$$a_1 * s_1 + a_2 * s_2 + a_3 * s_3 + a_4 * s_4 + \cdots + a_l * s_l + \cdots + a_r * s_r + \cdots + \cdots + a_n * s_n$$

$$s_i = \left(2 - \frac{1}{2^{d_i}}\right) \Rightarrow s_i' = \left(2 - \frac{1}{2^{d_i}}\right) * 2^{maxd}$$

浮点数　　整数



为什么
会出一样的题目？

《船说：算法与数据结构》
第16章-树状数组与线段树