题目描述

对于集合$\{1,2,...,n\}$的一棵二叉搜索树，定义一个节点的深度为该节点到根节点的距离，设权值为i的点深度为d_i，给定序列 $p_1,p_2,...,p_n$，定义该二叉搜索树的**代价和**为：

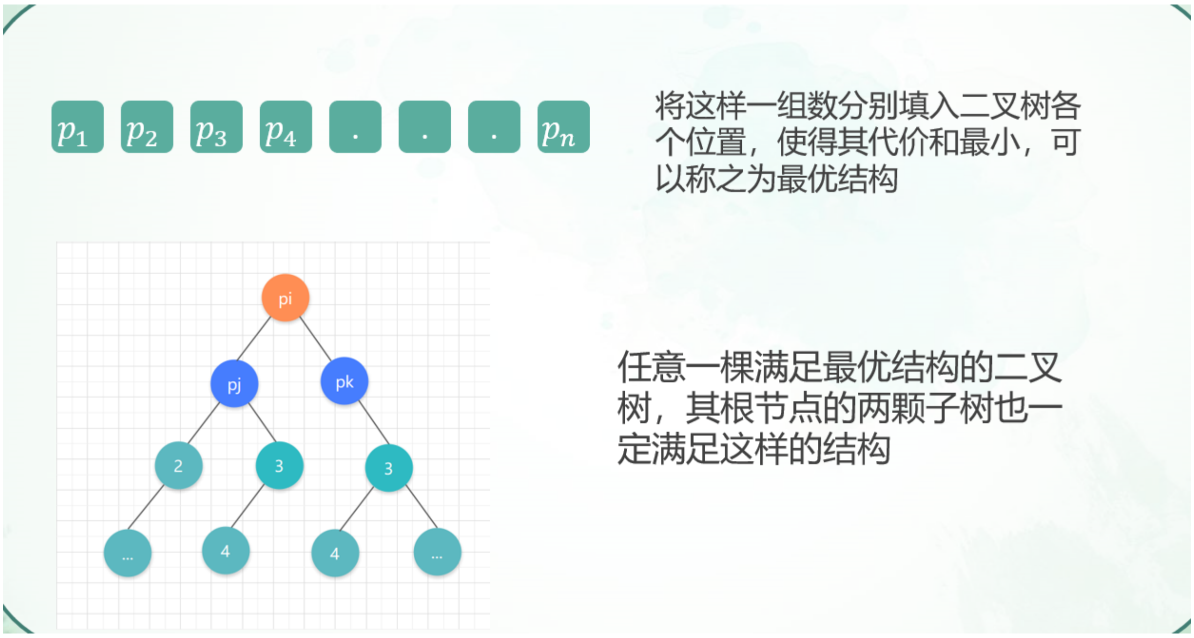
$$\sum_{i=1}^{n}(d_i+1)p_i$$

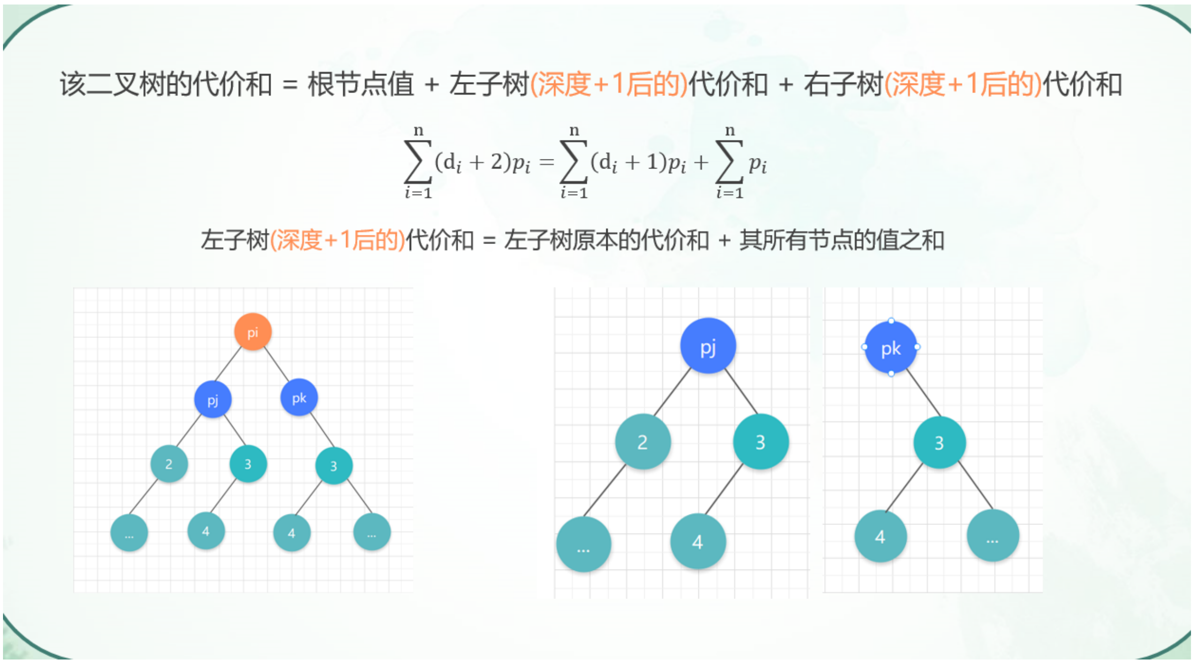
请你求解集合$\{1,2,...,n\}$ 所有二叉搜索树中最小的代价和。

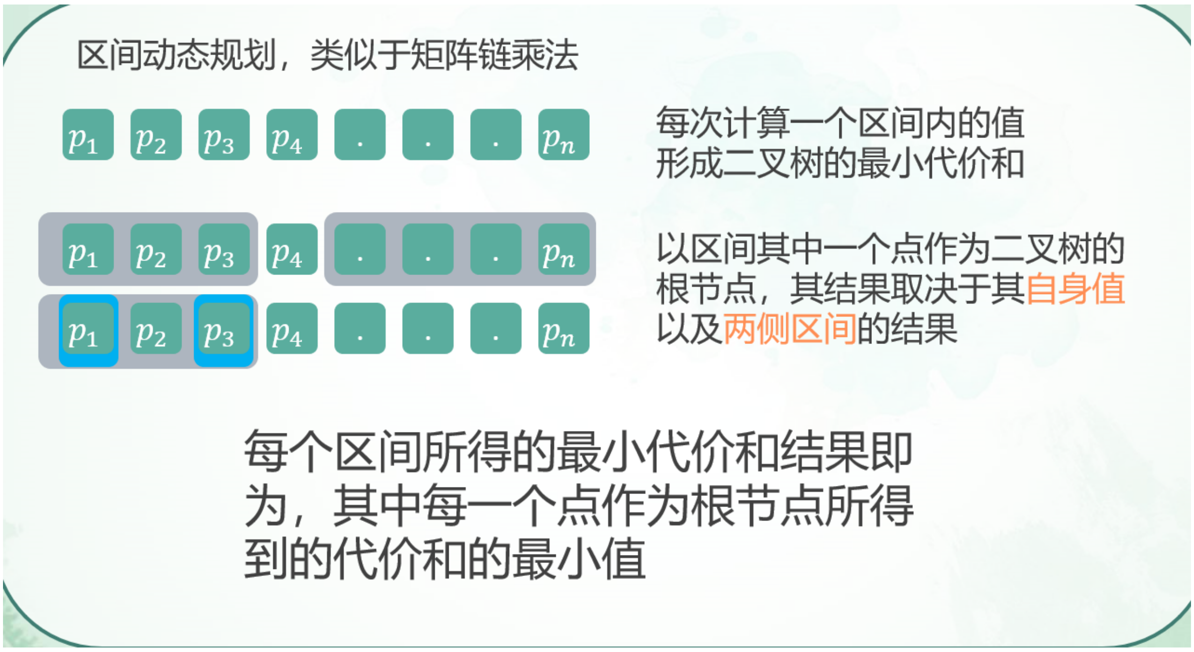
求解思路

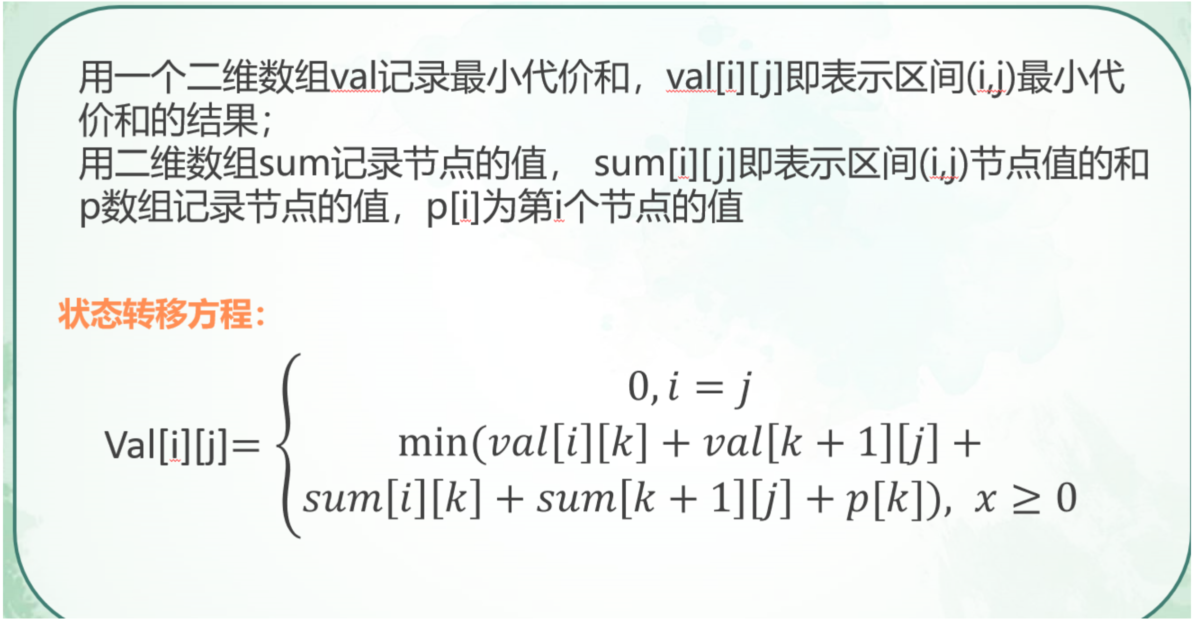
本题为区间动态规划问题，可以参考《算法导论》p226

具体的思路和形式与之前的矩阵链相乘问题相似









代码

```
#include <stdio.h>
#define maxSize 510
#define maxData 0x7fffffff

int p[maxSize];
int pSum[maxSize][maxSize];
int resSum[maxSize][maxSize];

void getMinCost(int n);

int main()
{
    int n = 0;

    scanf("%d", &n);
    for (int i = 0; i < n; ++i)
        scanf("%d", &p[i]);
    getMinCost(n);
```

```
    printf("%d", resSum[0][n]);

    return 0;
}

void getMinCost(int n)
{
    for (int i = 0; i <= n; ++i)
        pSum[i][i] = resSum[i][i] = 0;
    for (int i = 0; i <= n; ++i)
    {
        for (int j = i + 1; j <= n; ++j)
            pSum[i][j] = pSum[i][j - 1] + p[j - 1];
    }
    for (int l = 2; l <= n + 1; ++l)
    {
        for (int i = 0; i <= n - l + 1; ++i)
        {
            int j = i + l - 1;
            int temp = maxData, min = maxData;
            for (int k = i; k < j; ++k)
            {
                temp = resSum[i][k] + resSum[k + 1][j] +
                    pSum[i][k] + pSum[k + 1][j] + p[k];
                if (temp < min) min = temp;
            }
            resSum[i][j] = min;
        }
    }
}
```