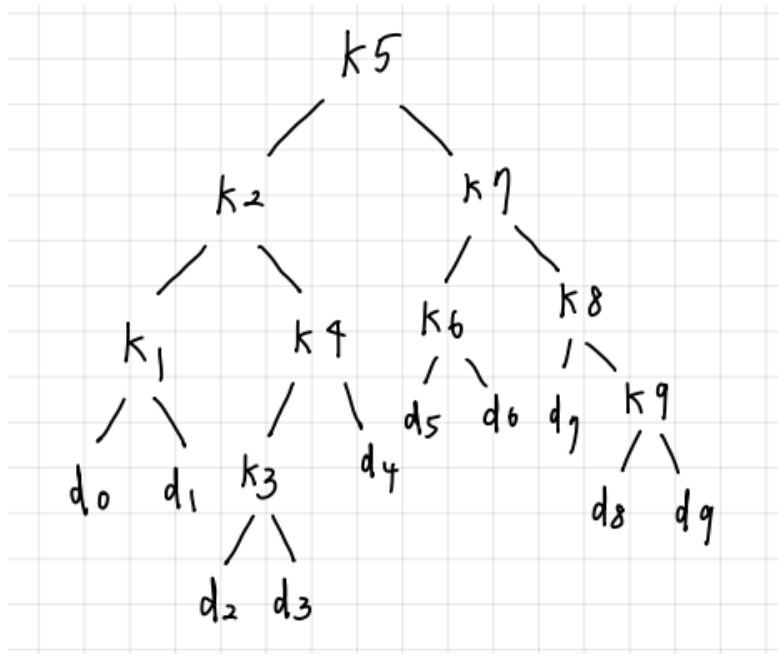109610025 陳品妍

Correctness of coding:

```
please input the n : 5
please input the p (p1,p2,p3...pn): 0.15 0.1 0.05 0.1 0.2
please input the q (q0,q1,q2...qn): 0.05 0.1 0.05 0.05 0.05 0.1
the smallest cost is: 2.75
root is : 2
```

Same with the example

With the problem:

```
please input the n : 9
please input the p (p1,p2,p3...pn): 0.05 0.04 0.02 0.07 0.08 0.09 0.04 0.08 0.03
please input the q (q0,q1,q2...qn): 0.08 0.06 0.04 0.04 0.03 0.06 0.07 0.06 0.04 0.02
the smallest cost is: 3.45
root is : 5
R-5
   L-2
      L-1
      R-4
         L-3
   R-7
      L-6
      R-8
         R-9
```
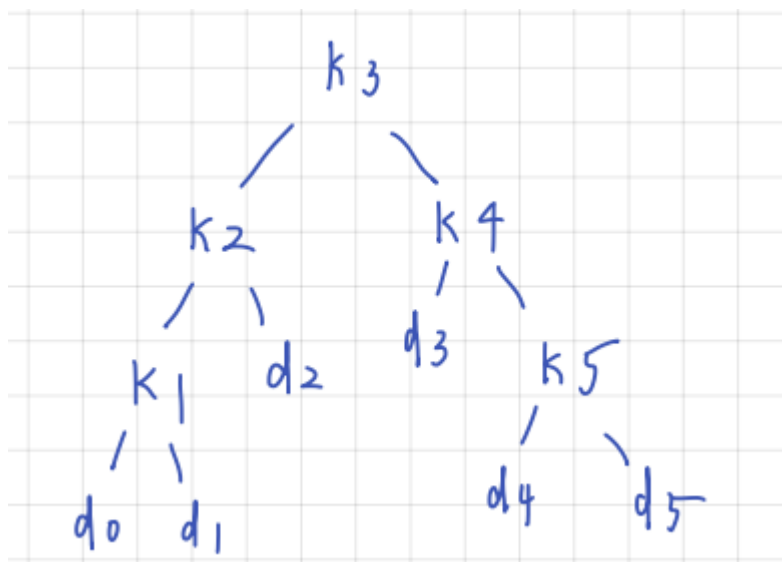

Discussion:

1.

```
please input the n : 5
please input the p (p1,p2,p3...pn): 0.05 0.15 0.15 0.1 0.1
please input the q (q0,q1,q2...qn): 0.05 0.1 0.05 0.1 0.05 0.1
the smallest cost is: 2.75
root is : 3
R-3
   L-2
      L-1
   R-4
      R-5
```

Search cost :

$$1 \times P_3 + 2 \times P_2 + 2 \times P_5 + 3 \times P_1 + 3 \times q_2 + 3 \times P_4 + 3 \times q_5 + 4 \times q_0 + 4 \times q_1 + 4 \times q_3 + 4 \times q_4$$

$$= 0.15 + 0.3 + 0.2 + 0.15 + 0.15 + 0.3 + 0.3 + 0.2 + 0.4 + 0.4 + 0.2$$

$$= 2.75$$

2.把程式的 18 行判斷式改成小於等於即可得到不同結構但是相同 SEARCH COST

```
please input the n : 5
please input the p (p1,p2,p3...pn): 0.05 0.15 0.15 0.1 0.1
please input the q (q0,q1,q2...qn): 0.05 0.1 0.05 0.1 0.05 0.1
the smallest cost is: 2.75
root is : 3
R-3
   L-2
      L-1
   R-5
      L-4
```

Search cost

$$1 \times P_3 + 2 \times P_2 + 2 \times P_5 + 3 \times P_1 + 3 \times q_2 + 3 \times P_4 + 3 \times q_5 + 4 \times q_0 + 4 \times q_1 + 4 \times q_3 +$$
$$4 \times q_4$$

$$= 0.15 + 0.3 + 0.2 + 0.15 + 0.15 + 0.3 + 0.3 + 0.2 + 0.4 + 0.4 + 0.2 = 2.75$$

```
              K3
          /        \
        K2           K5
       /  \         /  \
     K1    d2     K4    d5
    /  \         /  \
  d0    d1     d3    d4
```