

Algorithm Description

- ❖ After making the necessary adjustments in the file "input.txt", the necessary values were taken in the order of the program by looking at the data taken from the user. Values f1 and f2 have been added to the end of the matrix to avoid unnecessary use.
- ❖ Since all probabilities have to be calculated with tree logic for problem solving, operations are performed on the 2-dimensional matrix using "investment number" (right ascending order) and "investment year".
- ❖ All possibilities are calculated with two loop in the interior. In order to be able to do this process, the next step was completed by using the factors such as the year in which it was made, the position in the previous year, and the choice in that year. At the end of the loop, all possibilities were calculated and the most beneficial situation was caught in the last process. In the meantime, it was found out which paths should be chosen by following the steps back.
- ❖ In many places, the power of Mathematics was used to do all of these things and avoid unnecessary loops. In most cases, the algorithm was used to reach previous calculations because it was in top-down structure.
- ❖ In addition, the greedy algorithm has been added for comparison and proofreading since it already computes all operations.

Descriptive Figure

Meaning of the shapes:

& selected number

% address

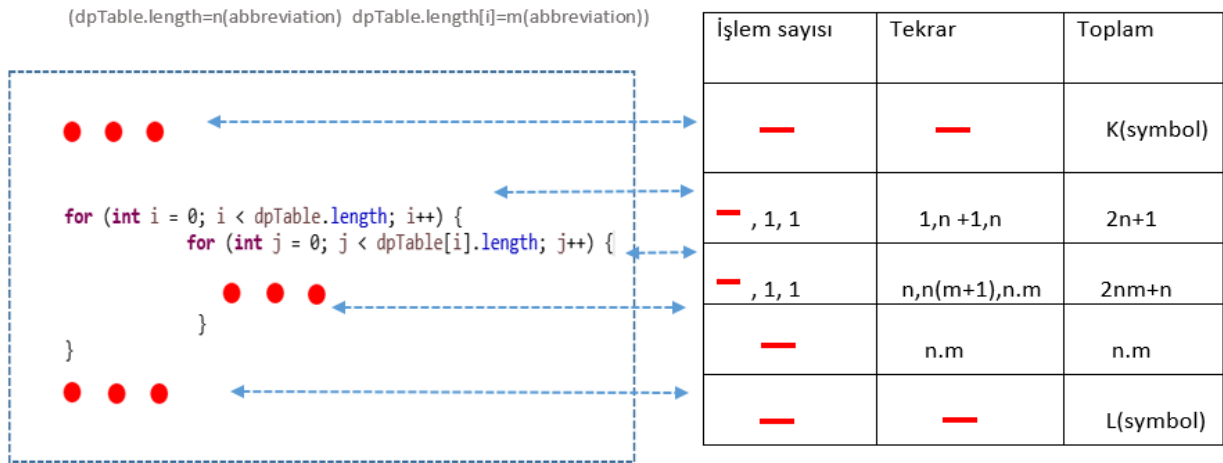
i-loop number

Address link-parameter used for indexing

i/Ins_ID	0	7(1)	4(2)	9(3)	Address link
1	0	1&	2&	3&	0
2	%1.1	1&1	1&2	1&3	1
3	%1.2	2&1	2&2	2&3	2
4	%1.3	3&1	3&2	3&3	3
5	%2.1	1&1&1	1&1&2	1&1&3	3
6	%2.2	1&2&1	1&2&2	1&3&3	4
7	%2.3	1&3&1	1&3&2	1&3&3	5
8	%3.1	2&1&1	2&1&2	2&1&3	5
9	%3.2	2&2&1	2&2&2	2&2&3	6
10	%3.3	2&3&1	2&3&2	2&3&3	7
11	%4.1	3&1&1	3&1&2	3&1&3	7
12	%4.2	3&2&1	3&2&2	3&2&3	8
13	%4.3	3&3&1	3&3&2	3&3&3	9

(Solution algorithm for 3 investments and 3 investment years)

Algorithm Analysis



$$\approx T(n) = 3nm + 3n + 1 + K + L \quad (K \text{ and } L < nm) (m \approx n)$$

$$T(n) = 3n^2 + 3n + 1$$

$$3n^2 + 3n + 1 \leq cn^2 \longrightarrow O(n^2)$$

Runtime Examples

Invest Number	Year	Runtime(nanoTime)
3	5	13071813
3	10	45487443
3	15	15214472466
6	5	17707866
9	5	30085555
12	5	55975156