



Project Description:

The aim of this project is to calculate a rental plan and additional costs such as hiring a coach or paying salaries, if necessary, in a scenario where the number of players to be promoted from the youth team of a football club to the A team is known and other clubs have requests to hire players from this club.

The project aims to determine the number of players (y_i) that will be requested each year for the club's next 'n' year period and to plan how the club will respond to these requests. If the club has to promote more than 'p' players to the first team in a year, additional coaches can be hired to support the development of these players. However, if the club does not hire any players, it will have to pay their salaries. The project aims to help the club make the most economical and efficient decisions in this scenario.

Completed – Uncompleted Tasks:

All tasks of the project have been completed.

The salary and demand txt files received in the project were scanned and a two-dimensional array was created accordingly. This array was filled with dynamic programming logic by comparing the methods that could be done for each year, such as hiring a coach or retaining players. Simultaneously, a line array of the same size was created and the paths reached here were recorded. Then these arrays were scanned with the bottom-top method and the possibility that offers the least cost for each year was displayed to the user.

Run-time Complexity and Space Complexity:

O(n) for the dp method is as follows:

$$k < 312$$

$$O((n + 2) * 311 * k) + O(n) = O(N * 311 * 311) = O(N)$$

Since the variable part of the array in the program is only the number of lines, operations are performed depending on a single n.

Space complexity for the dp method is as follows:

```
int[] demands = new int[51];
```

```
int[] salarys = new int[311];
```

```
int[][] dp = new int[51][311];
```

```
String[][] line = new String[dp.length][dp[0].length];
```

Totally, we need “ $51 + 311 + (51 * 311) = \mathbf{16,223}$ ” space for running this program.