IE400 PRINCIPLES OF ENGINEERING MANAGEMENT

Term Project Description   *Deadline: 10.05.24, 23:59 pm*

- Write a report explaining your choice of decision variables, constraints, parameters and the objective function in details. Include your comments about the problems. Your report should not contain any codes.

- Zip your report with your codes and name it "IE400_Project_GroupXX".

- You will be demonstrating your codes in-class in the last week of lectures.

- You may find the contact information of your group members in Moodle.

Part I (10 pts)

Radio Bilkent has just run its annual InCampus Music competition, accepting song submissions from new bands and musical artists. The six finalists are each in a different genre of music, and they have distinct track lengths. Due to an error, they sorted each columns of the table containing information about the songs alphabetically. This caused a table with full of incorrect information:

Artist	Song	Genre	Track Length
Far Eastern	All For Love	Country	2:34
Higher Days	Ceiling	EDM	2:58
Mark A Day	Dear Daisy	Folk	3:12
Steps Away	Heaven	Hip Hop	3:36
The Filaments	On The Edge	Pop	4:00
Toni Travis	Seven Years	Rock	4:14

People working at the radio station gathered every single piece of information they remember from the original table together and obtain the following list of clues:

- The six songs are the one by Higher Days, the one that goes for exactly 2 minutes 34 seconds, "Ceiling", "Seven Years", the one by Mark A Day, and the EDM track.

- Of "Dear Daisy" and the song by Mark A Day, one is 3:36 long and the other is a Pop song.

- "On The Edge" plays for longer than Toni Travis's track.

- The Country song has a shorter duration than Steps Away's offering.

- It's no accident that "On The Edge" is precisely 4 minutes long, with the artist being a fan of round numbers.

- No song starts with the first letter of its artist's name.

- Of "Ceiling" and the Higher Days song, one is a Folk song and the other is 2:58 long.

- There is a difference in duration of 1 minute 2 seconds between the Hip Hop song and the song by The Filaments.

- The Rock song is 14 seconds longer than the Country song.

- Far Eastern's song is 24 seconds longer than "Heaven".

- "Dear Daisy" is not a Hip Hop nor a Folk song.

- Far Eastern's song is longer than the Pop song, but shorter than Steps Away's song.

- "All For Love", which is not a Hip Hop song, was not recorded by The Filaments, Toni Travis, nor Mark A Day.

Your goal is to determine the name of each artist, their genre, the name of their track that made the finals, and the length of each track and reorganize the table above correctly using all the information provided. Formulate an integer linear program by explicitly defining your variables and writing the general assignment constraints and linear inequalities to implement the clues. Solve this problem by implementing it using Gurobi in Python.

Part II (10 pts)

You have 14,000 TL at the beginning of year 2021 and would like to invest your money. Your goal is to maximize your total amount of money at the beginning of year 2025. You have the following options:

Option	Duration (years)	Total Interest Rate	Available (at the beginning of)
1	2	26%	2021, 2023
2	1	12%	2021, 2022, 2023, 2024
3	3	19%	2021, 2022
4	2	27%	2022, 2023
5	3	%39	2022
6	2	%28	2023

How do we invest in order to maximize our profit? Formulate a linear programming model by explicitly writing the decision varaibles and the constraints, then implement it using Gurobi in Python.

To challenge your investments, suppose that the bank provides a contribution of 40% for your highest investment, 10% for your second highest investment, and 5% for your third highest investment. They consider all your investments to choose the top 3 but they make the contribution at the beginning of year 2025. Considering this support, how should we invest to achieve maximum total profit? Is your previous strategy good? Formulate an integer linear programming model by explicitly writing the decision varaibles and the constraints, then implement it using Gurobi in Python.