Conundrum

Exodia 2018

Problem Statement:

Santa is sick and for this year's christmas he asked you to deliver the gifts in a country named Exodistan. Exodistan has 500 cities, the coordinates of which have been given and you need to deliver the gifts to each city. Each city is connected to all the other cities by a straight road. To make it easier for you, he has given you his brand new Ferrari with a 30 Litre tank capacity and a mileage of 10 km/Litre. Initially the tank is empty. Each city in Exodistan has a petrol pump where people bid to get the petrol. In case your bid turns out to be lesser than the outcome of the bidding you are not given any petrol.

(Outcome of bidding: Mutiple people make individual bids of price at which they will buy petrol per liter and the individual who bids the highest wins the bid. The price at which he bids is the outcome of the bid. Only those individuals whose bidding price is equal to the outcome of the bid are sold petrol at the bidding price)

If you ever run out of petrol while travelling, santa's agents start pushing your car. They charge you at 0.6 Exorupees/Km. Inorder to help you make your bid, santa has given you a genie. The genie predicts the outcome of the bid for you however the genie drinks frequently and hence you can't completely rely on his predictions.

You want to minimise your expenditure in total at the end of your trip. You have to end your trip at the same city you started with and travel through all the cities. You are not allowed to visit a city more than once (except the city you start with) as per Exodistan traffic norms.

Can you find the best possible route and come up with the right bidding strategy?

Bidding Strategy:

In your bid you mention the price per litre you are willing to pay and the amount of petrol in litres you wish to buy from that city. Incase the price bid by you turns out to be lesser than the outcome of bidding you don't get any petrol otherwise you are sold the amount of petrol you asked for at the price you bid.

Important Points:

Note that the only place where you can store petrol is in the car's tank. Incase you ask for more petrol than you need the extra petrol spills out.

The distance between two cities is the euclidean distance between them. Ex: Distance between (0, 0) and (3, 4) is 5km.

Data Sets:

1. Predictions of petrol prices (outcome of bidding) in all 500 cities (one city in one row) by the genie for last 800 days (one colum for each day). (**File Name:genie_train_price_predictions.csv**)

2. Actual petrol prices (outcome of bidding) in all 500 cities (one city in one row) for last 800 days (one colum for each day). (**File Name: actual_train_price.csv**)

3. Predictions of petrol prices (outcome of bidding) in all 500 cities (one city in one row) by the genie for the 802st day. This is the leaderboard data. (**File Name: genie_lb_price_predictions.csv**)

4. Predictions of petrol prices (outcome of bidding) in all 500 cities (one city in one row) by the genie for the 802nd day. This is the surprise data. This will be given to you on 6th April.(**File Name: genie_surprise_price_predictions.csv**)

5. Coordinates of all cities. (**File Name: cities.csv**)
Each line consists of the x,y coordinates of a city. The number of the city is the line number on which the coordinates of the city are present, i.e the nth line contains the coordinates of the city number n. Note that for the numbering of cities 1 based indexing is considered.

Expected Output:

You are required to generate a csv file in the following format:

city_visited@1,bid_price_1,petrol_quantity_1

city_visited@2,bid_price_2,petrol_quantity_2

. . .
. . .

city_visited@500,bid_price_500,petrol_quantity_500

You don’t need to specify the start city again at the end of the file. Thus your output file should have exactly 500 lines. It will automatically be assumed that after city_visited@500 you are visiting city_visited@1.

Look at output_format.csv, which is a sample output file.

The submission details for the output results of the leader board and surprise data will be shared soon. Start working :)

Ranking Criteria:

Its simple. The lower your expenditure the better will be your rank.

You will be evaluated on the basis of a leaderboard and surprise dataset.

Leaderboard Dataset contains the genie predictions of petrol bid prices for the 801st day for all 500 cities. This dataset has been shared.

Surprise Dataset contains the genie predictions of petrol bid prices for the 802nd day for all 500 cities. The surprise dataset will be shared 2 days before Exodia.

The final ranklist will be based on descending order of aggregate_total which will be calculated as follows:

aggregate_total = 0.3*(No of teams – Your rank in leaderboard ranklist) + 0.7*(No of Teams – Your rank in surprise data ranklist)

Rules:

1. Under all circumstances the decision of the organizers of the event will be final and binding.

2. The problem statements are subject to change without any prior notice according to the organizers’ discretion. Any changes made to the problem statements will be reflected on the Exodia website.

3. A maximum of 3 individuals can be part of a team. There is no constraint on the number of teams that can participate from a college.