Cooperate Marketing Coding Exercise

Instruction:

- Please submit all your code, output, and charts or visualization.
- Ideally use a code Notebook, e.g. Jupyter, to capture all above, except for the demo app.
- You may choose to submit plain .py files or share a code repo.
- If you have questions about the tasks, please make best assumptions and move ahead.
- Please complete the exercise in two (2) days. You may want to budget two evenings to complete the exercise and submit on the next Morning.
    - E.g. If you received the coding exercise on a Monday, please submit your completed exercise on Wednesday morning.

Task 1 - Data Manipulation Basics

Suppose you have a data frame of two columns, score_1 and score_2, as the probability of two different events, respectively. Please complete the following.

1. Create a new column in the data frame called highlighted, which is a Boolean value representing whether a record passes the following logic check:
    - Both columns are below 0.35, OR
    - score_1 is below 0.20 and score_2 is below 0.90, OR
    - score_1 is below 0.15 and score_2 is below 0.80

2. Create a categorical column called risk_1_group, which is based on score_1 values, as following:

score_1	**score1_group**
x < 0.10	'Very Low'
0.10 <= x < 0.30	'Medium'
0.30 <= x < 0.80	'High'
x >= 0.80	'Very High'

Task 2 - Python Class Basics

Suppose we want to create a Reimbursement class that describes spending for Ads that a vendor can run and get reimbursed per following specs:

Ad_Type	Cost_Share_Rate (per dollar)	Allowed_Spend_per_Ad
0011	**0.50**	**$200**
1011	**1.00**	**$1000 to $2000**
1111	**0.75**	**$500**
1010	**0.90**	**Up to $750**

The class should have:

1. A function to initialize the Ads object.
2. A data structure to track how many Ads are there in each type of Ad.
3. A function to add and remove Ads of the specific type.
4. A function to print the content of the Ads object.
5. A function that returns the total amount of reimbursement.

Please show your code that defines the class, then unit test the class to ensure it behaves as you designed.

Task 3 - Data Analysis

Suppose we get a dataset as attached. (see File "task3_dataset.csv")

The dataset captures different vendors' cumulative Ads run. The client's data analyst made some mistakes during data entry. E.g. when Ads_Run is 0, that usually means it's an error.

Example 1 - Vendor A. Our analyst was able to add a Correced_Ads_Run column as following:

Site	Date	Ads_Run	Corrected_Ads_Run
A	2020-01-01	5	5
A	2020-01-02	6	5
A	2020-01-03	7	7
A	2020-01-04	0	8
A	2020-01-05	0	9
A	2020-01-06	10	10
A	2020-01-07	11	11

Example 2 - Vendor B. Our analyst was able to add a Correced_Ads_Run column as following:

Site	Date	Ads_Run	Corrected_Ads_Run
B	2020-01-01	38	38
B	2020-01-02	39	39
B	2020-01-03	40	40
B	2020-01-04	11	41

B	2020-01-05	12	42
B	2020-01-06	13	43
B	2020-01-07	44	44

Please write code that would generate the Corrected_Ads_Run column. First make sure your code generates the correct answer. Then think of optimization for time and memory consumption.

Task 4 – Demo App [Optional]

Please make a simple web app, preferably with Django, that is built upon the concept of task 2.

Key capabilities of the app:

- Allow users to select an Ad_type, input the number of Ads run for the type, and the actual spend for each Ad.
- Show actual spends, cost sharing, and reimbursements, by type of Ads and total amount. For example, this can be presented on the web page as a summary table, as shown below.
- While you may choose to make the frontend as visually appealing as possible, it's not required to spend lots of time there. You may either use a frontend framework or plain HTML/CSS.
- Optional bonus point: while not required, you're welcome to implement a very simple capability for users to create an account and login, so that the app simulates usage by multiple users.

Ad_Type	Date	Ads_Run	Spend	Cost_Sharing	Reimbursement
0011	2023-10-01	5	$1000	$500	$500