Bayes Rule and Marginalization

In this part of the lab, you will practice using Bayes and marginalization rules to compute the probabilities for a problem described below.

Imagine, that during the lunch with your friend Alice, you discuss recent TV shows that both of you are watching. You tell Alice that your favorite TV shows are "Suits" (S1) and "Game of Thrones" (S2). Alice then tells you that since you like these two TV shows you will also probably like "House of Cards" (S3).

After the lunch, you want to find out whether it is trully worth watching "House of Cards" (S3). You talk to your other friends and discover that 55% of them liked "Suits" (S1) and 95% of them liked "Game of Thrones" (S2). You also assume that these tastes are independent from each other.

Furthermore, you create a survey among your friends who already watched "House of Cards" (S3) and discover that:

$$P(S_3 = like | S_1 = like, S_2 = like) = 0.92$$
$$P(S_3 = like | S_1 = like, S_2 = dislike) = 0.43$$
$$P(S_3 = like | S_1 = dislike, S_2 = like) = 0.78$$
$$P(S_3 = like | S_1 = dislike, S_2 = dislike) = 0.29$$

Now you have to use all of this information to compute the following probabilities:

1) A probability of liking "House of Cards" (S3): $P_1 = P(S_3 = like)$

2) A probability of liking "House of Cards" (S3) given that you liked "Game of Thrones" (S2): $P_2 = P(S_3 = like | S_2 = like)$

3) A probability of liking "House of Cards" (S3) given that you also liked "Suits" (S1): $P_3 = P(S_3 = like | S_1 = like)$

4) A probability of liking "House of Cards" (S3) given that you disliked "Game of Thrones" (S2): $P_4 = P(S_3 = like | S_2 = dislike)$

Your Script

Save Reset MATLAB Documentation (https://www.mathworks.com/help/)

```
P_S1L=0.55; %probability of liking Suits
P_S2L=0.95; %probability of liking GOT

P_S3L_given_S1L_S2L=0.92; %probability of liking HOC given that you liked Suits and liked GOT
P_S3L_given_S1L_S2D=0.43; %probability of liking HOC given that you liked Suits and disliked GOT
P_S3L_given_S1D_S2L=0.78; %probability of liking HOC given that you disliked Suits and liked GOT
P_S3L_given_S1D_S2D=0.29; %probability of liking HOC given that you disliked Suits and disliked GOT

%% Computing P1: probability of liking HOC
P1= P_S3L_given_S1L_S2L * P_S1L * P_S2L + ...
    P_S3L_given_S1L_S2D * P_S1L * (1 - P_S2L) + ...
    P_S3L_given_S1D_S2L * (1 - P_S1L) * P_S2L + ...
    P_S3L_given_S1D_S2D * (1 - P_S1L) * (1 - P_S2L);


%% Computing P2: probability of liking HOC given that you liked GOT
P2= P_S3L_given_S1L_S2L * P_S1L * P_S2L + P_S3L_given_S1D_S2L * (1 - P_S1L) * P_S2L;


%% Computing P3: probability of liking HOC given that you liked Suits
P3= P_S3L_given_S1L_S2L * P_S1L * P_S2L + P_S3L_given_S1L_S2D * P_S1L * (1 - P_S2L);


%% Computing P4: probability of liking HOC given that you disliked GOT
P4= P_S3L_given_S1L_S2D * P_S1L * (1 - P_S2L) + P_S3L_given_S1D_S2D * (1 - P_S1L) * (1 - P_S2L);



```

Run Script

Previous Assessment: All Tests Passed

Submit

- Is P1 Correct?
- Is P2 Correct?
- Is P3 Correct?
- Is P4 Correct?

Output

```
Code ran without output.
```