

HW3: Implementing a conversational case-based recommender

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- ***Q1: If you refined the method above for calculating similarity, describe what you did (otherwise you can simply say that you followed the assignment statement). Describe your system's approach for selecting questions to ask.***

To calculate similarity, we combined the two given approaches - euclidean distance and McSherry's approach. We used McSherry's approach to calculate the similarity between individual features. Using these individual similarities, we build an array corresponding to the similarity of each case with respect to the query. We compute the L2 norm of each of these arrays to get a scalar similarity indicator for each case w.r.t. the query.

We trained a linear regression model to predict the price using all the features present in the data. We tested the model on the validation data, which gave the R^2 value of 0.75, representing the model had decent predictive power. Then we extracted the coefficient of each variable, took the absolute value, and normalized it so that the score adds up to one. We noticed **Accommodation, Transportation, and Number of person** had the highest predictive value. The selection of the top three questions is based on this score. While printing the score to the user, we are again normalizing the value by the score of three questions so that each time users see the question, they know which question has the highest probability value.

- ***Part 2: Test the system on the data, with equally weighted features (i.e., all weights = 1).***

The CCBR system works very well for the given test case even with equally weighted features. This is because the feature selection is restricted by the questions we present to the user. Since these questions are selected using a regression model trained on the entire dataset - the user is indirectly selecting the questions in the decreasing order of feature importance. In the attached test case - *unweighted_adapt.txt*, the first three questions are as follows:

1: *What type of accomodation you want? (Score: 0.38)*

2: *What mode of transportation are you looking for? (Score: 0.36)*

3: *How many people are there in the trip? (Score: 0.25)*

Though they may not necessarily be the top 3 questions for all travel recommender applications -> it does make intuitive sense for an application like ours that has the price as the solution. In other words, our model predicted that accommodation, transportation, and the number of people in our trip are the three most important features contributing to the trip's total price.

Once the user selects a Question, the system predicts the three best matches based on the feature selected by the user. In the test case, the user selects -> *1: What type of accomodation you want?* Our system finds the three best matches using the similarity calculation discussed in Part 1. Initially, the solutions are diverse - in our test case, we got results from a variety of Holiday types/transportation types/Seasons, etc. - but as we progress through the questions -> the solutions become more and more intuitive.

A key point here is that the cases that are presented initially change a lot, but as we progress through the questions, there are a few cases that appear multiple times. This is expected and more pronounced in our implementation because of our robust regression model to predict the best questions first. As a result, a good match might be presented to the user at the initial stages itself -> and possibly appear multiple times in the process.

- ***Q2: What to you observe about the quality of the selection of packages? Are the solutions intuitively reasonable? Why or why not?***
- ***Part 3: Tune the system by defining unequal feature weights, based on your sense of feature importance. Q3: Report the weighting you chose and your rationale.***

As indicated in part 2, the regression model coefficients worked very well to recommend questions to the user. The main reason is that it estimates feature importance-> and this makes it an ideal choice as weights of our features. Following are the feature weights predicted by our model:

Accommodation: 0.3228

Transportation: 0.3075

NumberOfPersons: 0.2135

Duration: 0.1106

HolidayType: 0.037

Season: 0.0069

Region: 0.0014

Hotel: 0.0005

- ***Rerun your tests. Q4: What do you observe now for the quality of retrievals? How does it compare to the version with equal weights?***

We make our system more robust and intuitive using unequal feature weights. Our system already used the regression model coefficients to decide on the questions to be presented to the user, and using it for computing similarity makes it better.

We observed that the quality of case retrieval stays on par with that of equal features, but this is only because our system was already working very well because of our use of the regression model for recommending questions. The attached test-case *weighted_adapt.txt* has the test run with the weights of features set to the coefficients computed by our regression model.

- ***Part 4: Q5: State in English plausible adaptation rules for adapting the price of a package based on **NumberOfPersons, Duration, and Season**. The rules should describe a possible difference between a retrieved case and a current problem, and the associated change to be made in the solution of the retrieved case. For example, if the domain were predicting travel times, a rule might be expressed as: "If the old trip was not during rush hour and the new prediction is for rush hour, increase travel time by 20%"***

The adaptation rule comes into play when the user answers all the questions and still doesn't choose any presented cases. So the recommendation system generates an output of the case that seems most similar to the user's input and adapts the price based on the users' input. In the question, it was asked to focus on NumberOfPersons, Duration, and Season so we trained a linear regression model using only these three variables as predictors and predicted on user input. However, if we do the prediction considering all the variables, we would get a better prediction as Accommodation and Transportation are the variables with higher prediction power.

Part 5: Add code to adapt the solutions of the retrieved cases using your rules. The rules may be hard coded.

- ***Part 6: Test the revised system to generate sample output.***

2 test cases → *unweighted_adapt.txt* and *weighted_adapt.txt* have the test runs for the adapted results.

- **Part 7: Q6 What are the strengths and limitations of your approach for this domain (both similarity and question selection)?**

- **Question Selection**

- **Strengths:**

- Instead of using an intuition based system, we wanted to develop a statistical based approach based on the data we have so that the user can answer the questions which are more important

- **Weakness:**

- If the data have a lot of outliers then the model might assign higher coefficients to features which have high outliers values. Even though there are multiple ways to deal with it we didn't do any outlier treatment as it was required.
 - We replaced the categorical data with a label encoder. Usually, in linear regression we have to do one hot encoding for the categorical variables but if we would have done one-hot encoding the number of features would shoot up and it would be hard to interpret

- **Similarity Selection**

- **Strengths:**

- It takes into account both categorical and numerical features and tries to collate both the results to give the cases which are more related.

- **Weakness:**

- For a few variables like Season which represent months in which the user wants to travel. We calculated similarity based on if the months are equal then 1 else 0. We could have made a more sophisticated calculation where similarity metrics can calculate the features which are cyclic in nature.

- **Q7: This system provides explanations of why cases are chosen and how they are adapted. What are the weaknesses of both types of explanations here, and how could they be improved?**

The cases are chosen based on the similarity scores. The similarity calculation of categorical variables is rudimentary where we check if the values are same then assign 1 else 0. We can improve this by creating an embedding which can give us which categorical variables might be interrelated with each other. The adaptation is happening

only based on three variables: NumberOfPersons, Duration, and Season. As per our regression analysis, Accommodation and Transportation have the highest importance. So if we include these variable the adaptation would give us better results

- ***Q8: A statement of relative contributions of the group members. Normally this will simply be "Equivalent", but please describe any special circumstances.***

Below are the contributions of the group members. The assignment can be divided into three major parts. We both were involved in all the three parts. We have highlighted the person who have the majority of contribution in the area

Approach: Shashank (Major), Abhinav

Coding: Abhinav (Major), Shashank

Report: Equal contribution from both

Following are the test runs:

- **1. unweighted_noadapt**

Welcome to Travel CBR system!

is_weighted: False

1: What type of accomodation you want? (Score: 0.38)

2: What mode of transportation are you looking for? (Score: 0.36)

3: How many people are there in the trip? (Score: 0.25)

Select one of the above Qs (1, 2 or 3):

1

What type of accomodation you want?

Choose 1 for HolidayFlat

Choose 2 for OneStar

Choose 3 for TwoStars

Choose 4 for ThreeStars

Choose 5 for FourStars

Choose 6 for FiveStars

6

User selection (running):

{'Accommodation': 6}

Case Score: 0.33

JourneyCode	108
HolidayType	Wandering
NumberOfPersons	2
Region	Harz
Transportation	Car
Duration	14
Season	May
Accommodation	FiveStars
Hotel	Hotel Maritim, Harz

Case Score: 0.33

JourneyCode	60
HolidayType	Wandering
NumberOfPersons	2
Region	Allgaeu
Transportation	Car
Duration	7
Season	September
Accommodation	FiveStars

Hotel Hofgut Kuernach, Allgaeu

Case Score: 0.33

JourneyCode 1440
HolidayType Bathing
NumberOfPersons 2
Region TurkishRiviera
Transportation Plane
Duration 14
Season November
Accommodation FiveStars
Hotel Club-Hotel Sera, Turk. Riviera

Do you want to select a Journey? [y/n]

n

1: What mode of transportation are you looking for? (Score: 0.49)

2: How many people are there in the trip? (Score: 0.34)

3: What is the duration of the trip? (Score: 0.18)

Select one of the above Qs (1, 2 or 3):

1

What mode of transportation are you looking for?

Choose 1 for Car

Choose 2 for Coach

Choose 3 for Plane

Choose 4 for Train

1

User selection (running):

{'Accommodation': 6, 'Transportation': 1}

Case Score: 0.33

JourneyCode 108
HolidayType Wandering
NumberOfPersons 2
Region Harz
Transportation Car
Duration 14
Season May
Accommodation FiveStars
Hotel Hotel Maritim, Harz

Case Score: 0.33

JourneyCode 60
HolidayType Wandering
NumberOfPersons 2
Region Allgaeu
Transportation Car
Duration 7
Season September
Accommodation FiveStars
Hotel Hofgut Kuernach, Allgaeu

Case Score: 0.33

JourneyCode 1181
HolidayType Active
NumberOfPersons 3
Region Tyrol
Transportation Car
Duration 7
Season February
Accommodation FiveStars
Hotel Hotel Feldmuellerhof, South Tyrol

Do you want to select a Journey? [y/n]
n

- 1: How many people are there in the trip? (Score: 0.59)
2: What is the duration of the trip? (Score: 0.31)
3: What holiday type are you looking for? (Score: 0.1)

Select one of the above Qs (1, 2 or 3):
2

What is the duration of the trip?
14

User selection (running):
{'Accommodation': 6, 'Transportation': 1, 'Duration': 14}

Case Score: 0.33
JourneyCode 506
HolidayType Active
NumberOfPersons 3
Region Tyrol
Transportation Car
Duration 14
Season August
Accommodation FiveStars

Hotel Aparthotel Hopfgarten

Case Score: 0.33

JourneyCode 59
HolidayType Active
NumberOfPersons 2
Region Allgaeu
Transportation Car
Duration 14
Season June
Accommodation FiveStars
Hotel Hofgut Kuernach, Allgaeu

Case Score: 0.33

JourneyCode 108
HolidayType Wandering
NumberOfPersons 2
Region Harz
Transportation Car
Duration 14
Season May
Accommodation FiveStars
Hotel Hotel Maritim, Harz

Do you want to select a Journey? [y/n]
y

Select Journey Code: 108

Here is your selected journey:

JourneyCode 108
HolidayType Wandering
NumberOfPersons 2
Region Harz
Transportation Car
Duration 14
Season May
Accommodation FiveStars
Hotel Hotel Maritim, Harz

Final price is: 3768
#####

Thanks for visiting Travel CBR system!

(mlsp) abhinav@Abhinavs-MacBook-Air xai-ccbr %

2. weighted_no_adapt

Welcome to Travel CBR system!

is_weighted: True

- 1: What type of accomodation you want? (Score: 0.38)
- 2: What mode of transportation are you looking for? (Score: 0.36)
- 3: How many people are there in the trip? (Score: 0.25)

Select one of the above Qs (1, 2 or 3):

1

What type of accomodation you want?

Choose 1 for HolidayFlat

Choose 2 for OneStar

Choose 3 for TwoStars

Choose 4 for ThreeStars

Choose 5 for FourStars

Choose 6 for FiveStars

6

User selection (running):

{'Accommodation': 6}

Case Score: 0.33

JourneyCode	108
HolidayType	Wandering
NumberOfPersons	2
Region	Harz
Transportation	Car
Duration	14
Season	May
Accommodation	FiveStars
Hotel	Hotel Maritim, Harz

Case Score: 0.33

JourneyCode	60
HolidayType	Wandering
NumberOfPersons	2
Region	Allgaeu
Transportation	Car
Duration	7
Season	September
Accommodation	FiveStars
Hotel	Hofgut Kuernach, Allgaeu

Case Score: 0.33
JourneyCode 1440
HolidayType Bathing
NumberOfPersons 2
Region TurkishRiviera
Transportation Plane
Duration 14
Season November
Accommodation FiveStars
Hotel Club-Hotel Sera, Turk. Riviera

Do you want to select a Journey? [y/n]
n

- 1: What mode of transportation are you looking for? (Score: 0.49)
2: How many people are there in the trip? (Score: 0.34)
3: What is the duration of the trip? (Score: 0.18)

Select one of the above Qs (1, 2 or 3):
3

What is the duration of the trip?
14

User selection (running):
{'Accommodation': 6, 'Duration': 14}

Case Score: 0.33
JourneyCode 1440
HolidayType Bathing
NumberOfPersons 2
Region TurkishRiviera
Transportation Plane
Duration 14
Season November
Accommodation FiveStars
Hotel Club-Hotel Sera, Turk. Riviera

Case Score: 0.33
JourneyCode 506
HolidayType Active
NumberOfPersons 3
Region Tyrol
Transportation Car
Duration 14

Season August
Accommodation FiveStars
Hotel Aparthotel Hopfgarten

Case Score: 0.33

JourneyCode 1436
HolidayType Bathing
NumberOfPersons 2
Region TurkishRiviera
Transportation Plane
Duration 14
Season November
Accommodation FiveStars
Hotel Hotel Favori Aqua Resort, Turk. Riviera

Do you want to select a Journey? [y/n]
n

- 1: What mode of transportation are you looking for? (Score: 0.55)
- 2: How many people are there in the trip? (Score: 0.38)
- 3: What holiday type are you looking for? (Score: 0.07)

Select one of the above Qs (1, 2 or 3):
1

What mode of transportation are you looking for?
Choose 1 for Car
Choose 2 for Coach
Choose 3 for Plane
Choose 4 for Train
1

User selection (running):
{'Accommodation': 6, 'Duration': 14, 'Transportation': 1}

Case Score: 0.33

JourneyCode 506
HolidayType Active
NumberOfPersons 3
Region Tyrol
Transportation Car
Duration 14
Season August
Accommodation FiveStars
Hotel Aparthotel Hopfgarten

Case Score: 0.33
JourneyCode 59
HolidayType Active
NumberOfPersons 2
Region Allgaeu
Transportation Car
Duration 14
Season June
Accommodation FiveStars
Hotel Hofgut Kuernach, Allgaeu

Case Score: 0.33
JourneyCode 108
HolidayType Wandering
NumberOfPersons 2
Region Harz
Transportation Car
Duration 14
Season May
Accommodation FiveStars
Hotel Hotel Maritim, Harz

Do you want to select a Journey? [y/n]
y

Select Journey Code: 108

Here is your selected journey:

JourneyCode 108
HolidayType Wandering
NumberOfPersons 2
Region Harz
Transportation Car
Duration 14
Season May
Accommodation FiveStars
Hotel Hotel Maritim, Harz

Final price is: 3768
#####

Thanks for visiting Travel CBR system!

(mlsp) abhinav@Abhinavs-MacBook-Air xai-ccbr %

3. unweighted_adapt

Welcome to Travel CBR system!

is_weighted: False

- 1: What type of accomodation you want? (Score: 0.38)
- 2: What mode of transportation are you looking for? (Score: 0.36)
- 3: How many people are there in the trip? (Score: 0.25)

Select one of the above Qs (1, 2 or 3):

1

What type of accomodation you want?

Choose 1 for HolidayFlat

Choose 2 for OneStar

Choose 3 for TwoStars

Choose 4 for ThreeStars

Choose 5 for FourStars

Choose 6 for FiveStars

2

User selection (running):

{'Accommodation': 2}

Case Score: 0.33

JourneyCode	856
HolidayType	Active
NumberOfPersons	2
Region	Czechia
Transportation	Car
Duration	7
Season	January
Accommodation	OneStar
Hotel	Hotel Central, Giant Mountains

Case Score: 0.33

JourneyCode	861
HolidayType	Skiing
NumberOfPersons	2
Region	Czechia
Transportation	Car
Duration	7
Season	March
Accommodation	OneStar
Hotel	Pension Protez, Giant Mountains

Case Score: 0.33
JourneyCode 666
HolidayType Bathing
NumberOfPersons 2
Region Mallorca
Transportation Plane
Duration 21
Season September
Accommodation OneStar
Hotel Pension El Golea, Mallorca

Do you want to select a Journey? [y/n]
n

- 1: What mode of transportation are you looking for? (Score: 0.49)
- 2: How many people are there in the trip? (Score: 0.34)
- 3: What is the duration of the trip? (Score: 0.18)

Select one of the above Qs (1, 2 or 3):
1

What mode of transportation are you looking for?
Choose 1 for Car
Choose 2 for Coach
Choose 3 for Plane
Choose 4 for Train
1

User selection (running):
{'Accommodation': 2, 'Transportation': 1}

Case Score: 0.33
JourneyCode 855
HolidayType Skiing
NumberOfPersons 3
Region Czechia
Transportation Car
Duration 14
Season February
Accommodation OneStar
Hotel Hotel Central, Giant Mountains

Case Score: 0.33
JourneyCode 493
HolidayType Wandering

NumberOfPersons 3
Region Tyrol
Transportation Car
Duration 7
Season June
Accommodation OneStar
Hotel Gasthof Edelweiss, Tyrol

Case Score: 0.33

JourneyCode 492
HolidayType Wandering
NumberOfPersons 2
Region Tyrol
Transportation Car
Duration 7
Season May
Accommodation OneStar
Hotel Gasthof Edelweiss, Tyrol

Do you want to select a Journey? [y/n]
n

- 1: How many people are there in the trip? (Score: 0.59)
2: What is the duration of the trip? (Score: 0.31)
3: What holiday type are you looking for? (Score: 0.1)

Select one of the above Qs (1, 2 or 3):
3

What holiday type are you looking for?
Choose 1 for Active
Choose 2 for Bathing
Choose 3 for City
Choose 4 for Education
Choose 5 for Language
Choose 6 for Recreation
Choose 7 for Skiing
Choose 8 for Wandering
7

User selection (running):
{'Accommodation': 2, 'Transportation': 1, 'HolidayType': 7}

Case Score: 0.33
JourneyCode 855
HolidayType Skiing

NumberOfPersons 3
Region Czechia
Transportation Car
Duration 14
Season February
Accommodation OneStar
Hotel Hotel Central, Giant Mountains

Case Score: 0.33

JourneyCode 843
HolidayType Skiing
NumberOfPersons 3
Region Slowakei
Transportation Car
Duration 7
Season February
Accommodation OneStar
Hotel Pension Bjoernson, High Tatra

Case Score: 0.33

JourneyCode 864
HolidayType Skiing
NumberOfPersons 2
Region Czechia
Transportation Car
Duration 7
Season February
Accommodation OneStar
Hotel Hotel Sirena, Giant Mountains

Do you want to select a Journey? [y/n]
n

- 1: How many people are there in the trip? (Score: 0.65)
2: What is the duration of the trip? (Score: 0.33)
3: In which Season are you planning the trip? (Score: 0.02)

Select one of the above Qs (1, 2 or 3):
1

How many people are there in the trip?
3

User selection (running):
{'Accommodation': 2, 'Transportation': 1, 'HolidayType': 7, 'NumberOfPersons': 3}

Case Score: 0.34

JourneyCode	855
HolidayType	Skiing
NumberOfPersons	3
Region	Czechia
Transportation	Car
Duration	14
Season	February
Accommodation	OneStar
Hotel	Hotel Central, Giant Mountains

Case Score: 0.34

JourneyCode	843
HolidayType	Skiing
NumberOfPersons	3
Region	Slowakei
Transportation	Car
Duration	7
Season	February
Accommodation	OneStar
Hotel	Pension Bjoernson, High Tatra

Case Score: 0.33

JourneyCode	844
HolidayType	Skiing
NumberOfPersons	2
Region	Slowakei
Transportation	Car
Duration	7
Season	March
Accommodation	OneStar
Hotel	Pension Bjoernson, High Tatra

Do you want to select a Journey? [y/n]

n

1: What is the duration of the trip? (Score: 0.93)

2: In which Season are you planning the trip? (Score: 0.06)

3: Which region are you interested in travelling? (Score: 0.01)

Select one of the above Qs (1, 2 or 3):

1

What is the duration of the trip?

10

User selection (running):

{'Accommodation': 2, 'Transportation': 1, 'HolidayType': 7, 'NumberOfPersons': 3, 'Duration': 10}

Case Score: 0.34

JourneyCode	843
HolidayType	Skiing
NumberOfPersons	3
Region	Slowakei
Transportation	Car
Duration	7
Season	February
Accommodation	OneStar
Hotel	Pension Bjoernson, High Tatra

Case Score: 0.33

JourneyCode	855
HolidayType	Skiing
NumberOfPersons	3
Region	Czechia
Transportation	Car
Duration	14
Season	February
Accommodation	OneStar
Hotel	Hotel Central, Giant Mountains

Case Score: 0.33

JourneyCode	844
HolidayType	Skiing
NumberOfPersons	2
Region	Slowakei
Transportation	Car
Duration	7
Season	March
Accommodation	OneStar
Hotel	Pension Bjoernson, High Tatra

Do you want to select a Journey? [y/n]

n

1: In which Season are you planning the trip? (Score: 0.79)

2: Which region are you interested in travelling? (Score: 0.16)

3: Do you have any preference of Hotel? (Score: 0.05)

Select one of the above Qs (1, 2 or 3):

1

*In which Season are you planning the trip?
Choose 1 for January, 2 for February ... 12 for December*

User selection (running):
{ 'Accommodation': 2, 'Transportation': 1, 'HolidayType': 7, 'NumberOfPersons': 3, 'Duration': 10, 'Season': 2 }

Case Score: 0.34	
JourneyCode	843
HolidayType	Skiing
NumberOfPersons	3
Region	Slowakei
Transportation	Car
Duration	7
Season	February
Accommodation	OneStar
Hotel	Pension Bjoernson, High Tatras

Case Score:	0.33
JourneyCode	855
HolidayType	Skiing
NumberOfPersons	3
Region	Czechia
Transportation	Car
Duration	14
Season	February
Accommodation	OneStar
Hotel	Hotel Central, Giant Mountains

Case Score:	0.33
JourneyCode	864
HolidayType	Skiing
NumberOfPersons	2
Region	Czechia
Transportation	Car
Duration	7
Season	February
Accommodation	OneStar
Hotel	Hotel Sirena, Giant Mountains

Do you want to select a Journey? [y/n]
n

1: Which region are you interested in travelling? (Score: 0.75)

2: Do you have any preference of Hotel? (Score: 0.25)

Select one of the above Qs (1, 2 or 3):

1

Which region are you interested in travelling? Slowakei

User selection (running):

{'Accommodation': 2, 'Transportation': 1, 'HolidayType': 7, 'NumberOfPersons': 3, 'Duration': 10, 'Season': 2, 'Region': 56}

Case Score: 0.35

JourneyCode	843
HolidayType	Skiing
NumberOfPersons	3
Region	Slowakei
Transportation	Car
Duration	7
Season	February
Accommodation	OneStar
Hotel	Pension Bjoernson, High Tatra

Case Score: 0.32

JourneyCode	842
HolidayType	Skiing
NumberOfPersons	3
Region	Slowakei
Transportation	Car
Duration	7
Season	February
Accommodation	TwoStars
Hotel	Hotel Sverma, High Tatra

Case Score: 0.32

JourneyCode	826
HolidayType	Skiing
NumberOfPersons	3
Region	Slowakei
Transportation	Car
Duration	7
Season	February
Accommodation	TwoStars
Hotel	Hotel Banik, High Tatra

Do you want to select a Journey? [y/n]

n

1: Do you have any preference of Hotel? (Score: 1.0)

Select one of the above Qs (1, 2 or 3):

1

Do you have any preference of Hotel?Pension Bjoernson, High Tatra

User selection (running):

{'Accommodation': 2, 'Transportation': 1, 'HolidayType': 7, 'NumberOfPersons': 3, 'Duration': 10, 'Season': 2, 'Region': 56, 'Hotel': 289}

Case Score: 0.36

<i>JourneyCode</i>	<i>843</i>
<i>HolidayType</i>	<i>Skiing</i>
<i>NumberOfPersons</i>	<i>3</i>
<i>Region</i>	<i>Slowakei</i>
<i>Transportation</i>	<i>Car</i>
<i>Duration</i>	<i>7</i>
<i>Season</i>	<i>February</i>
<i>Accommodation</i>	<i>OneStar</i>
<i>Hotel</i>	<i>Pension Bjoernson, High Tatra</i>

Case Score: 0.33

<i>JourneyCode</i>	<i>844</i>
<i>HolidayType</i>	<i>Skiing</i>
<i>NumberOfPersons</i>	<i>2</i>
<i>Region</i>	<i>Slowakei</i>
<i>Transportation</i>	<i>Car</i>
<i>Duration</i>	<i>7</i>
<i>Season</i>	<i>March</i>
<i>Accommodation</i>	<i>OneStar</i>
<i>Hotel</i>	<i>Pension Bjoernson, High Tatra</i>

Case Score: 0.31

<i>JourneyCode</i>	<i>842</i>
<i>HolidayType</i>	<i>Skiing</i>
<i>NumberOfPersons</i>	<i>3</i>
<i>Region</i>	<i>Slowakei</i>
<i>Transportation</i>	<i>Car</i>
<i>Duration</i>	<i>7</i>
<i>Season</i>	<i>February</i>
<i>Accommodation</i>	<i>TwoStars</i>
<i>Hotel</i>	<i>Hotel Sverma, High Tatra</i>

Do you want to select a Journey? [y/n]
n

User selection (Final):
{'Accommodation': 2, 'Transportation': 1, 'HolidayType': 7, 'NumberOfPersons': 3, 'Duration': 10, 'Season': 2, 'Region': 56, 'Hotel': 289}

Here's the best match:

```
#####  
HolidayType           Skiing  
NumberOfPersons           3  
Region           Slowakei  
Transportation           Car  
Duration           7  
Season           February  
Accommodation           OneStar  
Hotel           Pension Bjoernson, High Tatra  
Price           1272
```

```
#####  
Based on the input, the Case-adapted Price is: 1681.1  
#####
```

Thanks for visiting Travel CBR system!

(mlsp) abhinav@Abhinavs-MacBook-Air xai-ccbr %

4. weighted_adapt

Welcome to Travel CBR system!

is_weighted: True

- 1: What type of accomodation you want? (Score: 0.38)
- 2: What mode of transportation are you looking for? (Score: 0.36)
- 3: How many people are there in the trip? (Score: 0.25)

Select one of the above Qs (1, 2 or 3):
1

What type of accomodation you want?
Choose 1 for HolidayFlat
Choose 2 for OneStar
Choose 3 for TwoStars
Choose 4 for ThreeStars
Choose 5 for FourStars
Choose 6 for FiveStars

2

User selection (running):
{'Accommodation': 2}

Case Score: 0.33

JourneyCode	856
HolidayType	Active
NumberOfPersons	2
Region	Czechia
Transportation	Car
Duration	7
Season	January
Accommodation	OneStar
Hotel	Hotel Central, Giant Mountains

Case Score: 0.33

JourneyCode	861
HolidayType	Skiing
NumberOfPersons	2
Region	Czechia
Transportation	Car
Duration	7
Season	March
Accommodation	OneStar
Hotel	Pension Protez, Giant Mountains

Case Score: 0.33

JourneyCode	666
HolidayType	Bathing
NumberOfPersons	2
Region	Mallorca
Transportation	Plane
Duration	21
Season	September
Accommodation	OneStar
Hotel	Pension El Golea, Mallorca

Do you want to select a Journey? [y/n]
n

- 1: What mode of transportation are you looking for? (Score: 0.49)
- 2: How many people are there in the trip? (Score: 0.34)
- 3: What is the duration of the trip? (Score: 0.18)

Select one of the above Qs (1, 2 or 3):

1

What mode of transportation are you looking for?

Choose 1 for Car

Choose 2 for Coach

Choose 3 for Plane

Choose 4 for Train

1

User selection (running):

{'Accommodation': 2, 'Transportation': 1}

Case Score: 0.33

JourneyCode	855
HolidayType	Skiing
NumberOfPersons	3
Region	Czechia
Transportation	Car
Duration	14
Season	February
Accommodation	OneStar
Hotel	Hotel Central, Giant Mountains

Case Score: 0.33

JourneyCode	493
HolidayType	Wandering
NumberOfPersons	3
Region	Tyrol
Transportation	Car
Duration	7
Season	June
Accommodation	OneStar
Hotel	Gasthof Edelweiss, Tyrol

Case Score: 0.33

JourneyCode	492
HolidayType	Wandering
NumberOfPersons	2
Region	Tyrol
Transportation	Car
Duration	7
Season	May
Accommodation	OneStar
Hotel	Gasthof Edelweiss, Tyrol

Do you want to select a Journey? [y/n]

n

1: How many people are there in the trip? (Score: 0.59)

2: What is the duration of the trip? (Score: 0.31)

3: What holiday type are you looking for? (Score: 0.1)

Select one of the above Qs (1, 2 or 3):

1

How many people are there in the trip?

3

User selection (running):

{'Accommodation': 2, 'Transportation': 1, 'NumberOfPersons': 3}

Case Score: 0.33

JourneyCode	843
HolidayType	Skiing
NumberOfPersons	3
Region	Slowakei
Transportation	Car
Duration	7
Season	February
Accommodation	OneStar
Hotel	Pension Bjoernson, High Tatra

Case Score: 0.33

JourneyCode	391
HolidayType	Bathing
NumberOfPersons	3
Region	Riviera
Transportation	Car
Duration	7
Season	August
Accommodation	OneStar
Hotel	Hotel Tritone, Ital. Riviera

Case Score: 0.33

JourneyCode	855
HolidayType	Skiing
NumberOfPersons	3
Region	Czechia
Transportation	Car
Duration	14
Season	February
Accommodation	OneStar

Hotel Hotel Central, Giant Mountains

Do you want to select a Journey? [y/n]

n

1: What is the duration of the trip? (Score: 0.72)

2: What holiday type are you looking for? (Score: 0.24)

3: In which Season are you planning the trip? (Score: 0.04)

Select one of the above Qs (1, 2 or 3):

1

What is the duration of the trip?

10

User selection (running):

{'Accommodation': 2, 'Transportation': 1, 'NumberOfPersons': 3, 'Duration': 10}

Case Score: 0.33

JourneyCode	843
HolidayType	Skiing
NumberOfPersons	3
Region	Slowakei
Transportation	Car
Duration	7
Season	February
Accommodation	OneStar
Hotel	Pension Bjoernson, High Tatra

Case Score: 0.33

JourneyCode	391
HolidayType	Bathing
NumberOfPersons	3
Region	Riviera
Transportation	Car
Duration	7
Season	August
Accommodation	OneStar
Hotel	Hotel Tritone, Ital. Riviera

Case Score: 0.33

JourneyCode	493
HolidayType	Wandering
NumberOfPersons	3
Region	Tyrol

Transportation Car
Duration 7
Season June
Accommodation OneStar
Hotel Gasthof Edelweiss, Tyrol

Do you want to select a Journey? [y/n]
n

- 1: What holiday type are you looking for? (Score: 0.82)
2: In which Season are you planning the trip? (Score: 0.15)
3: Which region are you interested in travelling? (Score: 0.03)

Select one of the above Qs (1, 2 or 3):
1

What holiday type are you looking for?
Choose 1 for Active
Choose 2 for Bathing
Choose 3 for City
Choose 4 for Education
Choose 5 for Language
Choose 6 for Recreation
Choose 7 for Skiing
Choose 8 for Wandering
7

User selection (running):
{'Accommodation': 2, 'Transportation': 1, 'NumberOfPersons': 3, 'Duration': 10, 'HolidayType': 7}

Case Score: 0.34
JourneyCode 843
HolidayType Skiing
NumberOfPersons 3
Region Slowakei
Transportation Car
Duration 7
Season February
Accommodation OneStar
Hotel Pension Bjoernson, High Tatra

Case Score: 0.33
JourneyCode 855
HolidayType Skiing
NumberOfPersons 3
Region Czechia

Transportation Car
Duration 14
Season February
Accommodation OneStar
Hotel Hotel Central, Giant Mountains

Case Score: 0.33

JourneyCode 844
HolidayType Skiing
NumberOfPersons 2
Region Slowakei
Transportation Car
Duration 7
Season March
Accommodation OneStar
Hotel Pension Bjoernson, High Tatra

Do you want to select a Journey? [y/n]
n

- 1: In which Season are you planning the trip? (Score: 0.79)
- 2: Which region are you interested in travelling? (Score: 0.16)
- 3: Do you have any preference of Hotel? (Score: 0.05)

Select one of the above Qs (1, 2 or 3):
1

In which Season are you planning the trip?
Choose 1 for January, 2 for February ... 12 for December
2

User selection (running):
{'Accommodation': 2, 'Transportation': 1, 'NumberOfPersons': 3, 'Duration': 10, 'HolidayType': 7, 'Season': 2}

Case Score: 0.34

JourneyCode 843
HolidayType Skiing
NumberOfPersons 3
Region Slowakei
Transportation Car
Duration 7
Season February
Accommodation OneStar
Hotel Pension Bjoernson, High Tatra

Case Score: 0.33
JourneyCode 855
HolidayType Skiing
NumberOfPersons 3
Region Czechia
Transportation Car
Duration 14
Season February
Accommodation OneStar
Hotel Hotel Central, Giant Mountains

Case Score: 0.33
JourneyCode 864
HolidayType Skiing
NumberOfPersons 2
Region Czechia
Transportation Car
Duration 7
Season February
Accommodation OneStar
Hotel Hotel Sirena, Giant Mountains

Do you want to select a Journey? [y/n]
n

1: Which region are you interested in travelling? (Score: 0.75)
2: Do you have any preference of Hotel? (Score: 0.25)

Select one of the above Qs (1, 2 or 3):
1

Which region are you interested in travelling? Slowakei

User selection (running):
{'Accommodation': 2, 'Transportation': 1, 'NumberOfPersons': 3, 'Duration': 10, 'HolidayType': 7, 'Season': 2, 'Region': 56}

Case Score: 0.35
JourneyCode 843
HolidayType Skiing
NumberOfPersons 3
Region Slowakei
Transportation Car
Duration 7
Season February

Accommodation OneStar
Hotel Pension Bjoernson, High Tatra

Case Score: 0.32

JourneyCode 842
HolidayType Skiing
NumberOfPersons 3
Region Slowakei
Transportation Car
Duration 7
Season February
Accommodation TwoStars
Hotel Hotel Sverma, High Tatra

Case Score: 0.32

JourneyCode 826
HolidayType Skiing
NumberOfPersons 3
Region Slowakei
Transportation Car
Duration 7
Season February
Accommodation TwoStars
Hotel Hotel Banik, High Tatra

Do you want to select a Journey? [y/n]
n

1: Do you have any preference of Hotel? (Score: 1.0)

Select one of the above Qs (1, 2 or 3):
1

Do you have any preference of Hotel? Pension Bjoernson, High Tatra

User selection (running):

{'Accommodation': 2, 'Transportation': 1, 'NumberOfPersons': 3, 'Duration': 10, 'HolidayType': 7, 'Season': 2, 'Region': 56, 'Hotel': 289}

Case Score: 0.36

JourneyCode 843
HolidayType Skiing
NumberOfPersons 3
Region Slowakei
Transportation Car

Duration 7
Season February
Accommodation OneStar
Hotel Pension Bjoernson, High Tatra

Case Score: 0.33

JourneyCode 844
HolidayType Skiing
NumberOfPersons 2
Region Slowakei
Transportation Car
Duration 7
Season March
Accommodation OneStar
Hotel Pension Bjoernson, High Tatra

Case Score: 0.31

JourneyCode 842
HolidayType Skiing
NumberOfPersons 3
Region Slowakei
Transportation Car
Duration 7
Season February
Accommodation TwoStars
Hotel Hotel Sverma, High Tatra

Do you want to select a Journey? [y/n]

n

User selection (Final):

{'Accommodation': 2, 'Transportation': 1, 'NumberOfPersons': 3, 'Duration': 10, 'HolidayType': 7, 'Season': 2, 'Region': 56, 'Hotel': 289}

Here's the best match:

#####

HolidayType Skiing
NumberOfPersons 3
Region Slowakei
Transportation Car
Duration 7
Season February
Accommodation OneStar
Hotel Pension Bjoernson, High Tatra
Price 1272

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Based on the input, the Case-adapted Price is: 1681.1

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Thanks for visiting Travel CBR system!

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