SavorySage - Documentation

July 18, 2023

1 SavorySage:

1.1 AI-Driven Savory Restaurant Recommendations

[1]:
```
#Importing necessary libraries for this project
import pandas
import random
import re
import numpy

from spacy.training.example import Example
import spacy
nlp = spacy.load("en_core_web_sm")

from sklearn.metrics.pairwise import cosine_similarity
from geopy.geocoders import Nominatim

import warnings
warnings.filterwarnings("ignore")
```

This is just documentation, the whole project is uploaded with this document. This will highlight results i

1.2 Step 1: Data Collection and Preprocessing

The first set of this project is to collect appropriate dataset to create a chat bot. I located a dataset of foodpanda, which is linked down below. It had data from various countries, in which foodpanda operated in. I filtered the data by only keeping data from Pakistan, so I can create a chat bot specifically tailored towards Pakistani audience. The dataset has various columns but the columns which I have picked include;

- budget ranging from 1 to 3.
- latitude and longitude to get the exact coordinates on the location.
- name of the restaurant.
- review_number which show total number of reviews posted on foodpanda.
- rating which ranges from 0 to 5.
- city in which it is located.
- main_cuisine indicating the main cuisine of the restaurant.

Link: https://www.kaggle.com/datasets/hashiromer/all-foodpanda-restaurants

[2]:
```
#This dataset belongs to foodpanda and I am going to pre process the data to␣
 ↪get desirable columns and rows.
data = pandas.read_csv(r'C:\Users\USER\Documents\Data Science␣
 ↪Internship\data\restaurants_data_analysis.csv', low_memory=False)

#All the columns in the original dataset
data
```

[2]:

	budget	is_new_until	latitude	longitude	\
0	2	2023-01-08T07:58:20Z	11.578462	104.894039	
1	3	2023-01-08T07:58:40Z	11.589699	104.874987	
2	3	2023-01-08T08:02:26Z	11.544155	104.916032	
3	3	2023-01-08T07:58:23Z	11.534426	104.885958	
4	3	2023-01-08T07:59:17Z	11.552822	104.883800	
…	…	…	…	…	
267373	2	2022-03-26T00:00:00Z	20.656424	96.630514	
267374	2	2022-03-25T00:00:00Z	20.659181	96.636431	
267375	1	2022-03-25T00:00:00Z	20.654039	96.629237	
267376	1	2022-08-28T00:00:00Z	20.659431	96.635571	
267377	1	2022-05-26T00:00:00Z	20.658523	96.641068	

	minimum_delivery_time	minimum_order_amount	minimum_pickup_time	\
0	0	0	15	
1	0	0	15	
2	29810	0	5	
3	29800	0	5	
4	29800	0	5	
…	…	…	…	
267373	0	0	15	
267374	0	0	15	
267375	0	0	15	
267376	0	0	15	
267377	0	0	15	

	name	post_code	rating	\
0	LG BrandShop (Toul Kork) - Vendor Delivery	12152	0.0	
1	LG BrandShop (Sen Sok) - Vendor Delivery	12105	0.0	
2	LG Brandshop Toul Tompoung - Vendor Delivery	12103	0.0	
3	LG Brandshop (Steung Meanchey) - Vendor Delivery	12350	0.0	
4	Phum Electronics North Bridge - Vendor Delivery	12102	0.0	
…	…	…	…	
267373	Shwe Dingar [Aung Pan]	06022	0.0	
267374	{Aung Pan}	06022	0.0	
267375	The Clay and Chill (Aung Pan)	06022	3.0	
267376	Hala Food (Aung Pan)	06022	0.0	

```
267377                          (  ) [Aungpan]     06022     0.0

        …  vertical_parent  delivery_provider is_active is_new is_promoted  \
0       …             Shop    vendor_delivery      True  False       False
1       …             Shop    vendor_delivery      True  False       False
2       …             Shop    vendor_delivery      True  False       False
3       …             Shop    vendor_delivery      True  False       False
4       …             Shop    vendor_delivery      True  False       False
…     …               …                 …       …     …         …
267373  …       Restaurant  platform_delivery      True  False       False
267374  …       Restaurant  platform_delivery      True  False       False
267375  …       Restaurant  platform_delivery      True  False       False
267376  …       Restaurant  platform_delivery      True  False       False
267377  …       Restaurant  platform_delivery      True  False       False

               city         timezone  dine_in      main_cuisine   country
0       Phnom Penh  Asia/Phnom_Penh    False               NaN  Cambodia
1       Phnom Penh  Asia/Phnom_Penh    False               NaN  Cambodia
2       Phnom Penh  Asia/Phnom_Penh    False               NaN  Cambodia
3       Phnom Penh  Asia/Phnom_Penh    False               NaN  Cambodia
4       Phnom Penh  Asia/Phnom_Penh    False               NaN  Cambodia
…              …               …      …                 …       …
267373     Aungpan      Asia/Yangon    False              Myanmar
267374     Aungpan      Asia/Yangon    False          Myanmar
267375     Aungpan      Asia/Yangon    False                  Myanmar
267376     Aungpan      Asia/Yangon    False                  Myanmar
267377     Aungpan      Asia/Yangon    False                  Myanmar

[267378 rows x 23 columns]
```

[3]:
```
data['country'].unique()
```

[3]:
```
array(['Cambodia', 'Pakistan', 'Malaysia', 'Singapore', 'Laos', 'Taiwan',
       'Hong_Kong', 'Slovakia', 'Thailand', 'Hungary', 'Philippines',
       'Bangladesh', 'Myanmar'], dtype=object)
```

[4]:
```
#Removing any restuarant that is not located in Pakistan because we are␣
 ↪creating a Pakistani based resturant recommender
data = data[data['country'] == 'Pakistan']

#Removing all unactive restuarants at foodpanda
data = data[data['is_active'] == 1]

#Selecting the appropriate columns for our system
data = data[['budget', 'latitude', 'longitude', 'name', 'rating',␣
 ↪'review_number', 'city', 'main_cuisine']]
```

```
#Lowercasing main_cuisine and city to create a standard format for scanning
data[['main_cuisine', 'city']] = data[['main_cuisine', 'city']].apply(lambda␣
 ↪row: row.astype(str).str.lower())

#Dropping duplicate rows
data = data.drop_duplicates()

#Dropping missing values
data = data.dropna()

#Reseting index
data.reset_index(drop=True, inplace=True)

#Creating a new csv which will includes our preprocessed data
data.to_csv('cleanedData.csv')

data
```

[4]:

	budget	latitude	longitude	name	rating	review_number	city	main_cuisine
0	2	24.901243	67.200907	Roll N Roll	3.8	82	karachi	fast food
1	2	24.893939	67.058118	Crispiest Fast Food	1.0	3	karachi	fast food
2	1	24.902181	67.067199	H pro pizza and fastfood	3.5	95	karachi	pizza
3	3	24.868921	67.059357	Imperial Court Chinese Restaurant	4.2	1187	karachi	chinese
4	2	24.904414	67.068519	Aslam Nihari & Bar B Q Fast Food	3.9	83	karachi	pakistani
…	…	…	…	…	…	…	…	…
12148	2	31.709790	73.979133	AC Cafe	3.1	115	sheikhupura	cakes & bakery
12149	1	31.712072	73.987402	Zam Zam Fast Food-Regal Chowk	3.5	102	sheikhupura	burgers
12150	1	31.712038	73.987347	Ahmed Rafique Fish Fry	3.5	30	sheikhupura	seafood
12151	3	31.712120	73.987233	New Bismillah Restaurant - Regal Chowk	3.8	645	sheikhupura	pakistani
12152	1	31.709839	73.978324	Punjab Naan Shop	3.5	34	sheikhupura	pakistani

[12153 rows x 8 columns]

1.3 Step 2: Natural Language Processing (NLP)

Our second step includes using an NLP to extract key information from user queries, such as location, cuisine preferences, and budget constraints. As I am creating this chat bot specifically for Pakistani audience, I need to make sure all the cities and rupee currency is identified by the spacy model. After some research, I figured out that the spacy pre build model doesn't properly recognise pakistani cities or currency. Examples include, the model failing to recognise pakistani cities in some context and failing to properly recognise rupees, like PKR, RS., rupees, rupee etc as a currency. So what I decided is to create a new custom model for detecting all these issues.

[5]:
```
string1 = "I am feeling like eating at a restaurant and my budget 1500 pkr and␣
 ↪my location is lahore"
string2 = "I am feeling like eating at a restaurant and my budget 1500 dollars␣
 ↪and my location is new york"

doc = nlp(string1)
for ent in doc.ents:
    print("Entity:", ent.text)
    print("Label:", ent.label_)

print("\n")
doc = nlp(string2)
for ent in doc.ents:
    print("Entity:", ent.text)
    print("Label:", ent.label_)
```

```
Entity: 1500
Label: CARDINAL


Entity: 1500 dollars
Label: MONEY
Entity: new york
Label: GPE
```

As you can see, the model fails to recognise lahore as a GPE (Geo Political Entity), while it can detect new york as one. It also fails to detect 1500 as a money in the first string (you can try rs, pkr, rupee, rupees and it will all fail), but detects dollars easily. So, we I will create a custom model which will detect cities, rating and cuisine too.

[6]:
```
data['main_cuisine'].unique()
```

[6]:
```
array(['fast food', 'pizza', 'chinese', 'pakistani', 'nan',
       'healthy food', 'beverages', 'cakes & bakery', 'desserts',
       'burgers', 'savouries', 'italian', 'biryani', 'pulao',
       'sandwiches', 'thai', 'japanese', 'tea & coffee', 'bbq',
       'continental', 'american', 'dumpling', 'shawarma',
       'middle eastern', 'fried chicken', 'seafood', 'indian', 'mexican',
       'steak', 'western', 'lebanese', 'mediterranean', 'turkish',
```

```
       'southeast asian', 'wraps & rolls'], dtype=object)
```

[7]:
```
data['city'].unique()
```

[7]:
```
array(['karachi', 'lahore', 'islamabad', 'rawalpindi', 'faisalabad',
       'multan', 'hyderabad', 'sialkot', 'peshawar', 'sukkur', 'murree',
       'bahawalpur', 'sadiqabad', 'larkana', 'sahiwal', 'wah cantt',
       'abbottabad', 'rahim yar khan', 'dera ghazi khan', 'sargodha',
       'gujranwala', 'quetta', 'okara', 'jhelum', 'mardan', 'gujrat',
       'sheikhupura'], dtype=object)
```

[8]:
```
#Creating a model which will detect pakistani cities, ratings, pakistani␣
 ↪currency and
def trainCustomModel(train_data, labels, iterations=45):
    nlp = spacy.blank("en")
    ner = nlp.create_pipe("ner")
    nlp.add_pipe("ner")

    for label in labels:
        ner.add_label(label)

    optimizer = nlp.begin_training()
    modified_training_data = []
    for text, annotations in train_data:
        doc = nlp.make_doc(text)
        entities = [(entity, label) for entity, label in␣
 ↪annotations["entities"]]
        modified_entities = []
        for entity, label in entities:
            start = text.find(entity)
            end = start + len(entity)
            modified_entities.append((start, end, label))
        modified_annotations = {"entities": modified_entities}
        example = Example.from_dict(doc, modified_annotations)
        modified_training_data.append((text, example))

    for _ in range(iterations):
        random.shuffle(modified_training_data)
        losses = {}
        for text, example in modified_training_data:
            nlp.update([example], drop=0.5, losses=losses, sgd=optimizer)

    return nlp

#Creating a custom dataset which will include PK_CITY, CUISINE, PK_CURRENCY,␣
 ↪MONEY, RATING labels to create custom entites for this chatbot
trainingData = [
```

```
    (
        "I want to order from a chinese restaurant that is rated 4.3, my cost␣
↪is rs. 500 and I live in lahore.",
        {"entities": [("lahore", "PK_CITY"), ("chinese", "CUISINE"), ("rs",␣
↪"PK_CURRENCY"), ("500", "MONEY"), ("4.3", "RATING")]}
    ),
    (
        "I am currently located in karachi and I want you to recommend me␣
↪chinese restaurants with a rating of 4.5 and my budget is pkr700",
        {"entities": [("karachi", "PK_CITY"), ("chinese", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("700", "MONEY"), ("4.5", "RATING")]}
    ),
    (
        "Craving some chinese takeaway which will cost me around rupees 900 and␣
↪it must have a rating of 4.9 and I am located in islamabad",
        {"entities": [("islamabad", "PK_CITY"), ("chinese", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("900", "MONEY"), ("4.9", "RATING")]}
    ),
    (
        "Tonight is the plan of chinese cuisine with some friends in rawalpindi.
↪ I will be spending 1000 pkr on the menu and it must be rated 4.2 at least",
        {"entities": [("rawalpindi", "PK_CITY"), ("chinese", "CUISINE"),␣
↪("pkr", "PK_CURRENCY"), ("1000", "MONEY"), ("4.2", "RATING")]}
    ),
    (
        "Gonna stay home today and i feel like eating pakistani. It must cost␣
↪me 1100 rupees.",
        {"entities": [("pakistani", "CUISINE"), ("rupees", "PK_CURRENCY"),␣
↪("1100", "MONEY")]}
    ),
    (
        "Tell me the best resturants around faisalabad with the budget rupee␣
↪1300 serving pakistani food with 4.0 rating.",
        {"entities": [("faisalabad", "PK_CITY"), ("rupee", "PK_CURRENCY"),␣
↪("1300", "MONEY"), ("pakistani", "CUISINE"), ("4.0", "RATING")]}
    ),
    (
        "I want you to recommend me a restaurant where I can get pakistani␣
↪takeaway from multan rated 4.1",
        {"entities": [("multan", "PK_CITY"), ("pakistani", "CUISINE"), ("4.1",␣
↪"RATING")]}
    ),
    (
        "I am living in sialkot and want some recommendations on some pakistani␣
↪takeaway which will cost 1500 rupee and has a good rating of 4.4",
```

```
      {"entities": [("sialkot", "PK_CITY"), ("pakistani", "CUISINE"),␣
↪("rupee", "PK_CURRENCY"), ("1500", "MONEY"), ("4.4", "RATING")]}
  ),
  (
      "I want to eat fast food today from hyderabad which should be rated␣
↪around at least 3.9.",
      {"entities": [("hyderabad", "PK_CITY"), ("fast food", "CUISINE"), ("3.
↪9", "RATING")]}
  ),
  (
      "I am living in peshawar. There aren't many fast food places here, but␣
↪do recommend me the best ones around rupees 1700 with a rating of minimum 3.
↪8.",
      {"entities": [("peshawar", "PK_CITY"), ("fast food", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("1700", "MONEY"), ("3.8", "RATING")]}
  ),
  (
      "Tell me a good rated restaurant around 4.8, around murree serving fast␣
↪food which I can easily spend around pkr 1900",
      {"entities": [("murree", "PK_CITY"), ("fast food", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("1900", "MONEY"), ("4.8", "RATING")]}
  ),
  (
      "I feel like eating fast food today, the restaurant should be rated␣
↪strictly above 3.7, and my total budget for tonight is 2000 rs",
      {"entities": [("bahawalpur", "PK_CITY"), ("fast food", "CUISINE"),␣
↪("rs", "PK_CURRENCY"), ("2000", "MONEY"), ("3.7", "RATING")]}
  ),
  (
      "I am craving some pizza today in sahiwal, I have 2200 rupee in my␣
↪pocket and that chain must have 5.0 rating.",
      {"entities": [("sahiwal", "PK_CITY"), ("pizza", "CUISINE"), ("rupee",␣
↪"PK_CURRENCY"), ("2200", "MONEY"), ("5.0", "RATING")]}
  ),
  (
      "Currently in abbottabad where I am looking for pizza, rated 3.4 and␣
↪cost around rs. 2400.",
      {"entities": [("abbottabad", "PK_CITY"), ("pizza", "CUISINE"), ("rs",␣
↪"PK_CURRENCY"), ("2400", "MONEY"), ("3.4", "RATING")]}
  ),
  (
      "I am in rahim yar khan, and I am feeling like eating some pizza, which␣
↪has 3.6 ratings and cost me pkr 2600.",
      {"entities": [("rahim yar khan", "PK_CITY"), ("pizza", "CUISINE"),␣
↪("pkr", "PK_CURRENCY"), ("2600", "MONEY"), ("3.6", "RATING")]}
  ),
```

```
    (
        "I am craving some pizza tonight located in dera gazi khan which is␣
↪rated 3.1 and will cost around 2800 rupees.",
        {"entities": [("dera gazi khan", "PK_CITY"), ("pizza", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("2800", "MONEY"), ("3.1", "RATING")]}
    ),
    (
        "Can you recommend me some places in sargodha city serving biryani␣
↪around rupee 3000, which has an overall rating of 3.0",
        {"entities": [("sargodha", "PK_CITY"), ("biryani", "CUISINE"),␣
↪("rupee", "PK_CURRENCY"), ("3000", "MONEY"), ("3.0", "RATING")]}
    ),
    (
        "I want food in gujwanwala, and craving some biryani around rupees 3200␣
↪with rating 3.4",
        {"entities": [("gujranwala", "PK_CITY"), ("biryani", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("3200", "MONEY"), ("3.4", "RATING")]}
    ),
    (
        "My budget for today is 3400 rs and rating of choice is 3.3. Suggest me␣
↪some biryani places in quetta.",
        {"entities": [("quetta", "PK_CITY"), ("biryani", "CUISINE"), ("rs",␣
↪"PK_CURRENCY"), ("3400", "MONEY"), ("3.3", "RATING")]}
    ),
    (
        "Suggest me some biryani restaurants in jhelum city of pkr 3600 which␣
↪is 3.2 rated.",
        {"entities": [("jhelum", "PK_CITY"), ("biryani", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("3600", "MONEY"), ("3.2", "RATING")]}
    ),
    (
        "I am living in gujrat, and want some recommendations on pulao serving␣
↪places with a rating of 2.8 and budget of 3700 rupees.",
        {"entities": [("gujrat", "PK_CITY"), ("pulao", "CUISINE"), ("rupees",␣
↪"PK_CURRENCY"), ("3700", "MONEY"), ("2.8", "RATING")]}
    ),
    (
        "Advise me some pulao serving places in rs 4000 with a rating of 2.3 in␣
↪sheikhapura.",
        {"entities": [("sheikhapura", "PK_CITY"), ("pulao", "CUISINE"), ("rs",␣
↪"PK_CURRENCY"), ("4000", "MONEY"), ("2.3", "RATING")]}
    ),
    (
        "I want some locations around karachi selling pulao in 2.8 rating and␣
↪the budget is rupees 3700.",
```

```
      {"entities": [("karachi", "PK_CITY"), ("pulao", "CUISINE"), ("rupees",␣
↪"PK_CURRENCY"), ("3700", "MONEY"), ("2.8", "RATING")]}
  ),
  (
      "I want you to suggest me some locations in lahore selling pulao and is␣
↪rated by customers around 2.3 and the total cost is 4000 rupee.",
      {"entities": [("lahore", "PK_CITY"), ("pulao", "CUISINE"), ("rupee",␣
↪"PK_CURRENCY"), ("4000", "MONEY"), ("2.3", "RATING")]}
  ),
      (
      "I want to order from a desserts restaurant that is rated 4.3, my cost␣
↪is rs. 500 and I live in lahore.",
      {"entities": [("lahore", "PK_CITY"), ("dessert", "CUISINE"), ("rs.",␣
↪"PK_CURRENCY"), ("500", "MONEY"), ("4.3", "RATING")]}
  ),
  (
      "I am currently located in karachi and I want you to recommend me␣
↪desserts restaurants with a rating of 4.5 and my budget is pkr700",
      {"entities": [("karachi", "PK_CITY"), ("dessert", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("700", "MONEY"), ("4.5", "RATING")]}
  ),
  (
      "Craving some desserts takeaway which will cost me around rupees 900␣
↪and it must have a rating of 4.9 and I am located in islamabad",
      {"entities": [("islamabad", "PK_CITY"), ("dessert", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("900", "MONEY"), ("4.9", "RATING")]}
  ),
  (
      "Tonight is the plan of desserts cuisine with some friends in␣
↪rawalpindi. I will be spending 1000 pkr on the menu and it must be rated 4.2␣
↪at least",
      {"entities": [("rawalpindi", "PK_CITY"), ("dessert", "CUISINE"),␣
↪("pkr", "PK_CURRENCY"), ("1000", "MONEY"), ("4.2", "RATING")]}
  ),
  (
      "I want to order from a burgers restaurant that is rated 4.3, my cost␣
↪is rs. 500 and I live in lahore.",
      {"entities": [("lahore", "PK_CITY"), ("burger", "CUISINE"), ("rs.",␣
↪"PK_CURRENCY"), ("500", "MONEY"), ("4.3", "RATING")]}
  ),
  (
      "I am currently located in karachi and I want you to recommend me␣
↪burgers restaurants with a rating of 4.5 and my budget is pkr700",
      {"entities": [("karachi", "PK_CITY"), ("burger", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("700", "MONEY"), ("4.5", "RATING")]}
  ),
```

```
    (
        "Craving some burgers takeaway which will cost me around rupees 900 and␣
↪it must have a rating of 4.9 and I am located in islamabad",
        {"entities": [("islamabad", "PK_CITY"), ("burger", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("900", "MONEY"), ("4.9", "RATING")]}
    ),
    (
        "Tonight is the plan of burgers cuisine with some friends in rawalpindi.
↪ I will be spending 1000 pkr on the menu and it must be rated 4.2 at least",
        {"entities": [("rawalpindi", "PK_CITY"), ("burger", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("1000", "MONEY"), ("4.2", "RATING")]}
    ),
    (
        "I want to order from an italian restaurant that is rated 4.3, my cost␣
↪is rs. 500 and I live in lahore.",
        {"entities": [("lahore", "PK_CITY"), ("italian", "CUISINE"), ("rs",␣
↪"PK_CURRENCY"), ("500", "MONEY"), ("4.3", "RATING")]}
    ),
    (
        "I am currently located in karachi and I want you to recommend me␣
↪italian restaurants with a rating of 4.5 and my budget is pkr700",
        {"entities": [("karachi", "PK_CITY"), ("italian", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("700", "MONEY"), ("4.5", "RATING")]}
    ),
    (
        "Craving some italian takeaway which will cost me around rupees 900 and␣
↪it must have a rating of 4.9 and I am located in islamabad",
        {"entities": [("islamabad", "PK_CITY"), ("italian", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("900", "MONEY"), ("4.9", "RATING")]}
    ),
    (
        "Tonight is the plan of italian cuisine with some friends in rawalpindi.
↪ I will be spending 1000 pkr on the menu and it must be rated 4.2 at least",
        {"entities": [("rawalpindi", "PK_CITY"), ("italian", "CUISINE"),␣
↪("pkr", "PK_CURRENCY"), ("1000", "MONEY"), ("4.2", "RATING")]}
    ),
    (
        "I want to order from a thai restaurant that is rated 4.3, my cost is␣
↪rs. 500 and I live in lahore.",
        {"entities": [("lahore", "PK_CITY"), ("thai", "CUISINE"), ("rs",␣
↪"PK_CURRENCY"), ("500", "MONEY"), ("4.3", "RATING")]}
    ),
    (
        "I am currently located in karachi and I want you to recommend me thai␣
↪restaurants with a rating of 4.5 and my budget is pkr700",
```

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      {"entities": [("karachi", "PK_CITY"), ("thai", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("700", "MONEY"), ("4.5", "RATING")]}
  ),
  (
      "Craving some thai takeaway which will cost me around rupees 900 and it␣
↪must have a rating of 4.9 and I am located in islamabad",
      {"entities": [("islamabad", "PK_CITY"), ("thai", "CUISINE"), ("rupees",␣
↪"PK_CURRENCY"), ("900", "MONEY"), ("4.9", "RATING")]}
  ),
  (
      "Tonight is the plan of thai cuisine with some friends in rawalpindi. I␣
↪will be spending 1000 pkr on the menu and it must be rated 4.2 at least",
      {"entities": [("rawalpindi", "PK_CITY"), ("thai", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("1000", "MONEY"), ("4.2", "RATING")]}
  ),
  (
      "Gonna stay home today and i feel like eating cakes & bakery. It must␣
↪cost me 1100 rupees.",
      {"entities": [("cakes", "CUISINE"), ("bakery", "CUISINE"), ("rupees",␣
↪"PK_CURRENCY"), ("1100", "MONEY")]}
  ),
  (
      "Tell me the best restaurants around faisalabad with the budget rupee␣
↪1300 serving cakes & bakery food with 4.0 rating.",
      {"entities": [("faisalabad", "PK_CITY"), ("rupee", "PK_CURRENCY"),␣
↪("1300", "MONEY"), ("cakes", "CUISINE"), ("bakery", "CUISINE"), ("4.0",␣
↪"RATING")]}
  ),
  (
      "I want to order from a chinese restaurant that is rated 4.3, my cost␣
↪is rs. 1500 and I live in sialkot.",
      {"entities": [("sialkot", "PK_CITY"), ("chinese", "CUISINE"), ("rs.",␣
↪"PK_CURRENCY"), ("1500", "MONEY"), ("4.3", "RATING")]}
  ),
  (
      "I want you to recommend me a restaurant where I can get cakes & bakery␣
↪takeaway from multan rated 4.1",
      {"entities": [("multan", "PK_CITY"), ("cakes", "CUISINE"), ("bakery",␣
↪"CUISINE"), ("4.1", "RATING")]}
  ),
  (
      "I am living in sialkot and want some recommendations on some cakes &␣
↪bakery takeaway which will cost 1500 rupee and has a good rating of 4.4",
      {"entities": [("sialkot", "PK_CITY"), ("cakes", "CUISINE"), ("bakery",␣
↪"CUISINE"), ("rupee", "PK_CURRENCY"), ("1500", "MONEY"), ("4.4", "RATING")]}
  ),
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    (
        "Gonna stay home today and i feel like eating sandwiches. It must cost␣
↪me 1100 rupees.",
        {"entities": [("sandwiches", "CUISINE"), ("rupees", "PK_CURRENCY"),␣
↪("1100", "MONEY")]}
    ),
    (
        "Tell me the best restaurants around faisalabad with the budget rupee␣
↪1300 serving sandwiches food with 4.0 rating.",
        {"entities": [("faisalabad", "PK_CITY"), ("rupee", "PK_CURRENCY"),␣
↪("1300", "MONEY"), ("sandwich", "CUISINE"), ("4.0", "RATING")]}
    ),
    (
        "I want you to recommend me a restaurant where I can get sandwiches␣
↪takeaway from multan rated 4.1",
        {"entities": [("multan", "PK_CITY"), ("sandwiches", "CUISINE"), ("4.1",␣
↪"RATING")]}
    ),
    (
        "I am living in sialkot and want some recommendations on some␣
↪sandwiches takeaway which will cost 1500 rupee and has a good rating of 4.4",
        {"entities": [("sialkot", "PK_CITY"), ("sandwiches", "CUISINE"),␣
↪("rupee", "PK_CURRENCY"), ("1500", "MONEY"), ("4.4", "RATING")]}
    ),
    (
        "Gonna stay home today and i feel like eating bbq. It must cost me 1100␣
↪rupees.",
        {"entities": [("bbq", "CUISINE"), ("rupees", "PK_CURRENCY"), ("1100",␣
↪"MONEY")]}
    ),
    (
        "Tell me the best restaurants around faisalabad with the budget rupee␣
↪1300 serving bbq food with 4.0 rating.",
        {"entities": [("faisalabad", "PK_CITY"), ("rupee", "PK_CURRENCY"),␣
↪("1300", "MONEY"), ("bbq", "CUISINE"), ("4.0", "RATING")]}
    ),
    (
        "I want you to recommend me a restaurant where I can get bbq takeaway␣
↪from multan rated 4.1",
        {"entities": [("multan", "PK_CITY"), ("bbq", "CUISINE"), ("4.1",␣
↪"RATING")]}
    ),
    (
        "I am living in sialkot and want some recommendations on some bbq␣
↪takeaway which will cost 1500 rupee and has a good rating of 4.4",
```

```
      {"entities": [("sialkot", "PK_CITY"), ("bbq", "CUISINE"), ("rupee",␣
↪"PK_CURRENCY"), ("1500", "MONEY"), ("4.4", "RATING")]}
  ),
  (
      "Gonna stay home today and i feel like eating japanese. It must cost me␣
↪1100 rupees.",
      {"entities": [("japanese", "CUISINE"), ("rupees", "PK_CURRENCY"),␣
↪("1100", "MONEY")]}
  ),
  (
      "Tell me the best restaurants around faisalabad with the budget rupee␣
↪1300 serving japanese food with 4.0 rating.",
      {"entities": [("faisalabad", "PK_CITY"), ("rupee", "PK_CURRENCY"),␣
↪("1300", "MONEY"), ("japanese", "CUISINE"), ("4.0", "RATING")]}
  ),
  (
      "I want you to recommend me a restaurant where I can get japanese␣
↪takeaway from multan rated 4.1",
      {"entities": [("multan", "PK_CITY"), ("japanese", "CUISINE"), ("4.1",␣
↪"RATING")]}
  ),
  (
      "I am living in sialkot and want some recommendations on some japanese␣
↪takeaway which will cost 1500 rupee and has a good rating of 4.4",
      {"entities": [("sialkot", "PK_CITY"), ("japanese", "CUISINE"),␣
↪("rupee", "PK_CURRENCY"), ("1500", "MONEY"), ("4.4", "RATING")]}
  ),
  (
      "I want to eat tea & coffee today from hyderabad which should be rated␣
↪around at least 3.9.",
      {"entities": [("hyderabad", "PK_CITY"), ("tea", "CUISINE"), ("coffee",␣
↪"CUISINE"), ("3.9", "RATING")]}
  ),
  (
      "I am living in peshawar. There aren't many tea & coffee places here,␣
↪but do recommend me the best ones around rupees 1700 with a rating of␣
↪minimum 3.8.",
      {"entities": [("peshawar", "PK_CITY"), ("tea", "CUISINE"), ("coffee",␣
↪"CUISINE"), ("rupees", "PK_CURRENCY"), ("1700", "MONEY"), ("3.8", "RATING")]}
  ),
  (
      "Tell me a good rated restaurant around 4.8, around murree serving tea␣
↪& coffee which I can easily spend around pkr 1900",
      {"entities": [("murree", "PK_CITY"), ("tea", "CUISINE"), ("coffee",␣
↪"CUISINE"), ("pkr", "PK_CURRENCY"), ("1900", "MONEY"), ("4.8", "RATING")]}
  ),
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    (
        "I feel like eating tea & coffee today, the restaurant should be rated␣
↪strictly above 3.7, and my total budget for tonight is 2000 rs",
        {"entities": [("bahawalpur", "PK_CITY"), ("tea", "CUISINE"), ("coffee",␣
↪"CUISINE"), ("rs", "PK_CURRENCY"), ("2000", "MONEY"), ("3.7", "RATING")]}
    ),
    (
        "I want to eat continental today from hyderabad which should be rated␣
↪around at least 3.9.",
        {"entities": [("hyderabad", "PK_CITY"), ("continental", "CUISINE"), ("3.
↪9", "RATING")]}
    ),
    (
        "I am living in peshawar. There aren't many continental places here,␣
↪but do recommend me the best ones around rupees 1700 with a rating of␣
↪minimum 3.8.",
        {"entities": [("peshawar", "PK_CITY"), ("continental", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("1700", "MONEY"), ("3.8", "RATING")]}
    ),
    (
        "Tell me a good rated restaurant around 4.8, around murree serving␣
↪continental which I can easily spend around pkr 1900",
        {"entities": [("murree", "PK_CITY"), ("continental", "CUISINE"),␣
↪("pkr", "PK_CURRENCY"), ("1900", "MONEY"), ("4.8", "RATING")]}
    ),
    (
        "I feel like eating continental today, the restaurant should be rated␣
↪strictly above 3.7, and my total budget for tonight is 2000 rs",
        {"entities": [("bahawalpur", "PK_CITY"), ("continental", "CUISINE"),␣
↪("rs", "PK_CURRENCY"), ("2000", "MONEY"), ("3.7", "RATING")]}
    ),
    (
        "I want to eat american today from hyderabad which should be rated␣
↪around at least 3.9.",
        {"entities": [("hyderabad", "PK_CITY"), ("american", "CUISINE"), ("3.
↪9", "RATING")]}
    ),
    (
        "I am living in peshawar. There aren't many american places here, but␣
↪do recommend me the best ones around rupees 1700 with a rating of minimum 3.
↪8.",
        {"entities": [("peshawar", "PK_CITY"), ("american", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("1700", "MONEY"), ("3.8", "RATING")]}
    ),
    (
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        "Tell me a good rated restaurant around 4.8, around murree serving␣
↪american which I can easily spend around pkr 1900",
        {"entities": [("murree", "PK_CITY"), ("american", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("1900", "MONEY"), ("4.8", "RATING")]}
    ),
    (
        "I feel like eating american today, the restaurant should be rated␣
↪strictly above 3.7, and my total budget for tonight is 2000 rs",
        {"entities": [("bahawalpur", "PK_CITY"), ("american", "CUISINE"),␣
↪("rs", "PK_CURRENCY"), ("2000", "MONEY"), ("3.7", "RATING")]}
    ),
    (
        "I want to eat shawarma today from hyderabad which should be rated␣
↪around at least 3.9.",
        {"entities": [("hyderabad", "PK_CITY"), ("shawarma", "CUISINE"), ("3.
↪9", "RATING")]}
    ),
    (
        "I am living in peshawar. There aren't many shawarma places here, but␣
↪do recommend me the best ones around rupees 1700 with a rating of minimum 3.
↪8.",
        {"entities": [("peshawar", "PK_CITY"), ("shawarma", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("1700", "MONEY"), ("3.8", "RATING")]}
    ),
    (
        "Tell me a good rated restaurant around 4.8, around murree serving␣
↪shawarma which I can easily spend around pkr 1900",
        {"entities": [("murree", "PK_CITY"), ("shawarma", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("1900", "MONEY"), ("4.8", "RATING")]}
    ),
    (
        "I feel like eating shawarma today, the restaurant should be rated␣
↪strictly above 3.7, and my total budget for tonight is 2000 rs",
        {"entities": [("bahawalpur", "PK_CITY"), ("shawarma", "CUISINE"),␣
↪("rs", "PK_CURRENCY"), ("2000", "MONEY"), ("3.7", "RATING")]}
    ),
    (
        "I am craving some fried chicken today in sahiwal, I have 2200 rupee in␣
↪my pocket and that chain must have 5.0 rating.",
        {"entities": [("sahiwal", "PK_CITY"), ("fried chicken", "CUISINE"),␣
↪("rupee", "PK_CURRENCY"), ("2200", "MONEY"), ("5.0", "RATING")]}
    ),
    (
        "Currently in abbottabad where I am looking for fried chicken, rated 3.
↪4 and cost around rs. 2400.",
```

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        {"entities": [("abbottabad", "PK_CITY"), ("fried chicken", "CUISINE"),␣
↪("rs", "PK_CURRENCY"), ("2400", "MONEY"), ("3.4", "RATING")]}
    ),
    (
        "I am in rahim yar khan, and I am feeling like eating some fried␣
↪chicken, which has 3.6 ratings and cost me pkr 2600.",
        {"entities": [("rahim yar khan", "PK_CITY"), ("fried chicken",␣
↪"CUISINE"), ("pkr", "PK_CURRENCY"), ("2600", "MONEY"), ("3.6", "RATING")]}
    ),
    (
        "I am craving some fried chicken tonight located in dera gazi khan␣
↪which is rated 3.1 and will cost around 2800 rupees.",
        {"entities": [("dera gazi khan", "PK_CITY"), ("fried chicken",␣
↪"CUISINE"), ("rupees", "PK_CURRENCY"), ("2800", "MONEY"), ("3.1", "RATING")]}
    ),
    (
        "I am craving some seafood today in sahiwal, I have 2200 rupee in my␣
↪pocket and that chain must have 5.0 rating.",
        {"entities": [("sahiwal", "PK_CITY"), ("seafood", "CUISINE"), ("rupee",␣
↪"PK_CURRENCY"), ("2200", "MONEY"), ("5.0", "RATING")]}
    ),
    (
        "Currently in abbottabad where I am looking for seafood, rated 3.4 and␣
↪cost around rs. 2400.",
        {"entities": [("abbottabad", "PK_CITY"), ("seafood", "CUISINE"), ("rs",␣
↪"PK_CURRENCY"), ("2400", "MONEY"), ("3.4", "RATING")]}
    ),
    (
        "I am in rahim yar khan, and I am feeling like eating some seafood,␣
↪which has 3.6 ratings and cost me pkr 2600.",
        {"entities": [("rahim yar khan", "PK_CITY"), ("seafood", "CUISINE"),␣
↪("pkr", "PK_CURRENCY"), ("2600", "MONEY"), ("3.6", "RATING")]}
    ),
    (
        "I am craving some seafood tonight located in dera gazi khan which is␣
↪rated 3.1 and will cost around 2800 rupees.",
        {"entities": [("dera gazi khan", "PK_CITY"), ("seafood", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("2800", "MONEY"), ("3.1", "RATING")]}
    ),
    (
        "I am craving some indian today in sahiwal, I have 2200 rupee in my␣
↪pocket and that chain must have 5.0 rating.",
        {"entities": [("sahiwal", "PK_CITY"), ("indian", "CUISINE"), ("rupee",␣
↪"PK_CURRENCY"), ("2200", "MONEY"), ("5.0", "RATING")]}
    ),
    (
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      "Currently in abbottabad where I am looking for indian, rated 3.4 and␣
↪cost around rs. 2400.",
      {"entities": [("abbottabad", "PK_CITY"), ("indian", "CUISINE"), ("rs",␣
↪"PK_CURRENCY"), ("2400", "MONEY"), ("3.4", "RATING")]}
   ),
   (
      "I am in rahim yar khan, and I am feeling like eating some indian,␣
↪which has 3.6 ratings and cost me pkr 2600.",
      {"entities": [("rahim yar khan", "PK_CITY"), ("indian", "CUISINE"),␣
↪("pkr", "PK_CURRENCY"), ("2600", "MONEY"), ("3.6", "RATING")]}
   ),
   (
      "I am craving some indian tonight located in dera gazi khan which is␣
↪rated 3.1 and will cost around 2800 rupees.",
      {"entities": [("dera gazi khan", "PK_CITY"), ("indian", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("2800", "MONEY"), ("3.1", "RATING")]}
   ),
   (
      "I am craving some steak today in sahiwal, I have 2200 rupee in my␣
↪pocket and that chain must have 5.0 rating.",
      {"entities": [("sahiwal", "PK_CITY"), ("steak", "CUISINE"), ("rupee",␣
↪"PK_CURRENCY"), ("2200", "MONEY"), ("5.0", "RATING")]}
   ),
   (
      "Currently in abbottabad where I am looking for steak, rated 3.4 and␣
↪cost around rs. 2400.",
      {"entities": [("abbottabad", "PK_CITY"), ("steak", "CUISINE"), ("rs",␣
↪"PK_CURRENCY"), ("2400", "MONEY"), ("3.4", "RATING")]}
   ),
   (
      "I am in rahim yar khan, and I am feeling like eating some steak, which␣
↪has 3.6 ratings and cost me pkr 2600.",
      {"entities": [("rahim yar khan", "PK_CITY"), ("steak", "CUISINE"),␣
↪("pkr", "PK_CURRENCY"), ("2600", "MONEY"), ("3.6", "RATING")]}
   ),
   (
      "I am craving some steak tonight located in dera gazi khan which is␣
↪rated 3.1 and will cost around 2800 rupees.",
      {"entities": [("dera gazi khan", "PK_CITY"), ("steak", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("2800", "MONEY"), ("3.1", "RATING")]}
   ),
   (
      "Can you recommend me some places in sargodha city serving mexican␣
↪around rupee 3000, which has an overall rating of 3.0",
      {"entities": [("sargodha", "PK_CITY"), ("mexican", "CUISINE"),␣
↪("rupee", "PK_CURRENCY"), ("3000", "MONEY"), ("3.0", "RATING")]}
```

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    ),
    (
        "I want food in gujwanwala, and craving some mexican around rupees 3200␣
↪with rating 3.4",
        {"entities": [("gujranwala", "PK_CITY"), ("mexican", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("3200", "MONEY"), ("3.4", "RATING")]}
    ),
    (
        "My budget for today is 3400 rs and rating of choice is 3.3. Suggest me␣
↪some mexican places in quetta.",
        {"entities": [("quetta", "PK_CITY"), ("mexican", "CUISINE"), ("rs",␣
↪"PK_CURRENCY"), ("3400", "MONEY"), ("3.3", "RATING")]}
    ),
    (
        "Suggest me some mexican restaurants in jhelum city of pkr 3600 which␣
↪is 3.2 rated.",
        {"entities": [("jhelum", "PK_CITY"), ("mexican", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("3600", "MONEY"), ("3.2", "RATING")]}
    ),
    (
        "Can you recommend me some places in sargodha city serving western␣
↪around rupee 3000, which has an overall rating of 3.0",
        {"entities": [("sargodha", "PK_CITY"), ("western", "CUISINE"),␣
↪("rupee", "PK_CURRENCY"), ("3000", "MONEY"), ("3.0", "RATING")]}
    ),
    (
        "I want food in gujwanwala, and craving some western around rupees 3200␣
↪with rating 3.4",
        {"entities": [("gujranwala", "PK_CITY"), ("western", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("3200", "MONEY"), ("3.4", "RATING")]}
    ),
    (
        "My budget for today is 3400 rs and rating of choice is 3.3. Suggest me␣
↪some western places in quetta.",
        {"entities": [("quetta", "PK_CITY"), ("western", "CUISINE"), ("rs",␣
↪"PK_CURRENCY"), ("3400", "MONEY"), ("3.3", "RATING")]}
    ),
    (
        "Suggest me some western restaurants in jhelum city of pkr 3600 which␣
↪is 3.2 rated.",
        {"entities": [("jhelum", "PK_CITY"), ("western", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("3600", "MONEY"), ("3.2", "RATING")]}
    ),
    (
        "Can you recommend me some places in sargodha city serving turkish␣
↪around rupee 3000, which has an overall rating of 3.0",
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      {"entities": [("sargodha", "PK_CITY"), ("turkish", "CUISINE"),␣
↪("rupee", "PK_CURRENCY"), ("3000", "MONEY"), ("3.0", "RATING")]}
  ),
  (
      "I want food in gujwanwala, and craving some turkish around rupees 3200␣
↪with rating 3.4",
      {"entities": [("gujranwala", "PK_CITY"), ("turkish", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("3200", "MONEY"), ("3.4", "RATING")]}
  ),
  (
      "My budget for today is 3400 rs and rating of choice is 3.3. Suggest me␣
↪some turkish places in quetta.",
      {"entities": [("quetta", "PK_CITY"), ("turkish", "CUISINE"), ("rs",␣
↪"PK_CURRENCY"), ("3400", "MONEY"), ("3.3", "RATING")]}
  ),
  (
      "Suggest me some turkish restaurants in jhelum city of pkr 3600 which␣
↪is 3.2 rated.",
      {"entities": [("jhelum", "PK_CITY"), ("turkish", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("3600", "MONEY"), ("3.2", "RATING")]}
  ),
  (
      "Can you recommend me some places in sargodha city serving lebanese␣
↪around rupee 3000, which has an overall rating of 3.0",
      {"entities": [("sargodha", "PK_CITY"), ("lebanese", "CUISINE"),␣
↪("rupee", "PK_CURRENCY"), ("3000", "MONEY"), ("3.0", "RATING")]}
  ),
  (
      "I want food in gujwanwala, and craving some lebanese around rupees␣
↪3200 with rating 3.4",
      {"entities": [("gujranwala", "PK_CITY"), ("lebanese", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("3200", "MONEY"), ("3.4", "RATING")]}
  ),
  (
      "My budget for today is 3400 rs and rating of choice is 3.3. Suggest me␣
↪some lebanese places in quetta.",
      {"entities": [("quetta", "PK_CITY"), ("lebanese", "CUISINE"), ("rs",␣
↪"PK_CURRENCY"), ("3400", "MONEY"), ("3.3", "RATING")]}
  ),
  (
      "Suggest me some lebanese restaurants in jhelum city of pkr 3600 which␣
↪is 3.2 rated.",
      {"entities": [("jhelum", "PK_CITY"), ("lebanese", "CUISINE"), ("pkr",␣
↪"PK_CURRENCY"), ("3600", "MONEY"), ("3.2", "RATING")]}
  ),
  (
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        "I am living in gujrat, and want some recommendations on wraps & rolls␣
↪serving places with a rating of 2.8 and budget of 3700 rupees.",
        {"entities": [("gujrat", "PK_CITY"), ("wraps", "CUISINE"), ("rolls",␣
↪"CUISINE"), ("rupees", "PK_CURRENCY"), ("3700", "MONEY"), ("2.8", "RATING")]}
    ),
    (
        "Advise me some wraps & rolls serving places in rs 4000 with a rating␣
↪of 2.3 in sheikhapura.",
        {"entities": [("sheikhapura", "PK_CITY"), ("wraps", "CUISINE"),␣
↪("rolls", "CUISINE"), ("rs", "PK_CURRENCY"), ("4000", "MONEY"), ("2.3",␣
↪"RATING")]}
    ),
    (
        "I want some locations around karachi selling wraps & rolls in 2.8␣
↪rating and the budget is rupees 3700.",
        {"entities": [("karachi", "PK_CITY"), ("wraps", "CUISINE"), ("rolls",␣
↪"CUISINE"), ("rupees", "PK_CURRENCY"), ("3700", "MONEY"), ("2.8", "RATING")]}
    ),
    (
        "I want you to suggest me some locations in lahore selling wraps &␣
↪rolls and is rated by customers around 2.3 and the total cost is 4000 rupee.
↪",
        {"entities": [("lahore", "PK_CITY"), ("wraps", "CUISINE"), ("rolls",␣
↪"CUISINE"), ("rupee", "PK_CURRENCY"), ("4000", "MONEY"), ("2.3", "RATING")]}
    ),
    (
        "I am living in gujrat, and want some recommendations on mediterranean␣
↪serving places with a rating of 2.8 and budget of 3700 rupees.",
        {"entities": [("gujrat", "PK_CITY"), ("mediterranean", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("3700", "MONEY"), ("2.8", "RATING")]}
    ),
    (
        "Advise me some mediterranean serving places in rs 4000 with a rating␣
↪of 2.3 in sheikhapura.",
        {"entities": [("sheikhapura", "PK_CITY"), ("mediterranean", "CUISINE"),␣
↪("rs", "PK_CURRENCY"), ("4000", "MONEY"), ("2.3", "RATING")]}
    ),
    (
        "I want some locations around karachi selling mediterranean in 2.8␣
↪rating and the budget is rupees 3700.",
        {"entities": [("karachi", "PK_CITY"), ("mediterranean", "CUISINE"),␣
↪("rupees", "PK_CURRENCY"), ("3700", "MONEY"), ("2.8", "RATING")]}
    ),
    (
```

```
        "I want you to suggest me some locations in lahore selling␣
 ↪mediterranean and is rated by customers around 2.3 and the total cost is␣
 ↪4000 rupee.",
        {"entities": [("lahore", "PK_CITY"), ("mediterranean", "CUISINE"),␣
 ↪("rupee", "PK_CURRENCY"), ("4000", "MONEY"), ("2.3", "RATING")]}
    )
]

labels = ["PK_CITY", "CUISINE", "PK_CURRENCY", "MONEY", "RATING"]

model = trainCustomModel(trainingData, labels)

#Saving our model
# model.to_disk("SavorySage")
```

Testing out the same input and whether it recognises lahore as a city and identify different patterns like rating, money and cuisine. And as you can see, it does now recognise it.

[9]:
```
string = "I am feeling like drinking tea in sialkot with at least 4.5 rating␣
 ↪and my budget rs. 1500."
doc = model(string)

cuisine, location, rating, budget = 0, 0, 0, 0
for ent in doc.ents:
    if ent.label_ == 'CUISINE':
        cuisine = ent.text
    elif ent.label_ == 'RATING':
        rating = float(ent.text)
    elif ent.label_ == 'PK_CITY':
        location = ent.text
    #Some amount show up as MONEY while some show up with the PK_CURRENCY due␣
 ↪to the training data and limitations,
    # so that's why there are two different if conditions matching for it.
    elif ent.label_ == 'MONEY':
        money = int(ent.text)
        if money <= 700:
            budget = 1
        elif money > 700 and money < 1300:
            budget = 2
        else:
            budget = 3
    elif ent.label_ == 'PK_CURRENCY':
        match = re.search(r'\d+', ent.text)
        if match:
            money = int(match.group())
            if money <= 700:
                budget = 1
```

```
            elif money > 700 and money < 1300:
                budget = 2
            else:
                budget = 3

print(f"Cuisine: {cuisine}\nLocation: {location}\nRating: {rating}\nBudget:␣
 ↪{budget}")
```

```
Cuisine: tea
Location: sialkot
Rating: 4.5
Budget: 3
```

1.4 Step 3: Recommendation System

In this step, I will be creating a recommendation system which will use NLP's extracted inputs from the user's sentence and passing to the content-based filtering to generate personalized recommendations based on user preferences. First I will be filtering out any data that doesn't match the users cuisine choice. Then, using cosine similarity to determine the top 3 places where the user can eat by comparing the user inputs and the dataset to extract the top 3 rows.

[10]:
```
#This will take the latitude and longitude of a resturant and return the␣
 ↪address of that particular coordinate using Nominatim library
def extractAddress(latitude, longitude):

    geolocator = Nominatim(user_agent="resturantChatbot")
    geolocator.headers['Accept-Language'] = 'en'
    location = geolocator.reverse(f"{latitude}, {longitude}")

    return location.address
```

[11]:
```
def extractCoordinates(city):
    geolocator = Nominatim(user_agent="resturantChatbot")
    location = geolocator.geocode(city)

    latitude = location.latitude
    longitude = location.longitude
    return latitude, longitude
```

[13]:
```
#Filter the data that doesn't match user's cuisine choice.
filteredRestaurants = data[
    data['main_cuisine'].str.contains(cuisine)
]

#Extract coordinates of the city user is located in
latitude, longitude = extractCoordinates(location)
```

```
#Weights assigned to each features, coordinates get the priority because the␣
 ↪user can't easily leave the city and want the restaurant recommended to be␣
 ↪in the city mentioned.
weights = numpy.array([1, 1, 0.7, 0.4])

#Combining user preferences and comparing it to the filteredDataset (location␣
 ↪and cuisine matched) by finding the cosine similarity to find the top 3␣
 ↪restaurants with the matching preferences.
inputFilteredRestaurants = filteredRestaurants[['latitude', 'longitude',␣
 ↪'budget', 'rating']] * weights
inputUserChoice = [[latitude, longitude, budget, rating]] * weights

similarityScores = cosine_similarity(inputUserChoice,␣
 ↪inputFilteredRestaurants)[0]
# display(similarityScores)

#Sorting the similarity scores in a descending manner
recommendedRestaurants = filteredRestaurants.iloc[similarityScores.argsort()[::
 ↪-1]]
topRecommendedRestaurants = recommendedRestaurants.head(3)

display(topRecommendedRestaurants)
```

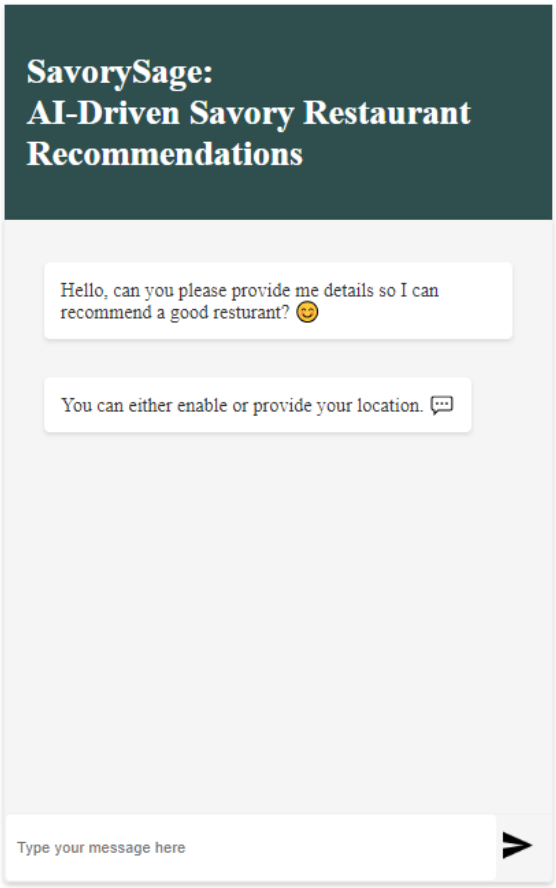
```
       budget   latitude  longitude                                    name  \
10131       2  32.519013  74.543200     The Coffee Bean & Tea Leaf - Sialkot
9996        2  32.516677  74.558749      Second Cup Coffee Company - Sialkot
11624       2  32.109925  74.199101  The Coffee Bean & Tea Leaf - Gujranwala

       rating  review_number        city  main_cuisine
10131     4.1             73     sialkot  tea & coffee
9996      4.0            320     sialkot  tea & coffee
11624     3.5             42  gujranwala  tea & coffee
```

1.5 Step 4: User Interface and Interaction

This project is created using flask. The front end contains html, css and js code or a template taken from a medium page linked below. The given code code merely depicts the interface of the chat bot that just shows a response from an array and no backend is implemented. Link: https://medium.com/@aakashthoriya/basic-chatbot-using-html-css-and-javascript-f534e202befd

The user interface for the chatbot allowing users to input a sentence containing their preferences. The chatbot performs preprocessing and display the recommended restaurants. It implements a conversational flow that guides users through the interaction, asking for clarification when necessary on the specific preferences (like budget, location, rating and cuisine).



The interface processing is designed in such a way that the location is accepted from the user in two different forms; one is user enters it manually and second is user enabling location and the system getting the location dynamically. JS code is designed with the help of different articles and ChatGPT.

The app.py file contains the following functions: 1) process_input(): This function processes incoming POST requests, which is in a JSON format. It takes the data passed from the JS page and passes it to the generate_response page and expects a response back which will be displayed on the interface. 2) generate_response(input_data, latitude, longitude, coordCheck): This function passes these parameters to createResponse function. 3) createResponse(query, latitude, longitude, coordCheck): coordCheck checks whether the coordinations are passed through the function (dynamically) or user has manunally entered them. The preprocessed data is read and depending on the coordCheck, a function is called. If the coordinates are obtained dynamically, extractEntitiesWithLocation is run and if not, extractEntitiesWithLocation is run. The rest of the functionality is explained already.