

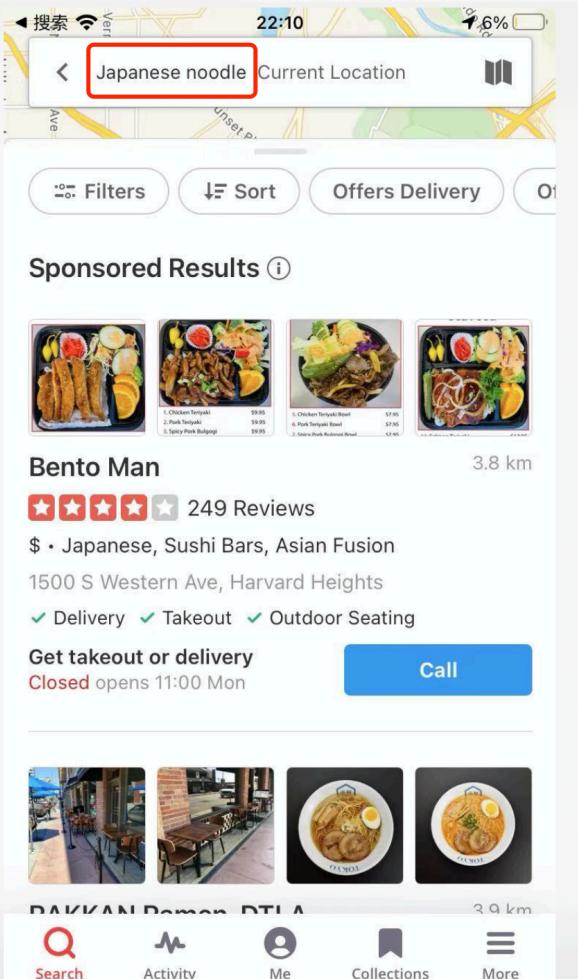


Los Angeles Travels

By Bin Zhang, Hanzhi Zhang

Motivation

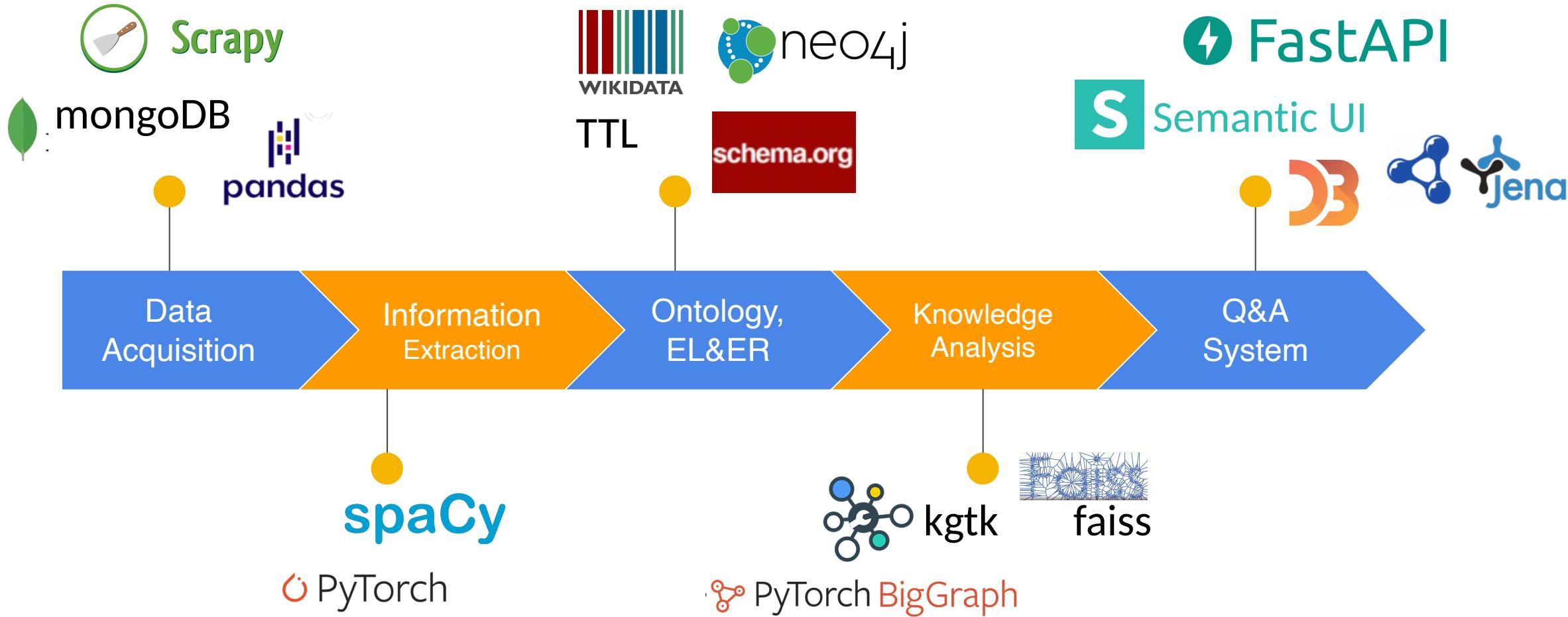
Japanese noodle?



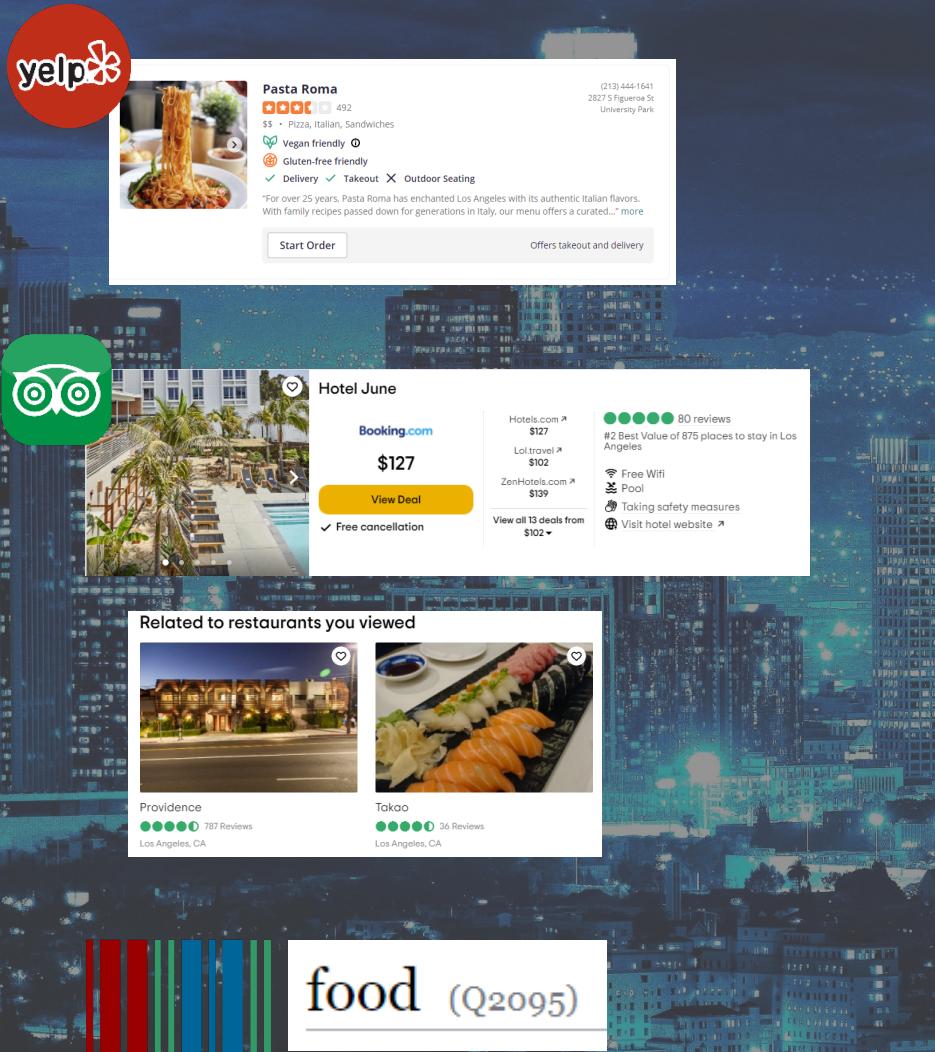
Artificial Q&A



Content



Data Acquisition



What are we trying to get?

- Restaurant Information
- Hotel Information
- Reviews
- Food Details



- 7k+ restaurant(Name,price,rating...)
- 2k+ hotel(Name,price,location...)
- 9w+ reviews for both restaurants and hotels
- 2w +Wikidata's all food entities

Information Extraction



Will C.

San Gabriel, CA

0 friends

74 reviews

2 photos

Share review

Embed review



9/13/2020

For me this is the best place if you want to get kabobs for take out or catering. For take out I usually get the combo with one chicken and one ground beef kabob. Both are really good. The meat is always tasty, juicy and tender. I really enjoy the sides as well. Their rice is always good and never dry. Although the meats are good enough alone, I do enjoy their swag sauce.

HOW?



kabob

ground beef kabob

chicken, good

meat

sides

rice, good & dry

swag sauce

Challenge: Lack of existing tools to extract specific items



Example:
spaCy

```
In [2]: nlp = spacy.load('en_core_web_sm')  
  
In [3]: text = nlp("The meat is always tasty, juicy and tender")  
text.ents  
  
Out[3]: ()
```

NER Model in spaCy are not supported

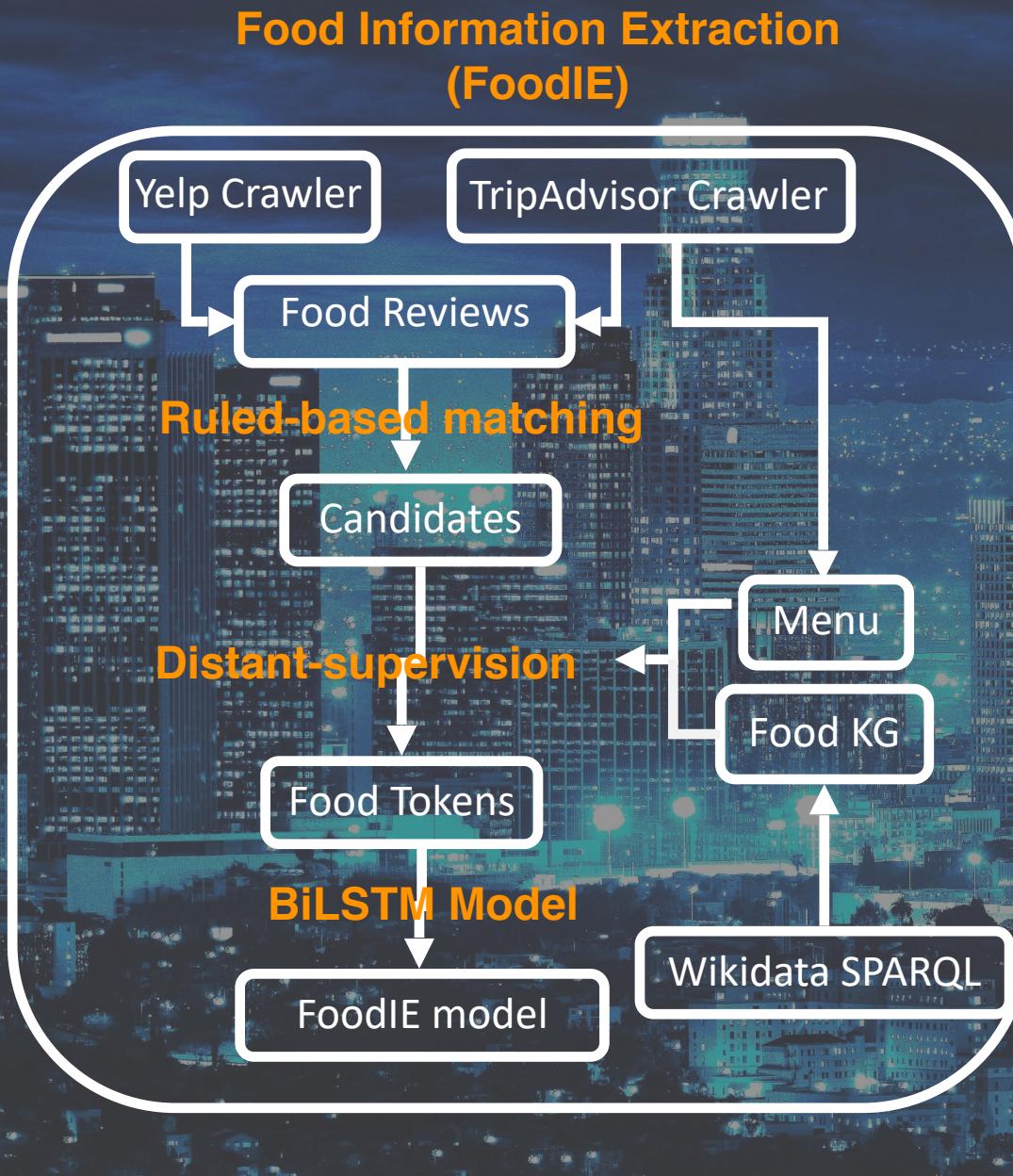
Named Entity Recognition

PRODUCT

Objects, vehicles, foods, etc. (Not services.)

for the type, Product (Objects, vehicles, foods, etc.)

Solution to IE



Step1: Rule-based matching

- Risotto with seafood NOUN, ADP, NOUN
 - Roasted chicken NOUN, NOUN
 - Soft drink ADJ, NOUN
- spaCy

Pattern1 = [{"POS": "ADJ", "OP": "*"}, {"POS": {"IN": ["PROPN", "NOUN"]}, "OP": "+"}]

Pattern2 = ...

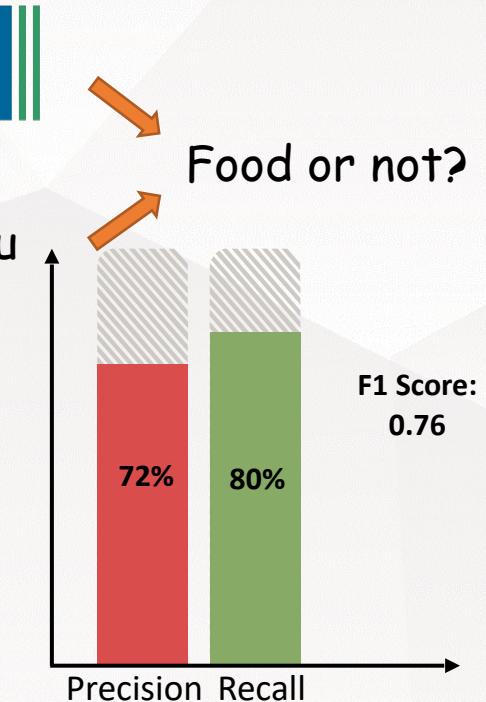
Step2: Distant supervision



Step3: BiLSTM model

PyTorch

BILUO Schema



Ontology Mapping



7 classes for :
Place, Restaurant,
Hotel, Attraction
Feature, Amenity,
Type,
20 attributes like:
location, price, rating,
longitude ...

EL&ER (Restaurant)



Northern Cafe

4.5 16 reviews

11468 South St, Cerritos, California

"...These XLB are not that heavenly, and not all the dumplings were filled with soup....."



1. Northern Cafe

4.5 266

\$\$ • Noodles, Chinese

0.3 Miles

✓ Delivery ✓ Takeout

(213) 741-9050
2904 S Figueroa St
University Park

"I at one point went to this place twice a week just to get chicken noodle soup! I dont know what is in it but Im sure the ingredients are simple! As I continued to visit, I tried to seaweed salad (my bestfriend!) , the wonton shrimp and another chicken dish. Last but not least, the pineapple. " more

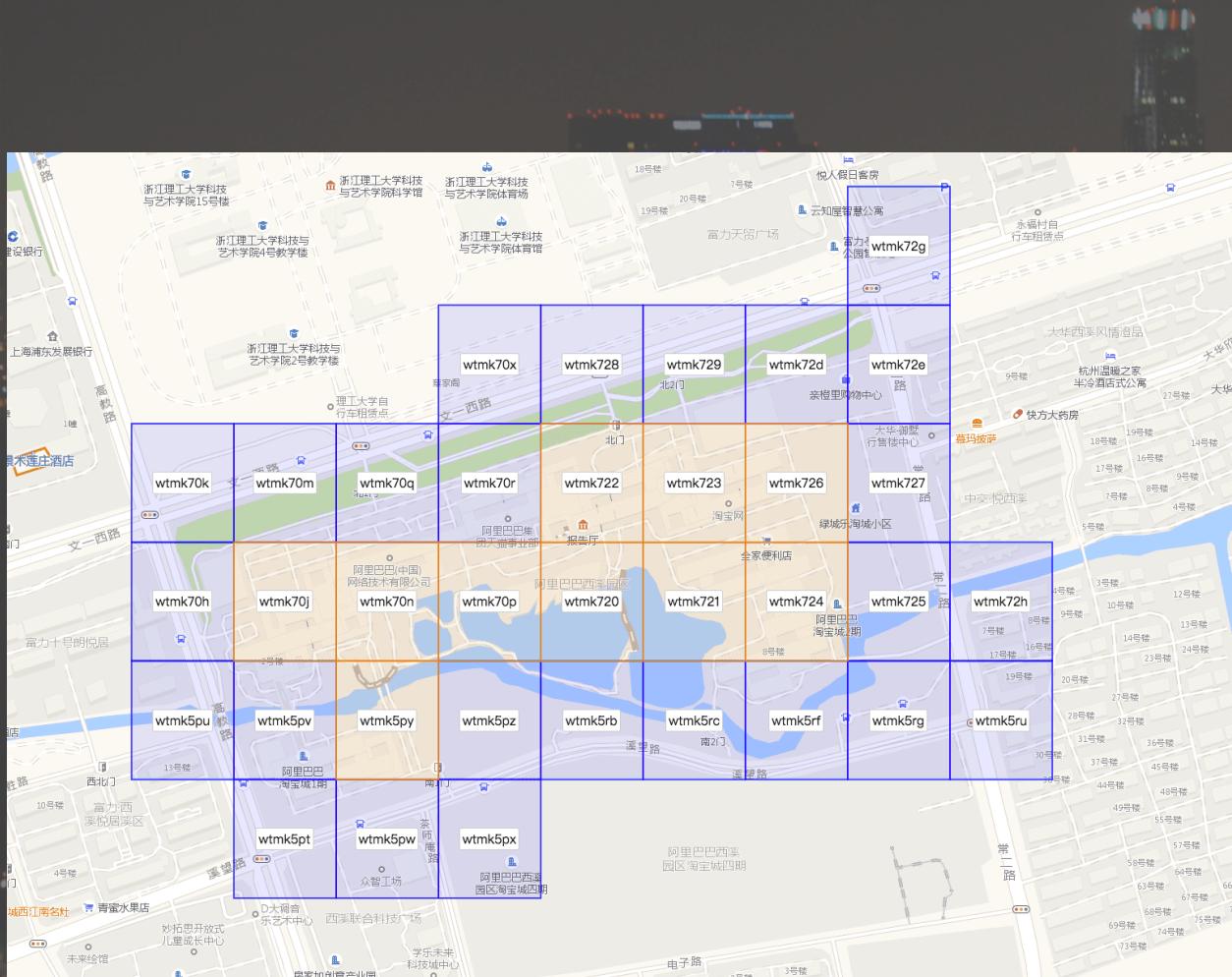
Target:

Entity Resolution of the same restaurant from two different datasets.

Observation

- One Name can be used by different Restaurants
- The restaurants having same location and name are likely to be the same one
- Compute string similarity for 6000 x 7000 would be time consuming, $O(n^2)$

EL&ER (Restaurant)



Method

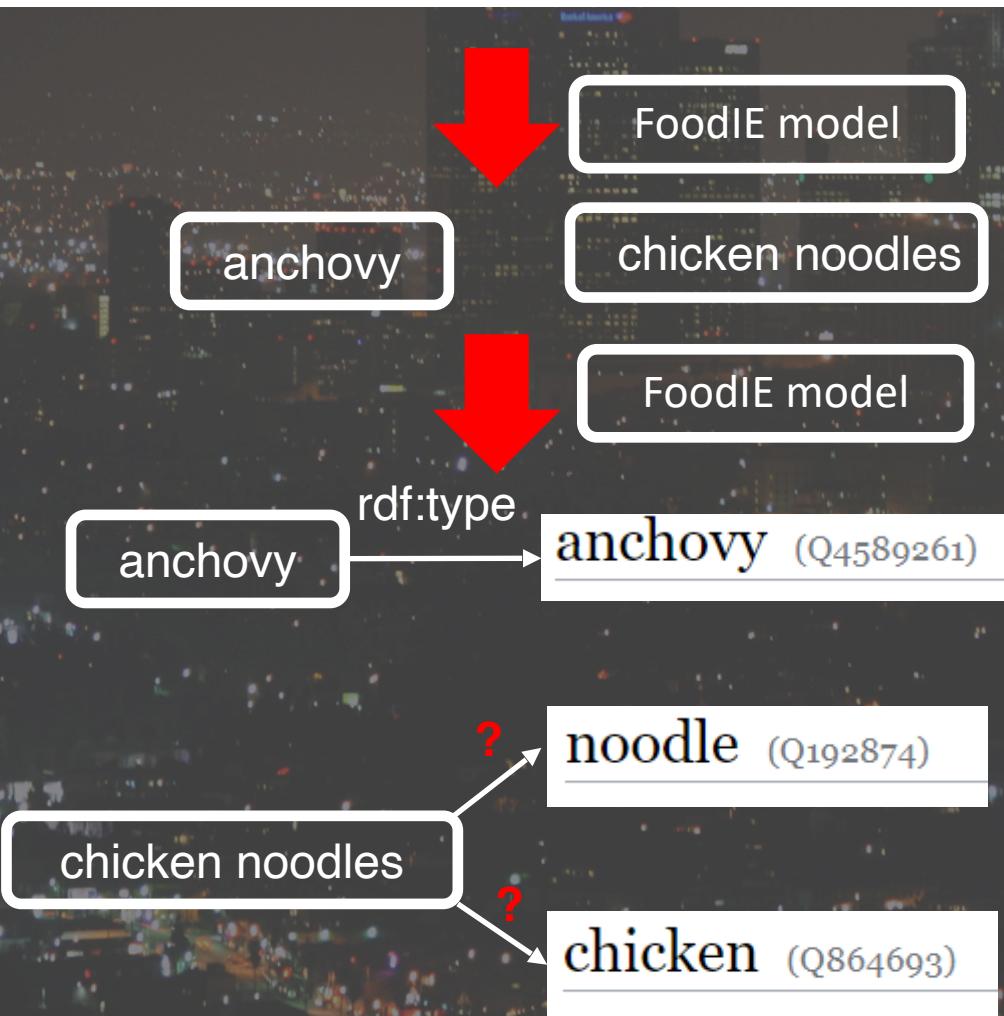
- Use Google API transfer Location to Latitude and longitude
 - Use GeoHash, the restaurant which are nearby are hashed into the same baskets
 - For each restaurant, restaurant will only search the ones that are in the same baskets.

Evaluation

- Precision: 100%
 - Recall: 100%

EL&ER (Food)

Both the original Anchovy and the Chicken noodles are equally good, thoughtfully constructed. The broth flavor is more aggressive than the other kalgooksoo places.



Target:

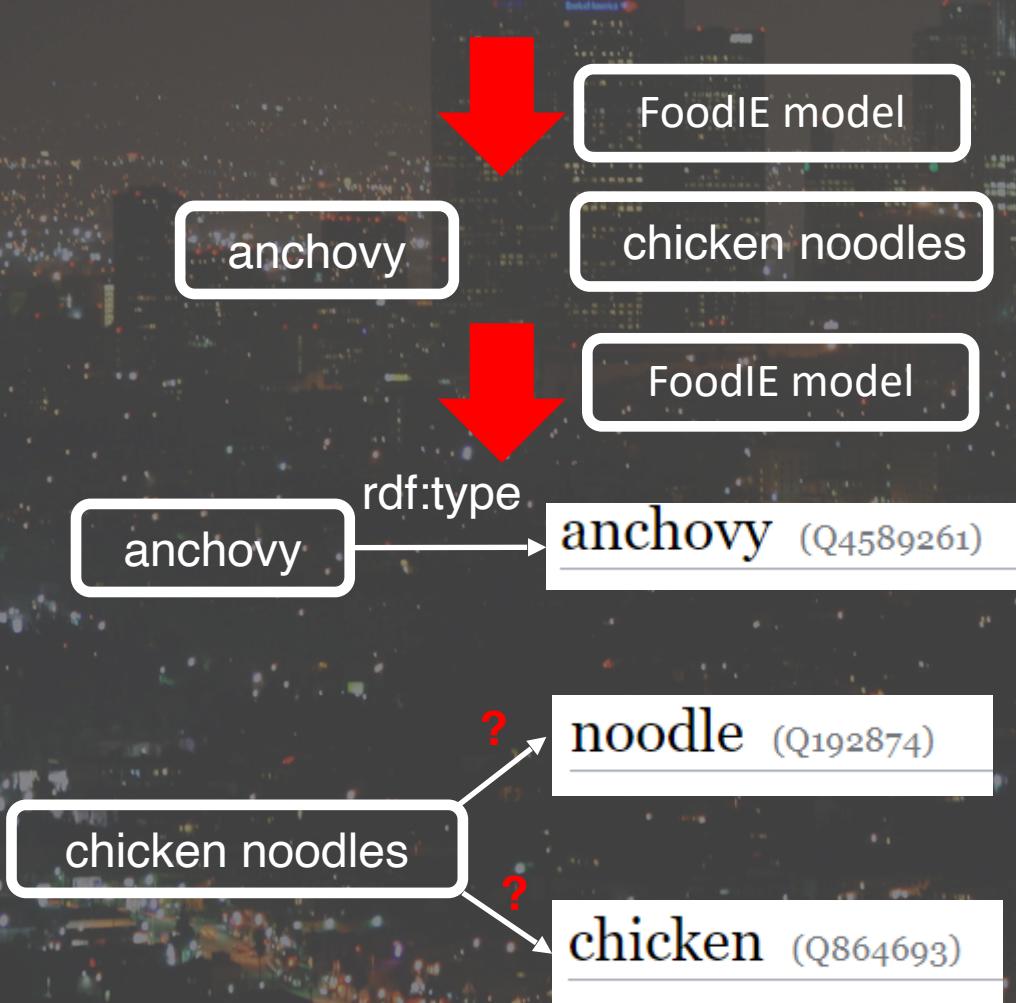
Link the food from restaurant to the food class in Food Knowledge Graph

Observation

- Food Knowledge Graph from wikidata do not have the entity, chicken noodles. However, the Levenshtein distances are same.
- Compute string similarity for 20K+ x 20K+ would need about 5 days. $O(n^2)$

EL&ER (Food)

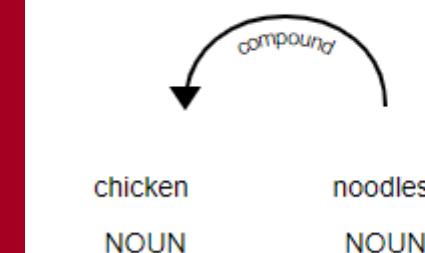
Both the original Anchovy and the Chicken noodles are equally good, thoughtfully constructed. The broth flavor is more aggressive than the other kalgooksoo places.



Method:

- Use Spacy to get the dependency of tokens. The root have a higher weight
- Use Min-hash.

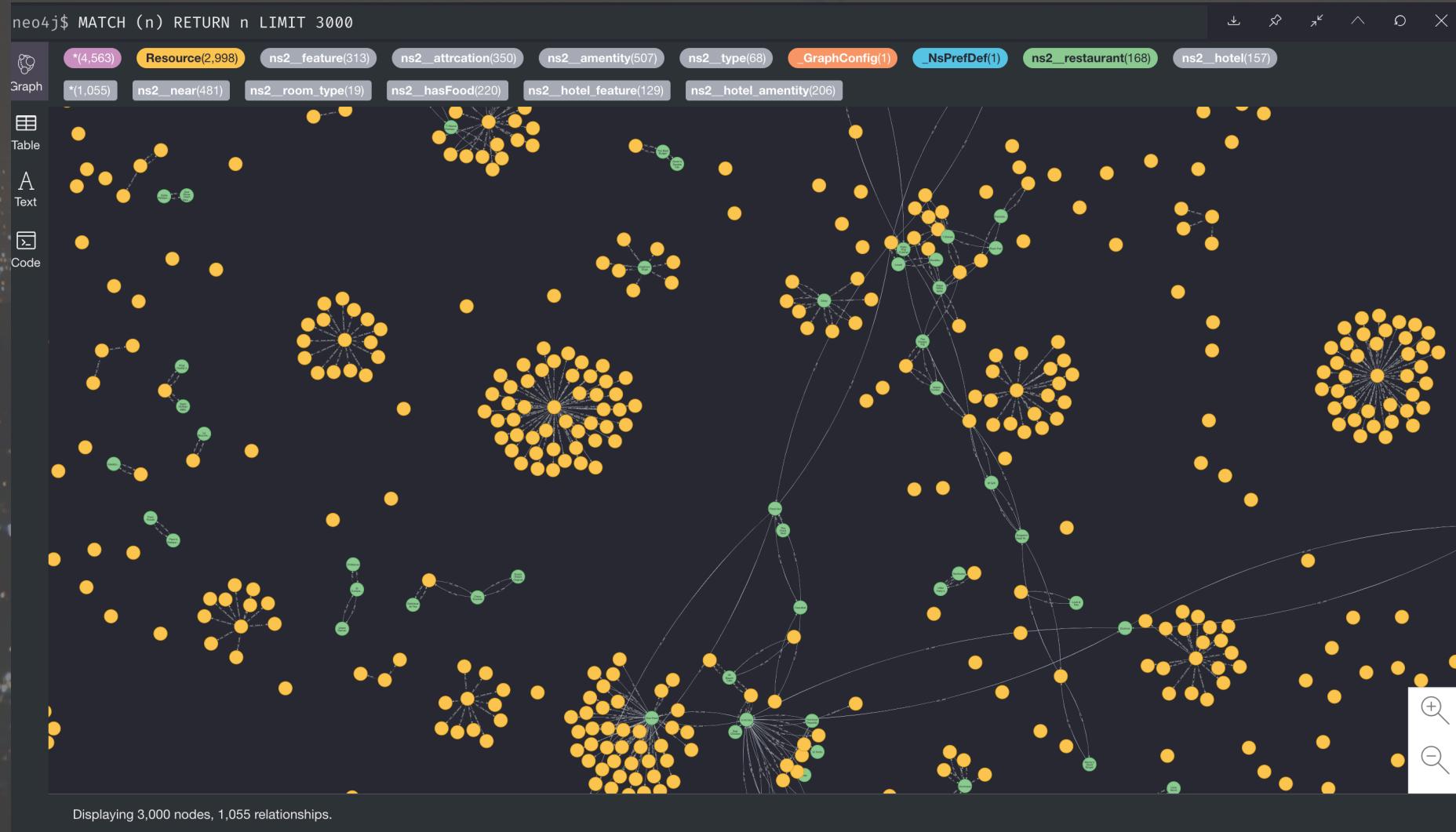
```
from spacy import displacy
options = {"distance": 120}
displacy.render(nlp("chicken noodles"), style="dep", options=options)
```



Evaluation:

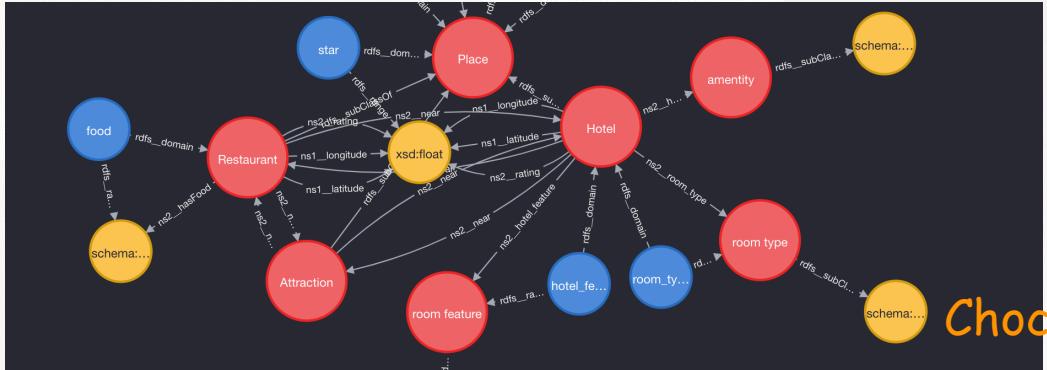
- Precision: 68%
- Recall: 70%

Overall Knowledge Graph



231476 nodes
355194 relations

Knowledge Analysis

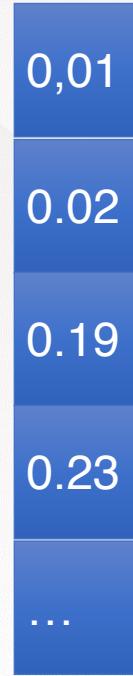


Graph Embedding



Chocolate frog

Node vector



ComplEx



Hanukkah gelt



0.8859408

Chocolate coins



0.8755959

Grated chocolate



0.8685804

Pocket coffee



0.8630165

United States military chocolate

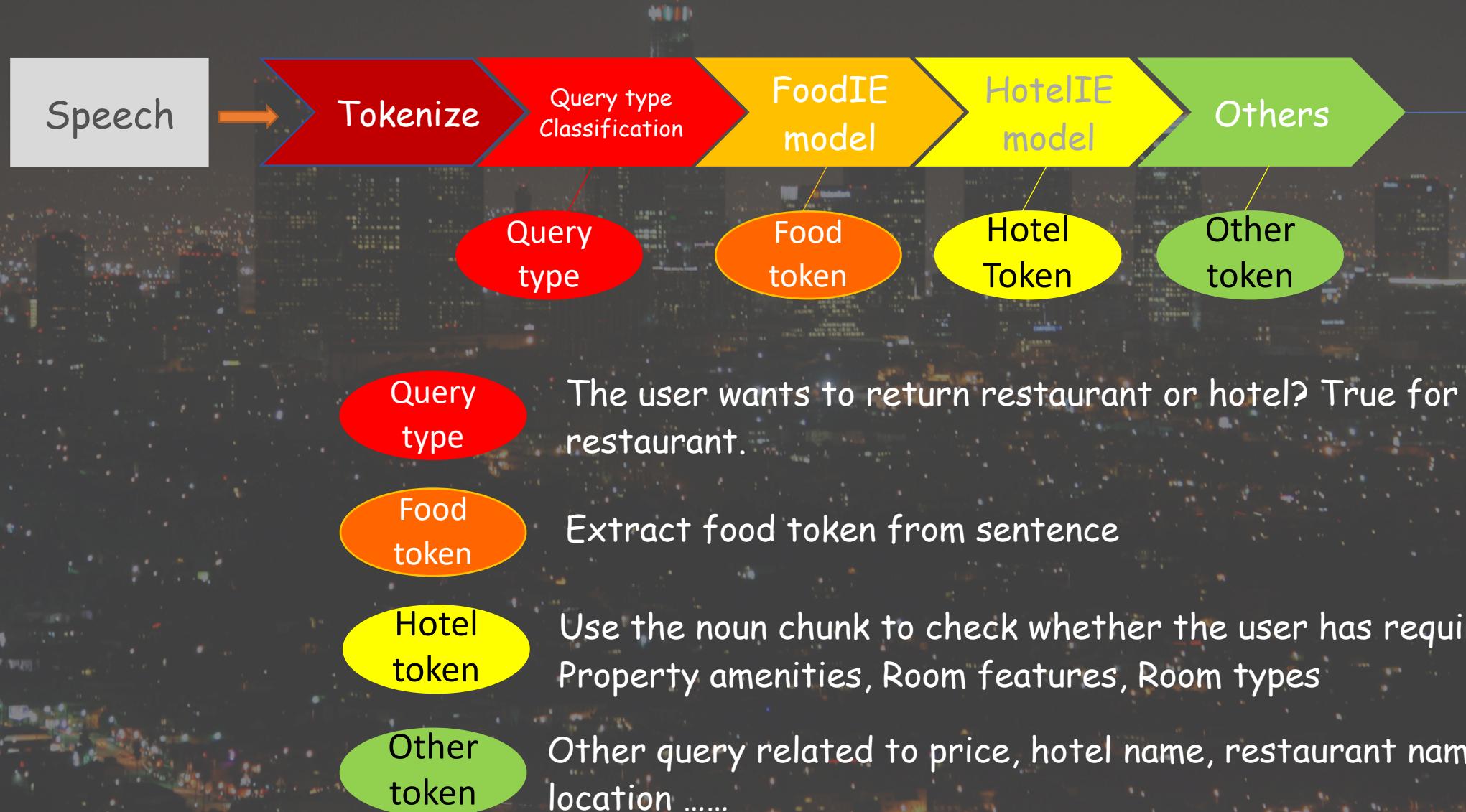


0.8607666



KNN searching

Q & A System



Q&A System Example



Welcome To LA

Back Add Some constraints

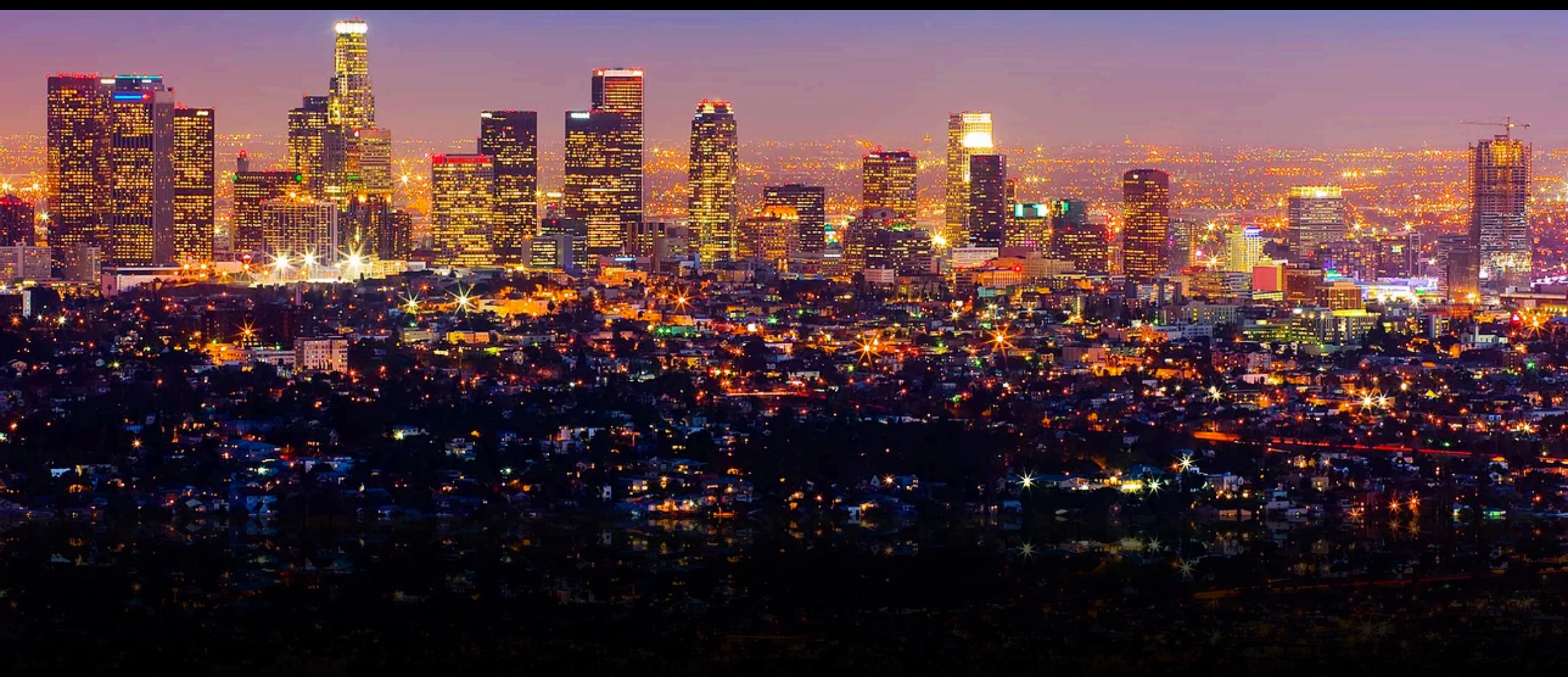
URI	Name	Rating	Price	Most Popular Food	Location	related tokens
https://www.tripadvisor.com/Restaurant_Review-g32655-d3800202-Reviews-or130-Tsujita_LA-Los_Angeles_California.html	Tsujita LA	4.0	\$\$ - \$\$\$	noodle	2057 Sawtelle Blvd, Los Angeles, CA 90025-6229	tsukemen, ramen, udon, noodle, japanese noodle, japanese noodle bar, japanese style noodle
https://www.tripadvisor.com/Restaurant_Review-g32655-d1022582-Reviews-or200-Daikokuya-Los_Angeles_California.html	Daikokuya	4.5	\$	noodle	2208 Sawtelle Blvd, Los Angeles, CA 90064-1706	tsukemen, tonkotsu ramen, ramen, japanese noodle
https://www.tripadvisor.com/Restaurant_Review-g32655-d3321000-Reviews-or10-Cha Cha Chili-Los_Angeles_California.html	Cha Cha Chili	4.5	\$	cheese steak sandwich	4625 Valley Blvd, Los Angeles, CA 90032-3831	japanese noodle
https://www.tripadvisor.com/Restaurant_Review-g32655-d4178694-Reviews-or130-Tatsu_Ramen-Los_Angeles_California.html	Tatsu Ramen	4.5	\$\$ - \$\$\$	noodle	2123 Sawtelle Blvd, Los Angeles, CA 90025-6200	japanese noodle
https://www.tripadvisor.com/Restaurant_Review-g32655-d12655622-Reviews-Dosanko_Ramen-Los_Angeles_California.html	Dosanko Ramen	5.0	not-list	deluxe shio butter ramen	11555 W Olympic Blvd, Los Angeles, CA 90064-1522	deluxe shio butter ramen, white miso ramen, red miso ramen
https://www.tripadvisor.com/Restaurant_Review-g32655-d468374-Reviews-or20-Yabu-Los_Angeles_California.html	Yabu	4.5	\$\$ - \$\$\$	soba	11820 W Pico Blvd, Los Angeles, CA 90064-1311	udon noodle, udon, soba
https://www.tripadvisor.com/Restaurant_Review-g32655-d4019757-Reviews-or70-Marugame_Monzo-Los_Angeles_California.html	Marugame Monzo	4.5	\$\$ - \$\$\$	udon	329 E. 1st, Los Angeles, California 90012, Los Angeles, CA	udon, hot sansai udon, udon noodle
https://www.tripadvisor.com/Restaurant_Review-g32655-d12932992-Reviews-or10-Marugame_Udon-Los_Angeles_California.html	Marugame Udon	4.5	\$	udon	2029 Sawtelle Blvd, Los Angeles, CA 90025-6229	udon, udon noodle, cold udon tofu salad

Graph

```
1 MATCH (n)-[r]->(m)
2 RETURN n,r,m
3 LIMIT 50;
```

neo4j

http://localhost:7474



Thanks for Listening