

Best Explanations For Recommendation

This survey only takes you 20 minutes to complete.

IMPORTANT: Please read the instruction carefully and select your answers. We will check the consistency of your answers to make sure that you do not answer the questions by random selection.

CAUTION: Workers providing inconsistent answers will get **REJECTED!**
Each worker can only provide **ONE** feedback!

* Indicates required question

Preliminary

We will consider a restaurant recommendation scenario, where **a restaurant r_0 is recommended to a user u_0 on Yelp.**

We will explain **WHY** such recommendation is made, where each explanation is represented by a graph, which consists of vertices and edges.

We have the following types of vertices as follows:

Main Vertex

r

a restaurant vertex

u

a user vertex

Restaurant Property Vertex

t

restaurant type

os

outdoor_seating

rd

restaurants_delivery

pl

price_level

cs

caters_services

rr

restaurants_reservation

sl

stars_level

g

goodForGroup

dr

dietary_restrictions

Restaurant Location Vertex

s

state vertex

c

city vertex

The edges connecting two vertices show different **relationships**:

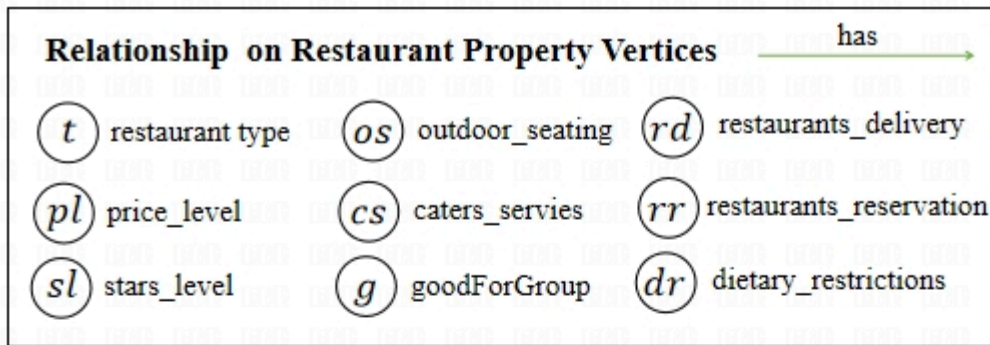
Relationship between Main Vertices r a restaurant vertex u a user vertex

Edge	Meaning
$u \xrightarrow{\text{visit}} r$	a user u visits a restaurant r
$u_1 \xrightarrow{\text{friend}} u_2$	user u_1 and user u_2 are friends

Relationship on Restaurant Location Vertices $\xrightarrow{\text{locate}}$
 s state vertex c city vertex

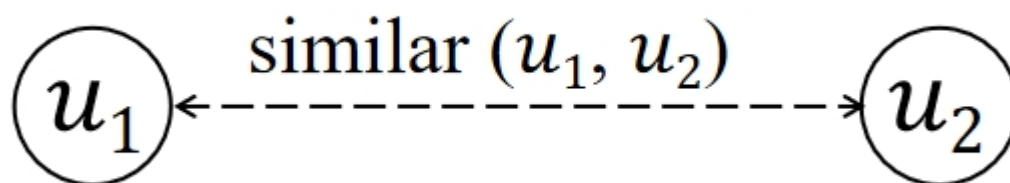
Edge	Meaning
$r \xrightarrow{\text{locate}} s$	a restaurant r is located at state s
$r \xrightarrow{\text{locate}} c$	a restaurant r is located at city c

The edges connecting two vertices show different **relationships**:



Edge	Meaning
$(r) \xrightarrow{\text{has}} (t)$	a restaurant r has type t
$(r) \xrightarrow{\text{has}} (os)$	a restaurant r has the outdoor seating option os
$(r) \xrightarrow{\text{has}} (rd)$	a restaurant r has the delivery option rd
$(r) \xrightarrow{\text{has}} (pl)$	a restaurant r has a price level pl
$(r) \xrightarrow{\text{has}} (cs)$	a restaurant r has caters services cs
$(r) \xrightarrow{\text{has}} (rr)$	a restaurant r has the reservation option rr
$(r) \xrightarrow{\text{has}} (sl)$	a restaurant r has a start level sl
$(r) \xrightarrow{\text{has}} (g)$	a restaurant r has the group service g
$(r) \xrightarrow{\text{has}} (dr)$	a restaurant r has dietary restrictions rd

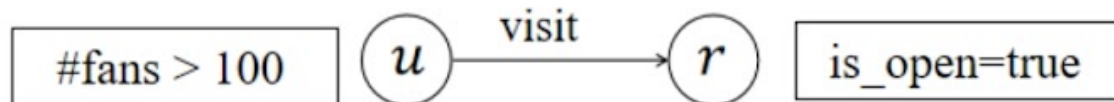
We can also check the **similarity** between vertices, e.g., if two users u_1 and u_2 **behave similarly**, we write **similar**(u_1, u_2) and use a dashed line to indicate it.



Each vertex may be associated with some **attributes**:

- User vertex: gender, age, job, #fans, average_stars, name, ..., etc
- Restaurant vertex: is_open option, item_review_count, user_review_count, yelping_since ..., etc

We can specify specific constraints on attributes in an explanation to express **richer relationships**, e.g., a user u with more than 100 fans visits an open restaurant r :



Questions

Consider the following four explanations for explaining **why a restaurant r_0 is recommended to user u_0** .

You will be asked eight questions based on the four sets of explanations.

Explanation 1:

The restaurant r_0 is recommended to user u_0 because:

(1) The following conditions hold for user u_0 :

(a) user u_0 **has visited an open restaurant r_1 of type t_1** and this restaurant has a **price level pl_1**

(b) user u_0 is **new to Yelp**, who has less than 5 fans

(c) user u_0 is **similar to user u_1 , who has visited restaurant r_0**

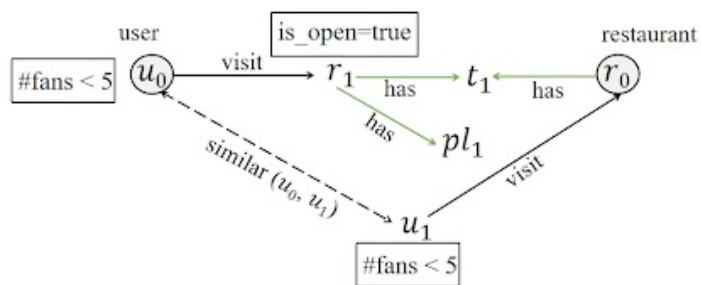
(2) The following conditions hold for restaurant r_0 :

(a) restaurant r_0 has type t_1 , which is **the same as restaurant r_1 that user u_0 has visited**

(b) restaurant r_0 has been visited by another **user u_1 similar to u_0** ; besides, this user u_1 is **also new to Yelp as u_0** , i.e., u_1 also has less than 5 fans

Statistically, this explanation contains 6 vertices and 5 edges in total, and the average number of attributes associated with each vertex is 0.5.

Besides, there are specific constraints associated with the attributes, e.g., $\#fans < 5$.



Statistic	Result
number of vertices	6
number of edges	5
average number of attributes associated with each vertex	0.5
Are there specific constraints associated with the attributes?	Yes

Explanation 2:

The restaurant r_0 is recommended to user u_0 because:

(1) The following conditions hold for user u_0 :

(a) user u_0 has a **friend** u_3

(b) user u_0 has **visited restaurants** r_1 - r_5 ; moreover, r_5 has been visited by another user u_4

(2) The following conditions hold for restaurant r_0 :

(b) restaurant r_0 has the **outdoor seating** option os_1

(c) restaurant r_0 has the **delivery option** rd_1

(d) restaurant r_0 has **type** t_2

(e) restaurant r_0 has **dietary restrictions** dr_1

(f) restaurant r_0 has **the reservation option** rr_1

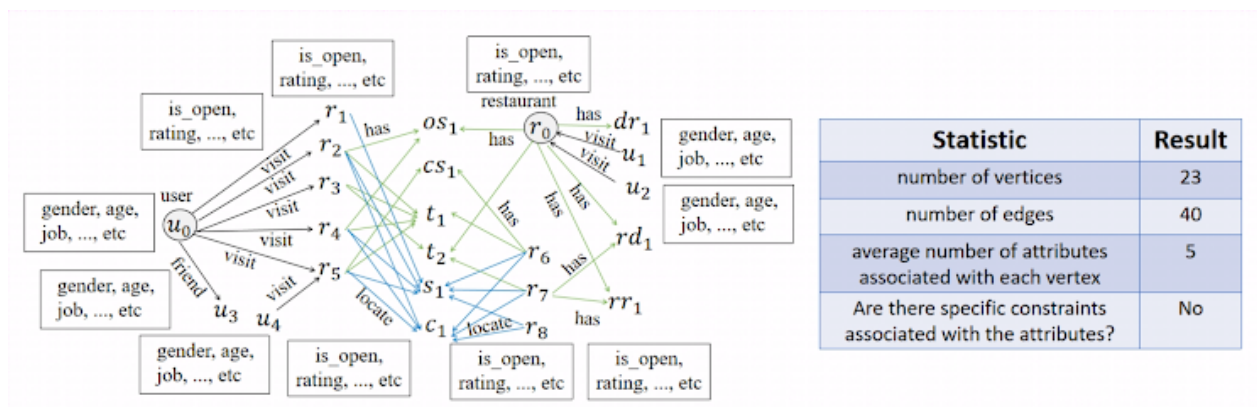
(g) restaurant r_0 has been **visited** by another two users u_1 and u_2

(h) restaurants r_2, r_3, r_4, r_7 **share** some similar properties and locations as r_0 , where r_2 - r_4 has been **visited by** user u_0

(h) restaurants r_1, r_5, r_6, r_8 have some properties, but r_0 does **not have** these properties

Statistically, this explanation has 23 vertices and 40 edges.

Besides, the average number of attributes associated with each vertex is 5, but there is no specific constraint associated with the attributes.



Explanation 3:

The restaurant r_0 is recommended to user u_0 because:

(1) The following conditions hold for user u_0 :

(a) user u_0 has **visited** restaurants r_1 - r_8

(2) The following conditions hold for restaurant r_0 :

(a) restaurant r_0 is **located** at state s_1

(b) restaurant r_0 has the **outdoor seating** option os_1

(c) restaurant r_0 has the **delivery option** rd_1

(d) restaurant r_0 has **type** t_1

(e) restaurant r_0 has **type** t_2

(f) restaurant r_0 has **caters services** cs_1

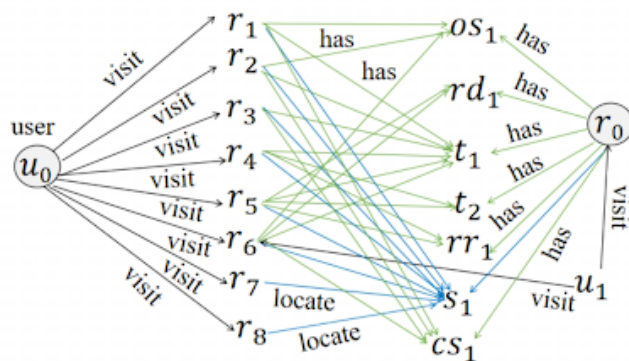
(g) restaurant r_0 has the **reservation option** rr_1

(h) restaurant r_0 has been **visited** by another user u_1 , who has also **visited** r_6

(i) restaurants r_1 - r_8 **share** some similar properties and locations as r_0 ;

Statistically, this explanation has 18 vertices and 44 edges.

Besides, no attributes are associated with the vertices.



Statistic	Result
number of vertices	18
number of edges	44
average number of attributes associated with each vertex	0
Are there specific constraints associated with the attributes?	No

Explanation 4:

The restaurant r_0 is recommended to user u_0 because:

(1) The following conditions hold for user u_0 :

(a) user u_0 has a **friend** u_1

(2) The following conditions hold for restaurant r_0 :

(a) restaurant r_0 is **located** at city c_1

(b) restaurant r_0 has the **outdoor seating** option os_1

(c) restaurant r_0 has the **delivery option** rd_1

(d) restaurant r_0 has **type** t_1

(e) restaurant r_0 has **caters services** cs_1

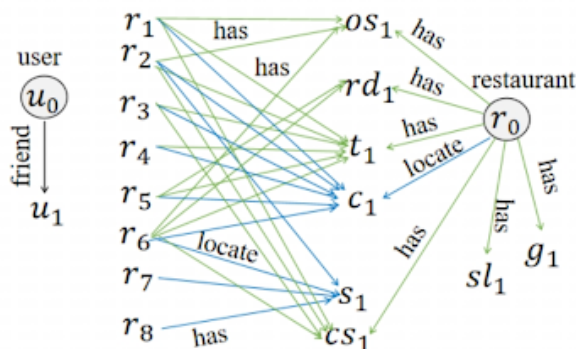
(f) restaurant r_0 has a **star** level sl_1

(g) restaurant r_0 has the **group** service g_1

(h) restaurants r_1 - r_8 **share** some similar properties and locations as r_0 ; moreover, some of them are **located** at state s_1

Statistically, this explanation has 19 vertices and 33 edges.

Besides, no attributes are associated with the vertices.



Statistic	Result
number of vertices	19
number of edges	33
average number of attributes associated with each vertex	0
Are there specific constraints associated with the attributes?	No

Statistic Summary

Explanation	Statistic			
	number of vertices	number of edges	average number of attributes associated with each vertex	Are there specific constraints associated with the attributes?
Explanaiton 1	6	5	0.5	Yes
Explanaiton 2	23	40	5	No
Explanaiton 3	18	44	0	No
Explanaiton 4	19	33	0	No

Evaluation

Consider the quality of the above four explanations for recommendation.

In particular, focus on the following four aspects of each explanation:

1. Reasonableness
2. Conciseness
3. Decisiveness
4. Overall Performance

Reasonableness

"Reasonableness" is an aspect to be evaluated in this survey.

A given explanation is considered as good in terms of reasonableness **if the logic behind the explanation is reasonable** for recommending a restaurant r_0 to user u_0 .

Thus, an explanation **with more reasonable logic** is better.

1. Q1. Consider only "Reasonableness" of each explanation. Please indicate one explanation that you think with the best "Reasonableness" in all four explanations. *

Mark only one oval.

- ☐ Explanation 1
- ☐ Explanation 2
- ☐ Explanation 3
- ☐ Explanation 4

2. Q2. Consider only "Reasonableness" of each explanation. Please indicate ***exactly 2 explanations*** that you think with better "Reasonableness" in all four explanations. Note: One of them ***must*** be the explanation you indicated in Q1. *

Check all that apply.

- ☐ Explanation 1
- ☐ Explanation 2
- ☐ Explanation 3
- ☐ Explanation 4

Conciseness

"Conciseness" is an aspect to be evaluated in this survey.

A given explanation is considered as good in terms of conciseness if the information contained in the explanation is concise, **e.g., the number of vertices or edges is as few as possible, and the average number of attributes associated with each vertex is as few as possible.**

Thus, an explanation using concise information is better than one that uses complicated information.

3. Q3. Consider only "Conciseness" of each explanation. Please indicate one explanation that you think with the best "Conciseness". *

Mark only one oval.

- ☐ Explanation 1
☐ Explanation 2
☐ Explanation 3
☐ Explanation 4

4. Q4. Consider only "Conciseness" of each explanation. Please indicate *exactly 2 explanations* that you think with better "Conciseness" in all four explanations. Note: One of them *must* be the explanation you indicated in Q3. *

Check all that apply.

- ☐ Explanation 1
☐ Explanation 2
☐ Explanation 3
☐ Explanation 4

Decisiveness

"Decisiveness" is an aspect to be evaluated in this survey.

A given explanation is considered as good in terms of decisiveness if the explanation only contains decisive factors for explaining the recommendation.

This can be reflected by, **e.g., any specific constraints associated with the attributes or containing the most critical/important vertices and edges in the explanation.**

In other words, **in a decisive explanation, if we remove any constraints/vertices/edges from the explanation,**

the resulting explanation may no longer make sense.

Thus, an explanation that only provides decisive information is better than one that mixes both critical and non-critical information.

5. Q5. Consider only "Decisiveness" of each explanation. Please indicate one explanation that you think with the best "Decisiveness". *

Mark only one oval.

- ☐ Explanation 1
☐ Explanation 2
☐ Explanation 3
☐ Explanation 4

6. Q6. Consider only "Decisiveness" of each explanation. Please indicate *exactly 2 explanations* that you think with better "Decisiveness" in all four explanations. Note: One of them *must* be the explanation you indicated in Q5. *

Check all that apply.

- ☐ Explanation 1
☐ Explanation 2
☐ Explanation 3
☐ Explanation 4

Overall Performance

"Overall Performance" is the last aspect to be evaluated in this survey.

It is an aspect of the overall performance of each explanation.

Under the aspect of the overall performance,

we would like to have an explanation such that it is good in terms of the reasonableness, conciseness and decisiveness **simultaneously**.

Thus, if the performance of an explanation is better than another one in terms of reasonableness, conciseness and decisive factor, the former explanation is better.

7. Q7. Consider only "Overall Performance" of each explanation. Please indicate one explanation that you think with the best "Overall Performance". *

Mark only one oval.

- ☐ Explanation 1
☐ Explanation 2
☐ Explanation 3
☐ Explanation 4

8. Q8. Consider only "Overall Performance" of each explanation. Please indicate *exactly 2 explanations* that you think with better "Overall Performance" in all four explanations. Note: One of them *must* be the explanation you indicated in Q7. *

Check all that apply.

- ☐ Explanation 1
☐ Explanation 2
☐ Explanation 3
☐ Explanation 4

9. Q9. According to the statistics summary above, which explanation only has 6 vertices (the fewest number of vertices)? This is a super-easy testing question to filter our workers who answer the survey by random selection. *

Mark only one oval.

- ☐ Explanation 1
☐ Explanation 2
☐ Explanation 3
☐ Explanation 4

You are almost done!

We will use your worker ID that you input in MTurk to verify your work.
Please enter your worker ID below.

10. Worker ID *

Survey code that should be filled in Mturk: **AcceptMakex**

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