FRAMEWORK FOR ANALYSIS AND FEEDBACK OF EVALUATION EXPRESSIONS IN RESTAURANT REVIEWS

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BACKGROUND & PURPOSE

- A lot of simple descriptions for reviews of the dish
  - ☆ ☆ ☆ ☆ ☆ : This is a good meat
  - ☆ : This vegetable is no good…
  - Above information is useless for both of

    - The user of the website

    - Restaurants

  →Unable to attract customers and advertising.

⇨The evaluation expressions specific to each dish is unknown.

Knowing some specific evaluations to guess the details of a dish

BACKGROUND & PURPOSE

Our research used
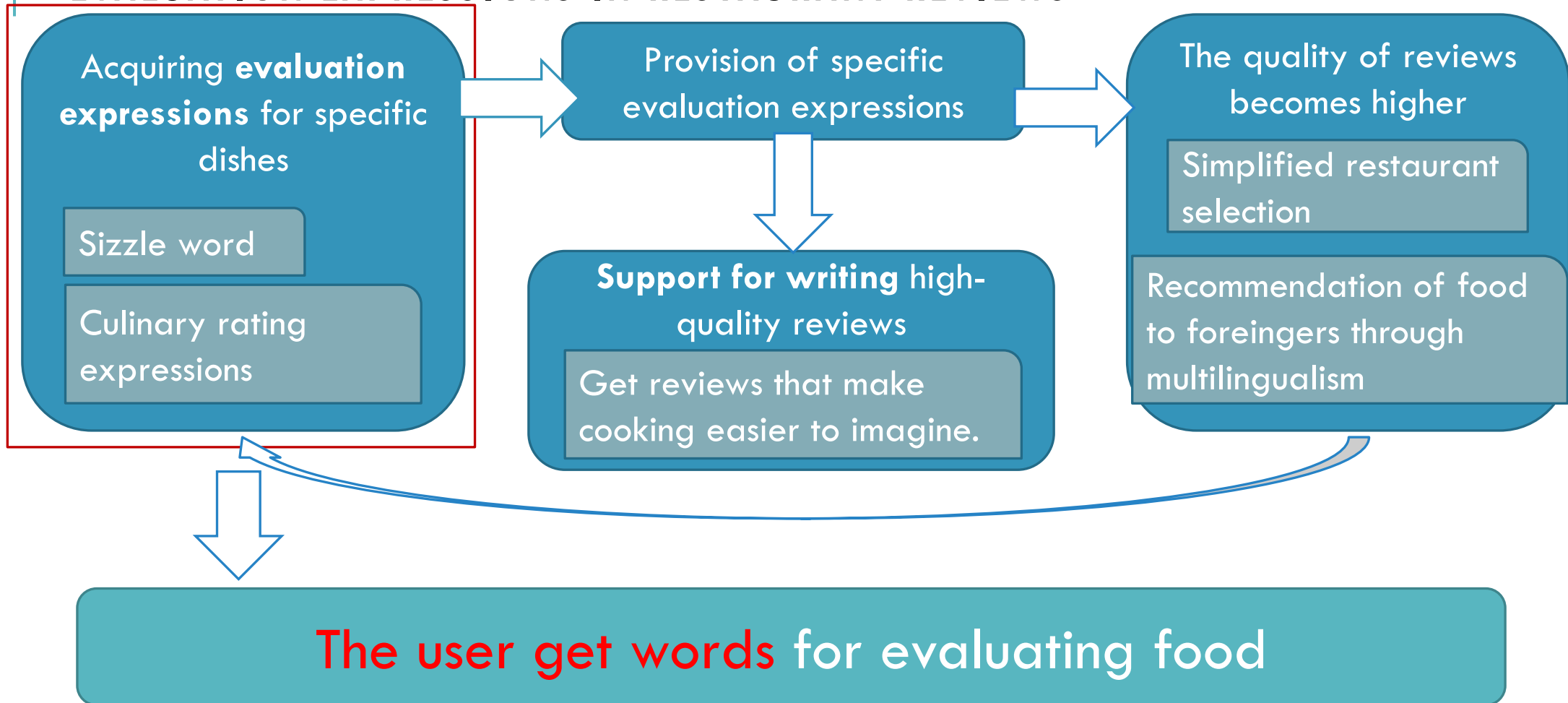- The word dependency analysis
- TF-IDF method

Why use both of methods?
- Get TF-IDF method that is not available in the word dependency analysis

Example for Japanese ticket machine

THE PROPOSED FRAMEWORK FOR ANALYSIS AND FEEDBACK OF EVALUATION EXPRESSIONS IN RESTAURANT REVIEWS

Acquiring **evaluation expressions** for specific dishes

Sizzle word

Culinary rating expressions

Provision of specific evaluation expressions

Support for writing high-quality reviews

Get reviews that make cooking easier to imagine.

The quality of reviews becomes higher

Simplified restaurant selection

Recommendation of food to foreingers through multilingualism

The user get words for evaluating food

WHAT IS THE DETAILS OF A DISH

Simple reviews

Yummy hamburg.

Cheap hamburg.

The user can not get reviews that make easier to imagine.

The details of reviews

A big hamburg steak is soft and juicy and a sauce is spicy and yummy.

Through sizzle words and the evaluation expressions specific to each dish use, the reviewer can write that make easier to imagine.

EVALUATION EXPRESSIONS

Genelal expressions =sizzle words

simply   crisp   just fried
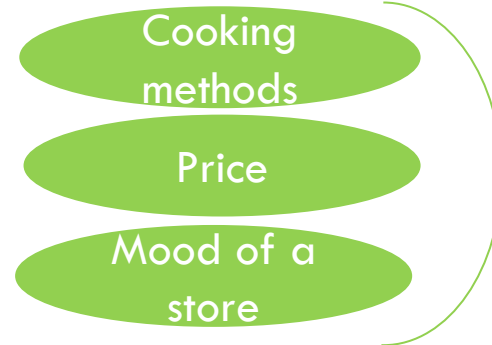
mild   chily   healthy

taste
feeling
information

Total 362 words

Evaluation expressions specific to each dish =not sizzle words

Demiglace sauce

Japanese style sauce

Teriyaki sauce

Including seasoning

Cooking methods

Price

Mood of a store
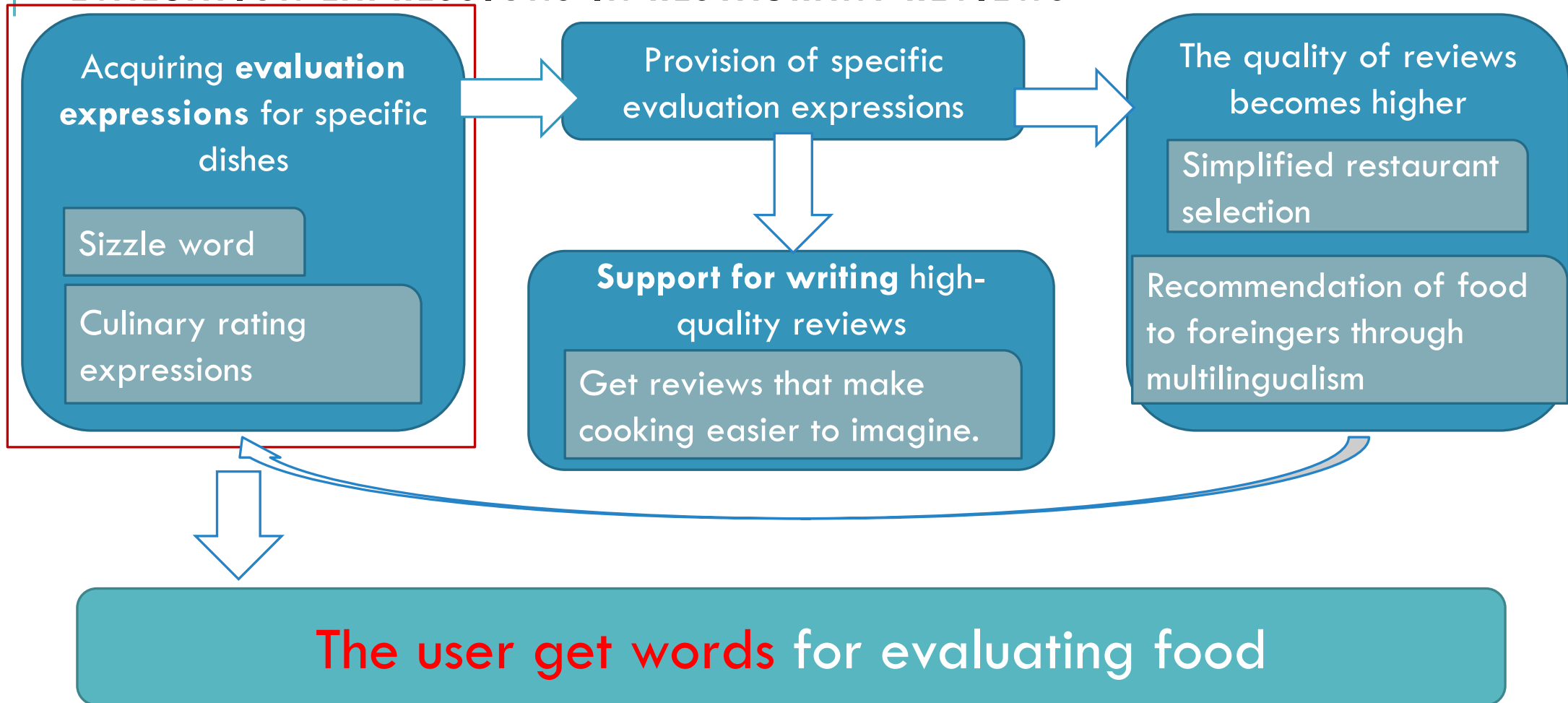
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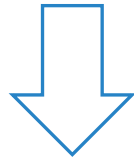
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HOW TO GET WORDS FOR EVALUATING FOOD

Acquiring **evaluation expressions** for specific dishes

Sizzle word

Culinary rating expressions

How to acquire evaluation expressions

Preparation for data

- How to get a lot of review from restaurant retrieval site(gurunavi's) API
- The necessary parts for review analysis are extracted

Data analysis

- Word dependency analysis
- A word analysis, and applying TF-IDF method

The user get words for evaluating food

A GRAMMER DIFFERENCE

Ex)1

- Japanese   Red: Subject   Green: Object   Blue: Verb

  私たちが リンゴを 食べた。

- English

  We ate apple.

Ex)2

- Japanese   Red: Subject   Green: modifier   Blue: Verb

  私たちは ゆっくり 食べた。

- English

  We ate slowly.

In Japanese, a modifier or object is written before a verb.

DATA PREPARATION

1. As using the gurunavi's API, we get **up to 1,000 reviews** including the menu names.

2. Each of the obtained reviews is divided into sentences. The clues to separate the sentences are paragraph, commas, periods, and symbols.

3. The sentence and three sentences before and after the sentence are obtained. That is, seven sentences are obtained in total for each sentence including the name of the intended dish.

OBTAIN REVIEWS

List of dishes to be analyzed 50 menus.

Japanese noodle	Eel	Oden	Ohagi	Omelette with rice	Okonomiyaki	Pork cutlet rice bowl	Cafelatte	Small Chinese steamed dumpling	Japanese noodle with deep-fried tofu
Kebab	Cream of corn soup	Croqutte	Boiled thin-sliced meat	curry	Sukiyaki	Steak	Red bean soup	Cheesecake	Fried rice
Tail soup	Pork cutlet	Hash and rice	Hamburger	Hamburg steak	Bangbang Chicken	Pizza	Bouillabaisse	Patato salad	Margerita
Fried cale of minced meat	Boiled entrails with soup	Ramen	Roast beef	Wonton Soup	Spitted cutlet	Deep-fried food	Tempura bowl	Sushi	Egg roll
Almond jelly	Grilled Chicken	Beef tongue	Beef bowl	Fermented soybeans	Meat and potatoes cooked with soy sauce and sugar	Bowl of rice with chicken and eggs	Pork and Korean pickles	Gyoza	Mabo tofu

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SEPARATED REVIEW

Review example for Curry

-3	NULL
-2	NULL
-1	おいしいインドカレーが食べたくて訪問しました
±0	辛党にお薦めのカシミール**カレー**を注文
+1	コクがありまたスパイスの風味が良かったです
+2	少々油っぽく感じましたが
+3	NULL

※Deficit = Sizzle words

The information about dish is described around the sentence including the name of dish.
→We propose a method to extract specific evaluation expressions by analyzing descriptions around the names of dishes in restaurant reviews.

SEPARATED REVIEW

Review example for Gyoza

-3	NULL
-2	NULL
-1	NULL
±0	焼き餃子にはパリパリ系ともっちり系が有ると思いますが
+1	こちらは後者かな
+2	アンも多め少なめで言うと多めに具が入っています
+3	ビールとの相性も良く

Review example for Gyoza has information about "beer".
Beer is important evaluation expressions for Gyoza, but word dependency analysis cannot get "Beer".
Why cannot it, beer is not directly modified.
→The expressions evaluating a dish are acquired by using the dependency analysis and the word importance.

ANALYSIS METHOD

1. **The word dependency analysis** is conducted for all of the words in the sentence including the name of the intended dish.

2. From the words obtained step1, nouns, verbs, adjectives, and adjective-verbs are extracted and used as analysis targets.

3. Applying TF-IDF method to the words extracted through the step2, **the word importance of those words are obtained.**

THE WORD DEPENDENCY ANALYSIS

The words evaluating the dish name

based on the word dependency analysis.

	Japanese noodles	Curry	Steak	Hamburg	Ramen	Gyoza
1st	Curry	Chicken	Sauce	Juicy	Miso	Boiled
2nd	Sanuki	Indian	Salad	Stewed	Solt	Grill
3rd	Japanese soup	Cutlet	Volume	Cheese	Pork bone	Juicy
4th	Stewed	Green	Soup	Demiglace sauce	Hakata	Steamed
5th	Cold	Soup	Soft	Sauce	Pork bone	Wrapper

Review example for hamburg

Hamburg with demiglace sauce, cheese and juicy is very nice.

The demiglace sauce matched the fluffy stewed hamburg is delicious.

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"demiglace sauce" is not a taste expression but
this word shows the attributes of "hamburg steaks."
→Also, "demiglace sauce" describes the details of dishes.

THE WORD DEPENDENCY ANALYSIS

The words evaluating the dish name

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Review example for Boiled

Review example for Grill

Boiled gyoza have sticky skin and gravy.

Grilled gyoza with thin skin is sticky and delicious.

THE WORD DEPENDENCY ANALYSIS

The words evaluating the dish name

based on the word dependency analysis.

	Japanese noodles	Curry	Steak	Hamburg	Ramen	Gyoza
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In many reviews for "gyoza," some description for the cooking methods frequently appeared.
→The evaluation expressions includes the cooking method.

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EXTRACT A PART OF SPEECH

- Divide into a word : MeCab

- Dictionary : NeologD

- The analysis targets are nouns, verbs, adjectives and adjective-verbs.

  → We used that appendix has few evaluation expressions in the

  attached words so we use 4 parts of speech.

Grammar example

- Japanese   Purple: appendix
  彼はアメリカにいます。

- English
  He is in America.

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OBTAIN IMPORTANCE OF THE WORD

TF-IDF formula

- Term frequency:

$$tf(t,d) = \frac{n_{t,d}}{\sum_{s \in d} n_{s,d}}$$

$n\_(t,d)$: number of occurrences of a word t in document d
$\sum\_(s \in d) n\_(s,d)$: sum of the number of occurrences of all words in document d

- Inverse document frequency:

$$idf(t) = log\frac{N}{df(t)} + 1$$

$$\boldsymbol{tfidf(t,d) = tf(t,d) \times idf(t)}$$

N : the number of dishes = 50
df(t) : the number of recipes for which the word *t* appears in the reviews

A high TF-IDF words frequently appeared in the given dish and rarely appeared in other dishes.
→ Frequently occurring words are easy to deduce in detail the rating of a dish.

OBTAIN IMPORTANCE OF THE WORD

TF-IDF

- Ramen(Sizzle words)

Evaluation expressions	TF-IDF
Volume	$0.16{\times}10^{-2}$
Rich	$0.70{\times}10^{-2}$
Simple	$0.20{\times}10^{-2}$
Exquisite	$0.09{\times}10^{-2}$
Juicy	$0.02{\times}10^{-2}$
Fresh	$0.04{\times}10^{-2}$
Hot	$0.00{\times}10^{-2}$
Healthy	$0.05{\times}10^{-2}$
Mellow	$0.20{\times}10^{-2}$
Luxury	$0.04{\times}10^{-2}$

- Ramen(not Sizzle words)

Evaluation expressions	TF-IDF
Soup	$1.73{\times}10^{-2}$
Noodles	$2.07{\times}10^{-2}$
Pork	$1.34{\times}10^{-2}$
Soy sauce	$0.64{\times}10^{-2}$
Miso	$0.48{\times}10^{-2}$

Three times

Compare Sizzle words to not Sizzle words, not Sizzle words are higher TF-IDF than Sizzle words around three times.
→Evaluation expressions specific to each dish has many information when the users write restaurant review.

OBTAIN IMPORTANCE OF THE WORD

Review example for "rich"

都内にチェーン展開する、
ラーメンブームの火付け役になった
ラーメン店の一つ．*濃厚*な<u>スープ</u>が
病みつき系の味．結構お気に入り．

"Rich" is an evaluation of evaluation expressions specific to each dishes.

Review example for "noodles"

カツオだしの効いた醤油ラーメンに、
もやしのシャキシャキが美味しい．
スープは透き通っていて
さっぱりとしたラーメン．*麺*は
*極細*で、スープがよくからみます。

"Noodles" is an evaluation expression that makes Ramen's imagine.

Using Evaluation expressions specific to each dishes and Sizzle words, it is easy to write **specific reviews**.

OBTAIN IMPORTANCE OF THE WORD

TF-IDF

- Hamburg steak

Evaluation expressions	TF-IDF
Sauce	1.17×10^{-2}
Meat Infusion	0.92×10^{-2}
Cheese	0.68×10^{-2}
Demiglace sauce	0.86×10^{-2}
Rare	0.40×10^{-2}

- Steak

Evaluation expressions	TF-IDF
Sauce	0.65×10^{-2}
Salad	0.54×10^{-2}
Reasonable	0.36×10^{-2}
Steel plate	0.43×10^{-2}
Grill	0.38×10^{-2}

Both of "steak" and "hamburg steak" are the meat dishes.
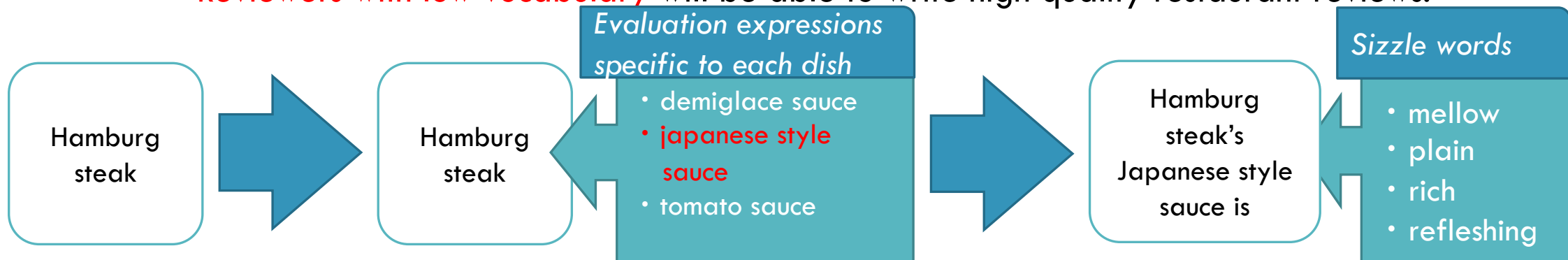
Both of the sauce's TF-IDF are the highest.

→This result suggested that the important words depend on the genre of dishes.

CONCLUSION

We tried word dependency analysis and applying TF-IDF method,

we get vocabulary for evaluating food.

<In the future>

- Analyze other languages

    - Foreigners' evaluation of Japanese food may vary depending on the taste.

        →For example Miso cutlet review's has "like a barbecue sauce".

- Construction of review description support system

    - Reviewers with low vocabulary will be able to write high quality restaurant reviews.

| Hamburg steak | → | Hamburg steak | ← | **Evaluation expressions specific to each dish**
• demiglace sauce
• japanese style sauce
• tomato sauce | → | Hamburg steak's Japanese style sauce is | ← | **Sizzle words**
• mellow
• plain
• rich
• refleshing |

発表練習

- 語尾が上がりすぎ、日本人英語、語尾を下げる
- 文字でかくする
- 7ページ目文法の違いを説明する理由を冒頭につける
- 例見せる時にさっき説明したけど"的な文章を乗せる
- hamburg steakっていう
- frameworkの話をする前に係り受け解析と周辺単語検索をしたこと<-この研究の目的
- 最初に目的と結果<-一蘭ビール