Gunma University, Kiryu University, and RMIT University at the NTCIR-11 Cooking Recipe Search Task

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Introduction

- Find a few popular recipes ➔ web search
- Satisfy information needs for cooking in realistic situation ➔ unexpectedly hard

Problem definitions

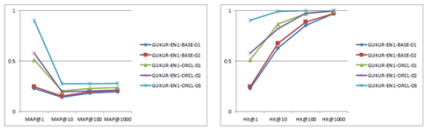
- Vocabulary mismatches.
  - Query words and the food names in recipes.
  - Query expansion with various numbers of dish/ingredient names in answer recipes.
- Negating words in search queries.
  - Unwanted ingredients or preparation steps.
  - Presence/absence of negating query words.

Evaluation criteria

- Experimental framework for our evaluation.
  - Indri Search Engine ver. 5.7 (default settings)
  - Dirichlet LM ranking function, no-stemming, and no-stopping.
  - MeCab (ver. 0.996) with IPADIC (ver. 2.7.0) for Japanese search.
- Various evaluation values with NTCIREVAL.
  - MAP, MRR, MSnDCG, ➡ Official evaluation values for the task.
    nDCG, ERR, RBP, NCU, P@k, Hit@K.

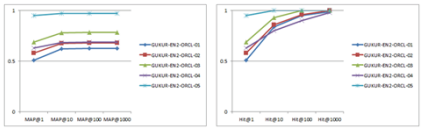
Experimental results (EN1)

- BASE-01: queries (all terms)
- BASE-02: queries (dropping negation terms)
- ORCL-01: queries and answer examples (recipe title)
- ORCL-02: queries and answer examples (recipe title, top ingredient lines)
- ORCL-03: queries and answer examples (recipe title, all ingredient lines)



Experimental results (EN2)

- ORCL-01: answer examples (recipe title)
- ORCL-02: answer examples (recipe title, three attributes) [side, salad, or dessert]
- ORCL-03: answer examples (recipe title, all attributes) [side, salad, dessert, seasons, cuisine styles, etc.]
- ORCL-04: answer examples (recipe title, top ingredient lines)
- ORCL-05: answer examples (recipe title, all ingredient lines)



A study of food synonyms

- Question: Food synonyms are the same or different among different search users?
- 769 pairs of synonyms from Japanese subtasks

Pairs were prepared by Task Organizer.

Synonym pairs:

No.1	cocoa	hot chocolate
No.2	capsicum	bell pepper
No.3	nappa cabbage	Chinese leaves

- Two assessors assigned labels:
  T (the same meaning) or F (different meanings).

Assessor-X:

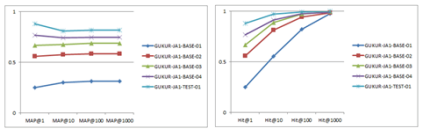
cocoa	hot chocolate	T
capsicum	bell pepper	T
nappa cabbage	Chinese leaves	T

Assessor-Y:

cocoa	hot chocolate	T
capsicum	bell pepper	T
nappa cabbage	Chinese leaves	F

Experimental results (JA1)

- BASE-01: queries (dish name)
- BASE-02: queries (dish name, ingredient lines)
- BASE-03: queries (dish name, negation/explanation conditions)
- BASE-04: queries (all) [conditions for recipe titles, ingredient lines, negation/explanation]
- TEST-01: answer examples (all) and a hand-made dictionary.



A study of recipe similarity

- Question: Similar recipes are the same or different among different search users?
- Candidate similar recipes were collected using answer examples for Japanese ad hoc search.
- 236 pairs of potential similar recipes.
- Five student assessors gave relevance labels:
  T for "similar", or F for "not similar".
  (NOTE: Similarity assessments were on a subjective basis.)
- Each of the potential similar pairs was judged by two assessors.

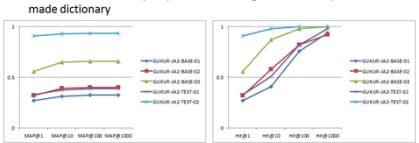
A study of food synonyms (cont.)

- Assessor-X disagreed with Task Organizer in 13 cases.
  (NOTE: Assessor-X enjoyed cooking as a hobby.)
- Assessor-Y disagreed with Task Organizer in 77 cases.
- (NOTE: Assessor-Y specialized in nutrition.)
- If the synonymous words require semantic interpretation according to the word context in recipes, inter-rater disagreements are more likely.

Task Organizer	Assessor-X	Asessor-Y	# pairs
T	T	T	688
T	T	F	68
T	F	T	4
T	F	F	9
		total	769

Experimental results (JA2)

- BASE-01: side-dish information in queries (dish name)
- BASE-02: side-dish information in queries queries (ingredient lines)
- BASE-03: side-dish information (dish name, ingredient lines)
- TEST-01: answer examples (dish name, top ingredient names) and a hand-made dictionary
- TEST-02: answer examples (dish name, all ingredient names) and a hand-made dictionary



A study of recipe similarity (cont.)

- Student-4 and Student-5 had advanced cooking knowledge.
- They completed a survey about all of the assessment data and recognized that their assessments were different from those of the other students.
- Similarity of cooking recipes can differ from person to person.
- Frequency and preferences of cooking may be important factors that affect recipe similarity.

	S-1	S-2	S-3	S-4	S-5
#T	108	55	39	36	28
#F	40	31	47	50	34
#total	148	86	86	86	62
Pct. T	73%	64%	45%	41%	45%
Pct. F	27%	36%	55%	59%	55%

Assessors	Kappa	p-value
S-1 and S-2	0.572	p<0.0001
S-1 and S-5	0.475	p<0.0001
S-3 and S-4	0.362	P=0.0008

Conclusions

- Comparison of the submitted runs.
- Query expansion using synonymous words is effective for the recipe search task.
  - Maintaining a synonymous food name list by human assessors is too costly.
  - Building a dictionary of synonymous food name is not feasible in an automated way.
- Future work: a side dish suggestion for a given main dish.