Elimination of Multiple Modifiers in Summarization

Kiyonori Ohtake and Shigeru Masuyama

Background

- Generating a natural and readable summary from a sentence.
- To eliminate noun modifiers is promising for natural summary, however, it is not easy to decide modifiers to be removed.

Elimination of adnominal modifiers

- It is difficult to correctly detect adnominal modifiers from surface information.
- Simple eliminations of adnominal modifiers may cause unnatural and unreadable summaries.

To cope with these points:

1. employ a parser.
2. focus on multiple modifiers.

What is multiple modification?

Two or more adnominal modifiers depend on a noun.
For example (double modifier):

君はおもしろいこの話を聞いたか。
(Did you hear this interesting talk?)

君は (you)
おもしろい(interesting)
この (this)
話を (talk)
聞いたか (hear)

Elimination of multiple modifiers

Did you hear this interesting talk? → Did you hear talk?
What portion should we eliminate? → Did you hear this talk?
Did you hear interesting talk?
↓ to answer this question

We manually constructed 36 rules,
- to avoid unnatural summary,
- to avoid wrong elimination caused by parsing errors.

Table 1: Example of the elimination rules for double modifiers

former modifier	latter modifier	modified	action
～の (*...no*)	～の (*...no*)	---	Do nothing
---	---	～との (*...tono*)	Do nothing
～という (*...toiu*)	～の (*...no*)	～の (*...no*)	Eliminate the latter
adnominal clause	adjective	---	Eliminate the latter

Summarization system with the method

- The summarization system consists of two components:
  - selecting important sentences;
    conventional but customized for newspaper articles.
  - summarizing each sentence.
    + employ a method of eliminating multiple modifiers;
    + employ other five methods to summarize a sentence.
- Summarization steps (overview)
  1. Decide the importance of each sentence.
  2. Summarize each sentence.
  3. Select sentences in the order of importance.

Evaluation

We participated in subtask A-2 of TSC (Text Summarization Challenge) to evaluate the summarization system.

- TSC is the automatic summarization task of NTCIR-2 (NII-NACSIS Test Collection for IR Systems-2) workshop.
- NTCIR-2 workshop is a competition-type workshop, like TREC.
- TSC chose 30 newspaper articles as targets to be summarized.
- Two summaries, 20% and 40% compression ratio, were evaluated.
- Nine systems participated in subtask A-2.

The results of evaluation

Two evaluations were done on subtask A-2.

- Subjective evaluation.
  - Two points of view: READABILITY and CONTENT
  - An evaluator scored from 1 (+) to 4 (-).

length	type	value (average)	ranking
20%	readability	2.53 (3.16)	1
20%	content	2.93 (3.24)	1
40%	readability	2.73 (3.05)	3
40%	content	2.77 (3.12)	1

- Content-based evaluation.
  - Compared with human summaries by vector space method.
  - Two kinds of human summary: FREE and PART

length	type	value (average)	ranking
20%	FREE	0.4727 (0.4418)	1
40%	FREE	0.6483 (0.6065)	1
20%	PART	0.5137 (0.4740)	1
40%	PART	0.6608 (0.6342)	1

Discussion

compression ratio* = $\frac{\text{summary length}}{\text{source length}}$

- Compression ratio* of summarization for sentences=91%
- Is the proposed method effective?

method	times to work	num. of charcters eliminated
Elimination of double modifier	61	729
Elimination of supplementary explanations	335	662
Elimination of the first sentence in direct quotations	7	277
Elimination of direct quotations	1	21
Elimination of illustrations	6	126
Paraphrasing	89	314

- The method may be effective, but we found unnatural eliminations with
  ‘‘adnominal clause - noun+*no* - modified’’
- Rigid evaluations for each method are left for future work.

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