Summarization Focusing on Polarity or Opinion Fragments in Blogs

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November 2008

Outline

- **Overview and Research question**
- **Summarization Approach**
- **Opinion and Polarity Detection**
- **Experiments and Results**
- **Conclusion**
- **Questions?**

Big Picture

1. **Opinion summarization to answer needs (questions) is promising for…**
    - **Application: public opinion/reputation analysis,…**
    - **Sources: blogs, message boards,…**

2. **Opinion extraction is an active research field. (*TREC Blog track*, *NTCIR MOAT*).**
    - **Is this a *fact* or an *opinion*? *Positive* or *negative*?**
        - **Unfortunately, large Japanese corporations got involved in Internet businesses.**

- **What is the relationship between 1 and 2?**

- **How to bridge these two challenges?**

Research Question

- **Clarify the possibility and the limit of a simple approach to apply *polarity extraction* to *summarize opinion*.**

  1. **What is the appropriate granularity of positive/negative elements to extract?**

  2. **Does positive or negative fragment extraction contribute to opinion summarization?**
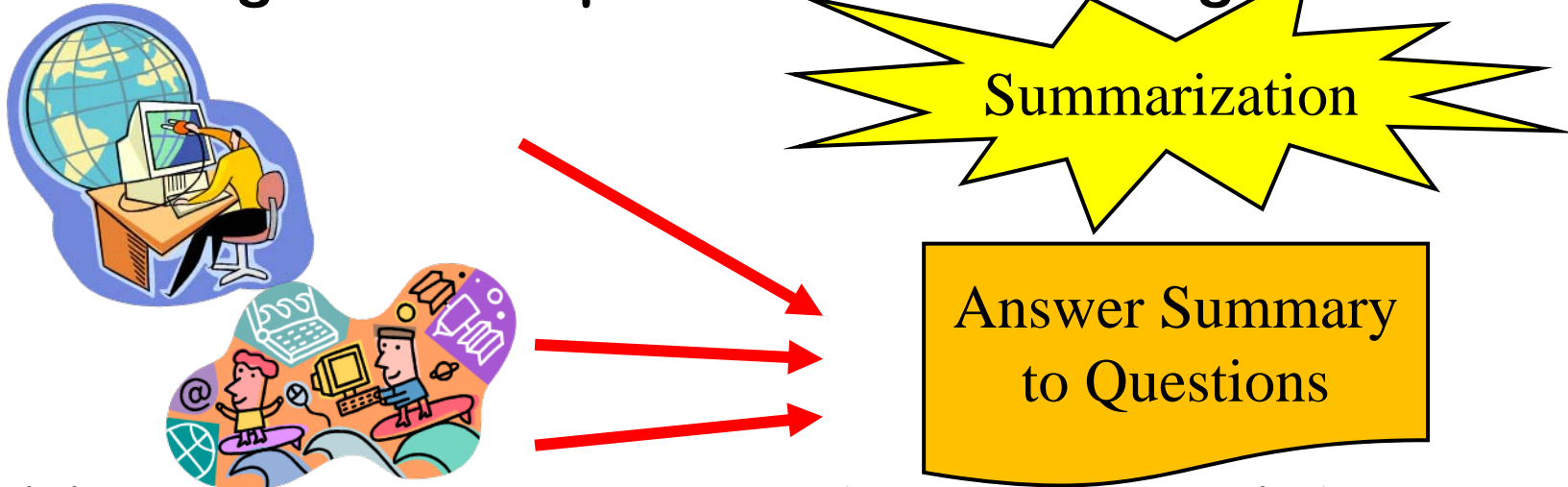
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Summarization Approach

- **Task Definition**
  - ☐ **Create long summaries (up to 7,000 characters) focusing on some questions from 25 blogs**

Summarization

Answer Summary to Questions

- **In blogs, sentence extraction approach is too grained to provide context (because of variety of writing styles)**
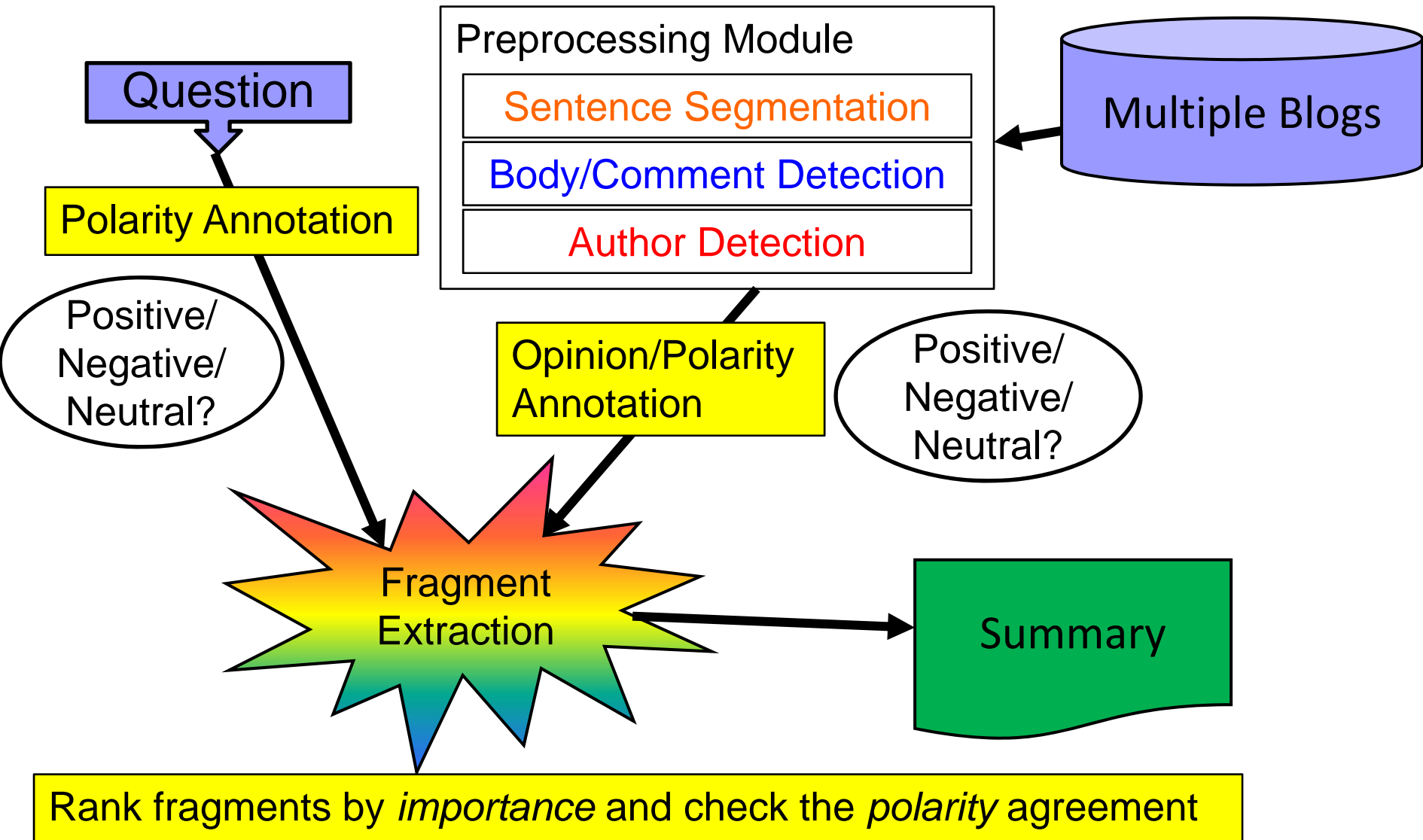
Fragment

1. **To extract important positive or negative elements, we define "*Fragment*" units.**

   - *Fragment = N* (≤ 3) **consecutive sentences in *the same body/comment part* by *the same author*.**

2. **The polarity of *fragment* was determined with *the polarity of sentences included*.**

3. **The importance of fragment was ranked by the cosine similarity with the question.**

Summarization System

Question

Preprocessing Module

Sentence Segmentation

Body/Comment Detection

Author Detection

Multiple Blogs

Polarity Annotation

Positive/ Negative/ Neutral?

Opinion/Polarity Annotation

Positive/ Negative/ Neutral?

Fragment Extraction

Summary

Rank fragments by *importance* and check the *polarity* agreement

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Polarity Detection: Overview

- **Polarity detection was two-stage model:**

  1. *Opinion detection* **to classify facts or opinions in sentences.**

  2. *Polarity classification* **of opinions to classify positive or negative ones.**

- **The clues were extracted from χ^2 test over the frequency of opinion tagged corpora: *MPQA* and *NTCIR-6 OAT* corpora.**

Feature Selection on χ^2 test

- **We extracted clues from NTCIR-6 and MPQA corpora for opinion/polarity detection.**

1. **Two type syntactic pairs checked by *Minipar.***
   - □ **grammatical subjects and verbs (governors).**
   - □ **auxiliary verbs and verbs.**

2. **Subjective term frequency [Wilson 2005]**

3. **Polarity term type frequency by lexicons: *adjective entries* [Hatsivassiloglou 2000], *the General Inquirer*, and *WordNet*.**

Opinion Detection Clues

- **Opinion Clues (example)**

Term	seem, should, must, doubt, excuse, unfair, fear, apologize,
Subject-Verb	I-VB, ZeroProNoun-SbjVerb, he-declare, he-judgment …
Auxiliary-Verb	can-say, may-be, could-SbjVerb, do-declare …

Polarity Classification Clues

- **Polarity Clues (example)**

	Positive Clues	Num	Negative Clues	Num
aux-verb	will — continue ,···	4	do — *SbjVerb* ,···	4
sbj-verb	PERSON — *SbjADJ* , NN — admire ,···	25	NN — characterize , She — say ,···	23
subjective verb type	act, contribute, broaden, play, promote, attracte, ···	22	characterize, complain, charge, order, pose, draw, ...	23
subjective adj/adv	able, balanced, well, wonderful, ambitious, ···	23	controversial, evil, harmful, negative, wrong, unfair, ···	30
subjective noun	friendship, breakthrough, hope, pledge, praise, ···	34	anger, blame, fear, harm, outcry, protest, threat, ···	45
Polarity term type	*IPS*, *POLP*, energy, acceptance, support, ···	60	*INS*, *POLM*, affirm, kill, damage, anger, beat, ···	83

Classification Accuracy

- Evaluation Results in NTCIR-7 *MOAT* (2008)

Opinion Detection			Polarity Classification		
P	R	F	P	R	F
0.3185	0.4092	0.3582	0.1943	0.183	0.1885

- Because the accuracy of opinion detection is better than that of polarity classification, we decided to submit two runs in TAC 2008.

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Submission Runs

1. **Opinion-focused Summarization**
   - **The system only extracted the fragments which contains at least one opinionated sentence (*opinion fragments*).**
2. **Polarity-focused Summarization**
   - **The system only extracted the fragments which contains at least one polar sentence requested by each question.**

Evaluation Results

	F-Score		Grammaticality		Non-Redundancy	
	Score	Rank	Score	Rank	Score	Rank
Polarity	0.132	29	5.591	10	6.545	8
Opinion	0.133	27	5.545	12	6.045	16
	Recall		Structure/Coherence		Fluency/Redability	
	Score	Rank	Score	Rank	Score	Rank
Polarity	0.312	18	2.409	24	3.545	22
Opinion	0.319	16	2.318	29	3.591	18
	Precision		Responsiveness			
	Score	Rank	Score	Rank		
Polarity	0.086	30	2.818	21		
Opinion	0.086	29	3	16		

- **Opinion-focused one is better in *content evaluation*, polarity-focused one is better in *linguistic quality*.**

- **Evaluation is almost on average, and slightly better on *grammaticality* or *non-redundancy*.**

- ***F-score* or *Precision* evaluation were poor because we extracted fragments up to maximal length.**

Post-Submission Analysis of Polarity Detection

- The evaluation of the opinionated/polarity agreements between the fragments similar to answer snippets (cosine $\geq$ 0.5) and question types is as follows.

	Accuracy	# of correct opinion/ polarity	# of sentences similar to snippets
Opinion	0.589	271	460
Polarity	0.299	81	271

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Conclusion

- **Polarity fragment extraction is effective to some extent to improve summary quality, especially for redundancy elimination.**

- **To increase coverage, opinion detection approach is better, but we need to investigate more with the improved polarity classifier appropriate for blogs.**

Future Work

- **Summaries seem to contain slightly *off-topic* fragments and must be combined with QA system to create summary with proper size.**

- **We plan to improve fluency considering discourse structure, such as *question-answering pairs* used in e-mail summarization (McKeown et al., 2007).**

Thank you very much!

Questions?