WIA Opinmine System in NTCIR-8 MOAT Evaluation

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Architecture and Workflow

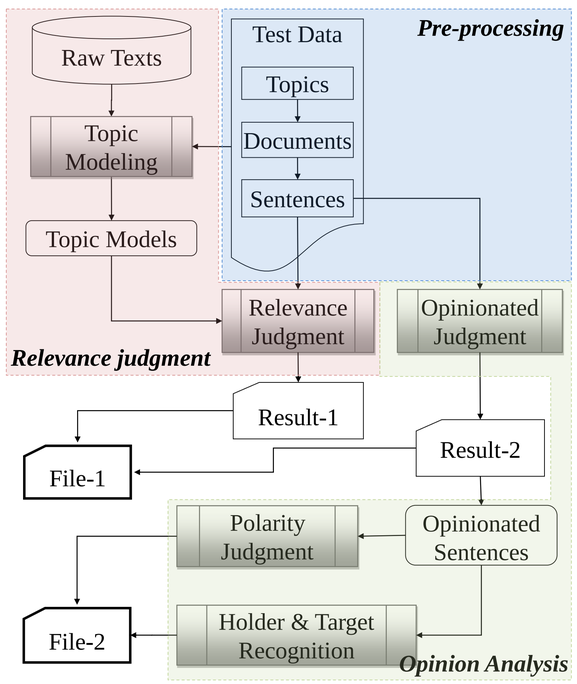
INPUT:

NTCIR MOAT Task formal run data

- STNO files
- OTNO files
- topic descriptions
- raw texts

Output:

File-1: Containing results of relevance judgment and opinionated judgment.
File-2: Containing results of polarity and holder&target information for each opinionated sentence.



Lexicon List

A Refined Opinion Lexicon

Type	Lexicons
Sentiment Words	Positive sentiment words Negative sentiment words Contextual sentiment words
Degree Adverbs	Degree adverbs
Conjunctions	Coordinating conjunctions Subordinating Conjunctions Correlative Conjunctions
Other Words	Opinion indicators Opinion operators Negations

Relevance Judgment

A topic model based algorithm is proposed for relevance sentence judgment. **60%** top ranked sentences of each topic are output as relevant sentences.

$$q = term_1 \text{ OR } term_2 \text{ OR } \ldots\ldots \text{ OR } term_k$$

$$w_i = tf_i \cdot cv_i$$

$$cv_i = \frac{1}{avg_i} \cdot \sqrt{\sum_{j=2002}^{2005} (tf_i^{\,j} - avg_i)^2 \cdot \frac{1}{4}}$$

$$Sim(S_i, M) = \frac{S_i \cdot M}{\|S_i\| \|M\|}$$

Original	Original + Coefficient of Variation
歐元, 歐洲, 投資人, 銀行, 貨幣, 投資, 基金, 匯價, 資產, 市場, 美國, 價位, 主管, 升值, 指出, 經濟, 認為, 利率, 建議, 外匯	歐元, 匯價, 經濟, 羅尤, 基金, 升值, 銀行, 投資, 貨幣, 投資人, 價位, 復甦, 存款, 物價, 主管, 債券, 指出, 澳幣, 日圓, 央行

Opinionatedness Judgment

A SVM classifier is trained based on following features:

- Punctuation level features
- Word-Level and entity-level features
- Bi-gram features

All features are combined using a RBF kernel and a SVM classifier is trained leading to get a recall of over 80% with tolerable *F-score* on development set.

Polarity Judgment

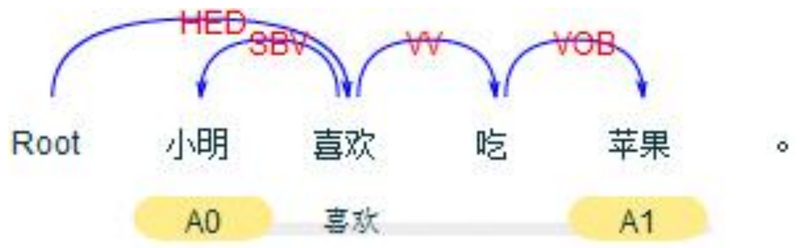
In addition to the features used in Opinionatedness Judgment, we incorporate features of s-VSM (Sentiment Vector Space Model) to enhance the performance of polarity judgment.

f_i	Number of sentiment units satisfying …
f_1	$f_{PSW}>0$, $f_{NSW}=f_{NEG}=f_{MOD}=0$
f_2	$f_{PSW}=0$, $f_{NSW}>0$, $f_{NEG}=f_{MOD}=0$
f_3	$f_{PSW}>0$, $f_{NSW}=0$, $f_{NEG}>0$, $f_{MOD}=0$
f_4	$f_{PSW}=0$, $f_{NSW}>0$, $f_{NEG}>0$, $f_{MOD}=0$
f_5	$f_{PSW}>0$, $f_{NSW}=0$, $f_{NEG}=0$, $f_{MOD}>0$
f_6	$f_{PSW}=0$, $f_{NSW}>0$, $f_{NEG}=0$, $f_{MOD}>0$
f_7	$f_{PSW}>0$, $f_{NSW}=0$, $f_{NEG}>0$, $f_{MOD}>0$
f_8	$f_{PSW}=0$, $f_{NSW}>0$, $f_{NEG}>0$, $f_{MOD}>0$

We select all neutral sentences and use PrefixSpan to mine useful patterns while maintaining the sequence of words.

Holder&Target Recognition

Both a dependency parser and a semantic role labeling (SRL) tool are incorporated in WIA-Opinmine. The meanings of A0's, A1's are different from one verb to another. In most conditions, A0 represents the **subject** of a verb and A1 represents the **object**.



A ranking method was proposed by using topic model and the position information. (a_0, a_1, a_2) is estimated using linear regression with ordinary least square (OLS) method on training data.

$$score(A) = a_0 \cdot \frac{A \cdot M}{\|A\| \|M\|} + a_1 \cdot \log \frac{N}{ap} + a_2 \cdot \log \frac{N}{vp}$$

Results and Future work

The NTCIR8 evaluation results show that our system could effectively recognize relevance sentences, opinionated sentences and polarities on both Simplified Chinese (SC) and Traditional Chinese (TC). But the performance of holder&target recognition is not satisfying. (Note that the performance of opinionated sentence judgment between TC and SC are very different)

Evaluation		TC	SC
Relevance Judgment	**P**	89.46	98.22
	R	58.74	59.17
	F	70.92	73.85
Opinionated Sentence Judgment	**P**	53.39	29.2
	R	83.68	95.9
	F	65.19	44.77
Polarity Judgment	**P**	50.65	50.72
	R	41.11	46.57
	F	45.38	48.56

Evaluation		SC	
		Holder	Target
Holder and Target Recognition	**P**	85.5	36.9
	R	76.8	33.0
	F	80.9	34.9

Evaluation		TC	
		Holder	Target
Holder and Target Recognition	**Strict**	62.1	28.3
	Lenient	51.3	23.3

The future work will be focused on two directions:

- Introducing discourse information in opinionated and polarity judgment such as sentence-level, paragraph-level and document-level features
- Boosting the performance of holder and target recognition.