Automatic Detection of Linguistic Quality Violations

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Universität des Saarlandes
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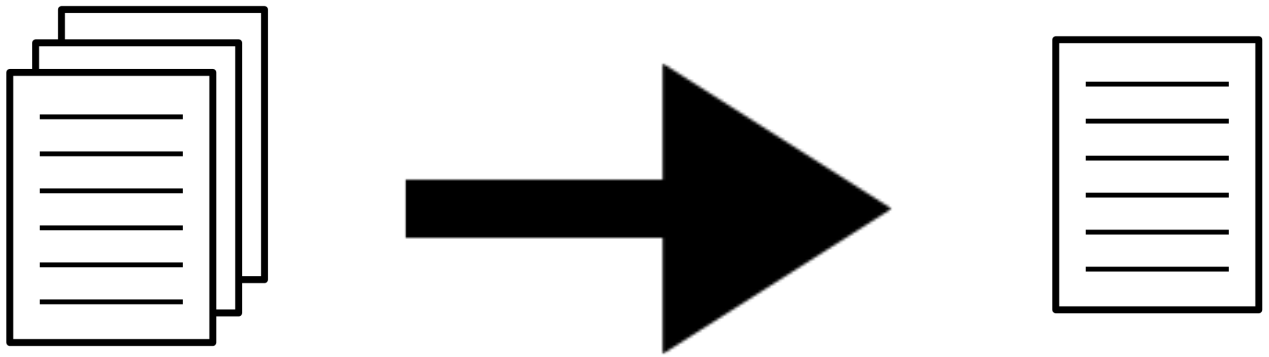
Automatic Summarization



Automatic Summarization

- **Single-Document:** One document
- **Multi-Document:** Multiple documents on the same topic

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- **Extractive:** New summary from source sentences

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	Single-document	Multi-document
Abstractive		
Extractive		

Linguistic Quality Violations

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$\Rightarrow$ LQVCorpus (Friedrich et al., 2014)

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- Entity level:
  - FM-EXPL, SM+EXPL
  - DNP-REF, INP+REF
  - PRN-ANT, PRN+MISLA
  - ACR-EXPL

LQVCorpus (Friedrich et al., 2014)

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- Entity level:
  - FM-EXPL, SM+EXPL
  - DNP-REF, INP+REF
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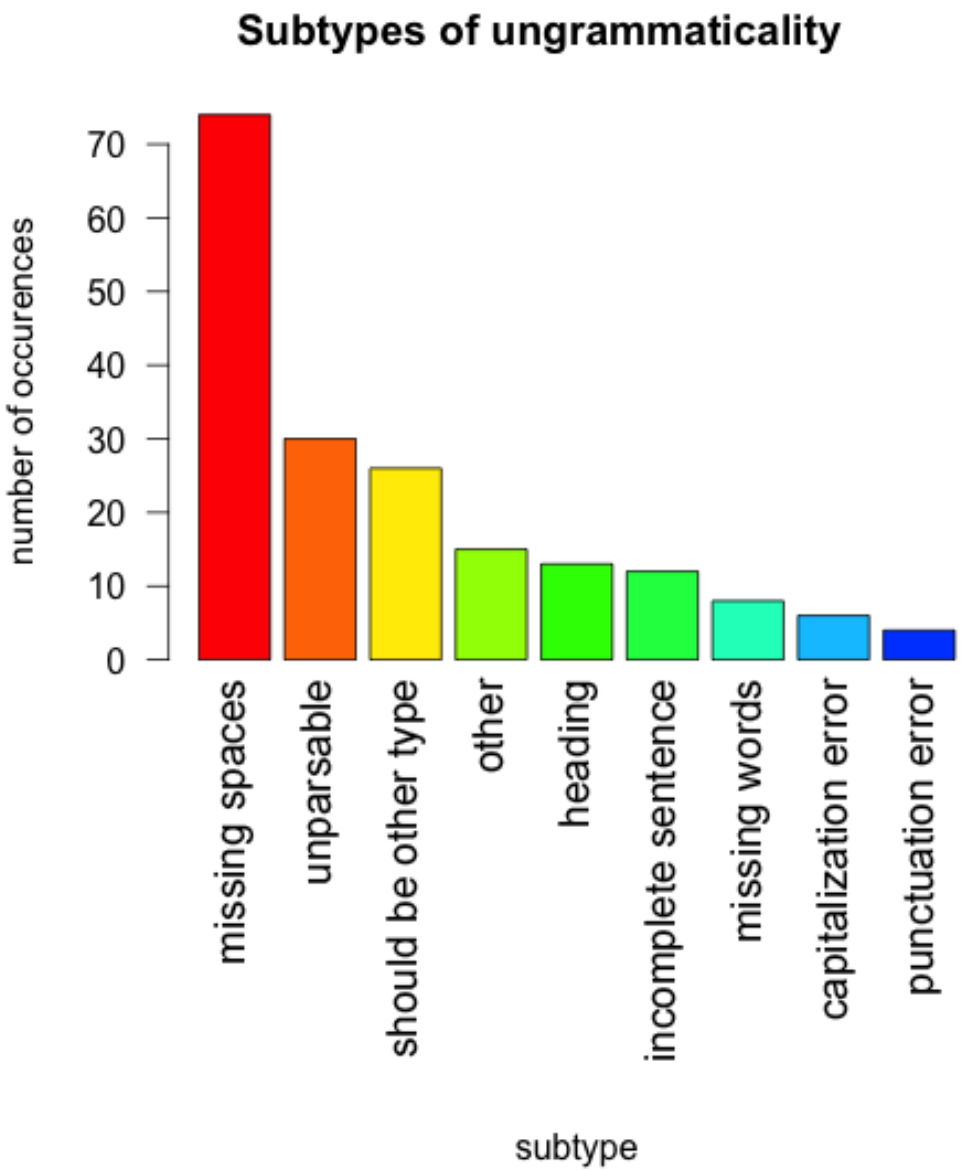
  - ACR-EXPL
- Clause level:
  - **incomplete sentence (INCOMPLSN)**
  - **inclusion of datelines (INCLDATE)**
  - **other ungrammatical form (OTHRUNGR)**
  - no semantic relatedness (NOSEMREL)
  - **redundant information (REDUNINF)**
  - no discourse relation (NODISREL)

Ungrammaticality (OTHRUNGR+INCOMPLSN)



Detecting missing spaces

"A strong earthquake measuring 7.8 magnitude struck **Wenchuancounty** *of Sichuan Province on Monday, leaving at least* **12,000people** *died and thousands more injured."*

"Virginia Tech reported a campus shooting Monday and told **studentsto** *stay inside their residences and away from windows."*

"A gunman opened fire on classrooms at Virginia Tech University **onMonday** *morning, killing at least 30 people before turning his* **gunon** *himself in the bloodiest school shooting in US history."*

UnknownTokens

Idea:
Sentence contains violation iff any word $\notin$ known tokens

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known tokens?

- Source documents available? $\rightarrow$ all tokens in source documents = $\textbf{UnknownTokens}_{\textbf{source}}$
- Otherwise $\rightarrow$ $\textbf{UnknownTokens}_{\textbf{general}}$

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- + Wikipedia = $\textbf{UnknownTokens}_{\textbf{gw+heur+ner+wiki}}$

UnknownTokens: Evaluation

	Missing spaces			No missing spaces		
	P	**R**	**F**	**P**	**R**	**F**
Baseline	0.0	0.0	0.0	94.8	**100**	97.3
UT_{gw}	15.0	**98.7**	26.0	**99.9**	69.1	81.7
$UT_{gw+heur}$	30.5	97.3	46.5	99.8	87.8	93.4
$UT_{gw+heur+ner}$	35.5	97.3	52.0	99.8	90.3	94.8
$UT_{gw+heur+ner+wiki}$	70.3	96.0	81.2	99.8	97.8	98.8
UT_{source}	**95.9**	94.6	**95.2**	99.7	99.7	**99.7**

RandomForest

RandomForest (Breiman, 2001) to train decision trees

Features:

- classification from **UnknownTokens**

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Features:

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- number of words

RandomForest: Evaluation

	Precision	**Recall**	**F-Score**
Ungrammatical	59.6	29.3	39.3
Not ungrammatical	90.1	97.0	93.4
Weighted Average	86.1	88.1	86.3

Datelines (INCLDATE)

BLACKSBURG, Virginia 2007-04-16 18:34: 44 UTC *A gunman opened fire in a dorm and classroom at Virginia Tech on Monday, killing at least 30 people in the deadliest shooting rampage in U.S. history.*

BERLIN, May 13(Xinhua) *The German government announced on Tuesday that it is to provide 500, 000 euros(around 770, 000 U.S. dollars) in aid for earthquake victims in Sichuan Province of China.*

00 a.m.*People are panicking.*

Detecting Datelines

Regular expression:

```
UTC|
^\d{4}-\d{2}-\d{2}|
^[A-Z]{3,}|
^(Jan|Feb|Mar|Apr|May|Jun|Jul|Aug|Sep|Oct|Nov|Dec)
```

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Precision	**Recall**	**F-Score**
90.3%	91.1 %	90.7%

Redundancy (REDUNINF)

According to a survey by the State Food and Drug Administration, 65 percent of the respondents worried about the food safety situation in China. Food and drug safety has become a major concern of Chinese people.

Cyclone Sidr, described as the worst storm in years to hit low-lying and disaster-prone Bangladesh, crashed into the southwestern coast Thursday night before sweeping north over the capital Dhaka. The cyclone hit the southwestern coast of Bangladesh on Thursday before sweeping north to the capital Dhaka.

Unigrams

- Remove non-alphanumeric characters and split into set of words

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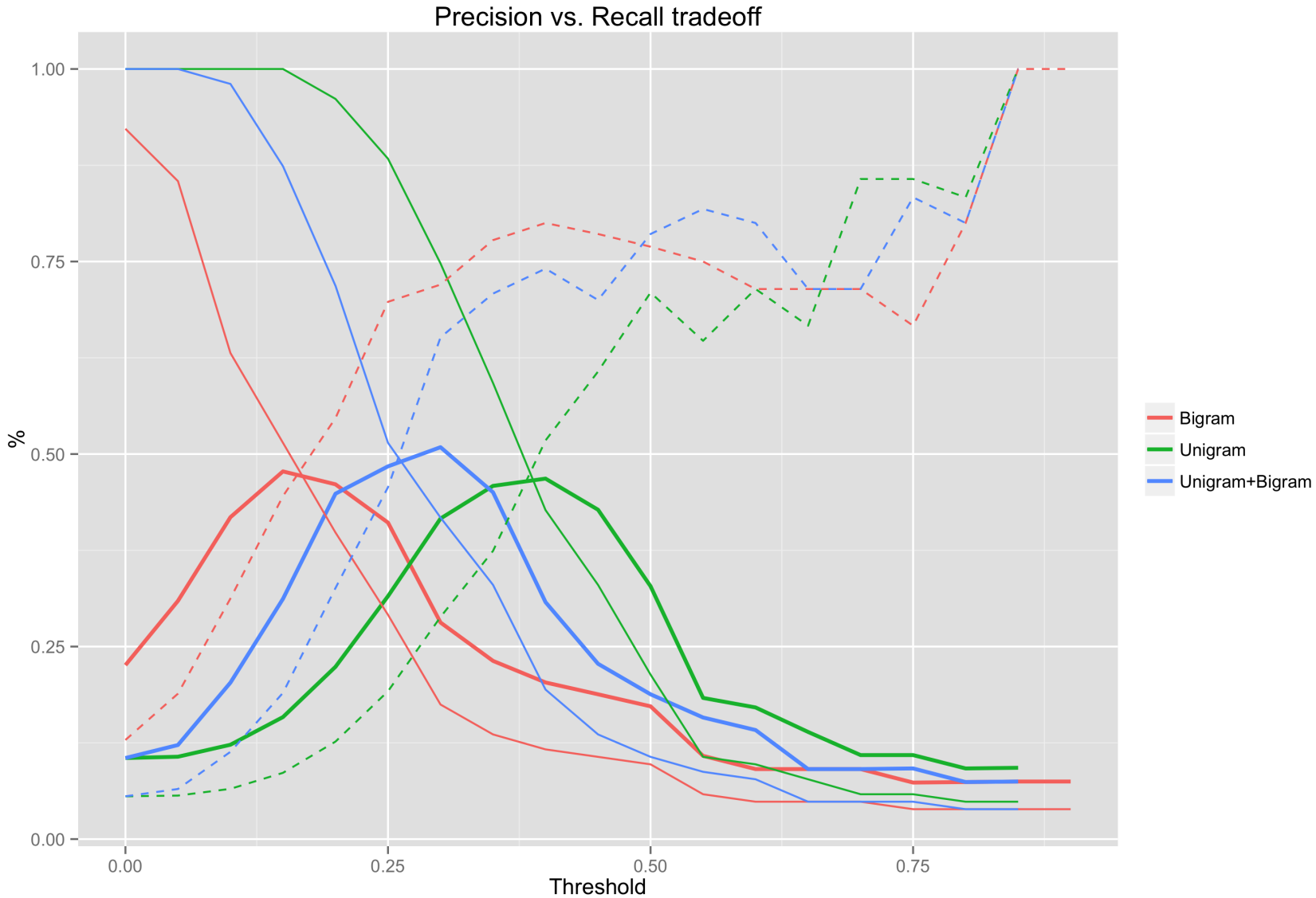
Variations: **Bigrams**, **Combined**

Threshold?

Finding a threshold



Evaluation of **Unigrams**, ...

	Unigrams	**Bigrams**	**Combined**
Threshold	0.5	0.4	0.4

	Precision	Recall	F-Score
Baseline	4.5%	**100%**	8.7%
Levenshtein	15.8%	17.3%	3.1%
Unigrams	**58.0%**	28.2%	**37.0%**
Bigrams	55.6%	14.5%	22.9%
Combined	56.8%	24.3%	34.0%

Discussion

LQVCorpus

- small
- inconsistent
- clause-level annotation
- same annotation for different violations
- tailored to corpus

Methods

- small
- inconsistent
- clause-level annotation
- same annotation for different violations
- tailored to corpus

Future Work

Other violations

- pronouns: coreference resolution
- acronyms: finding full form near first unexpanded form
- mentions & noun phrases: NER + ?
- no semantic relatedness: semantic parsing? Wordnet distance?
- no discourse relation: discourse parsing, does connective match relation?

Future Work

Ungrammaticality

- missing violation types
- detection methods for other subtypes

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Redundancy

- include contextual information
- include source document information
- semantic approaches

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Corpus

- annotate a corpus with our type system

Conclusion

- Tool will be made available to annotate with our methods

References

Breiman, L. (2001). Random forests. *Machine learning*, 45(1):5–32.

Finkel, J. R., Grenager, T., and Manning, C. (2005). Incorporating non-local information into information extraction systems by gibbs sampling. In *Proceedings of the 43rd Annual Meeting on Association for Computational Linguistics*, pages 363–370. Association for Computational Linguistics.

Friedrich, A., Valeeva, M., and Palmer, A. (2014). Lqvsumm: A corpus of linguistic quality violations in multi-document summarization.

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