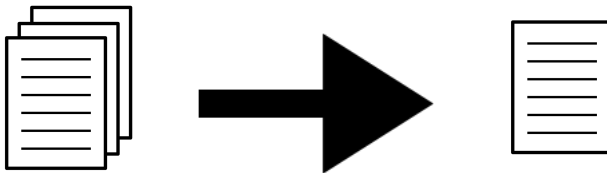


Automatic Detection of Linguistic Quality Violations

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Bachelor Thesis Defense
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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	Single-document	Multi-document
Abstractive		
Extractive		

Summarization systems should produce coherent and grammatical output.

Summarization systems **don't produce coherent and grammatical output.**

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⇒ LQVCorpus (Friedrich et al., 2014)

Annotated results of TAC 2011 Guided Summarization task
(Owczarzak and Dang, 2011)

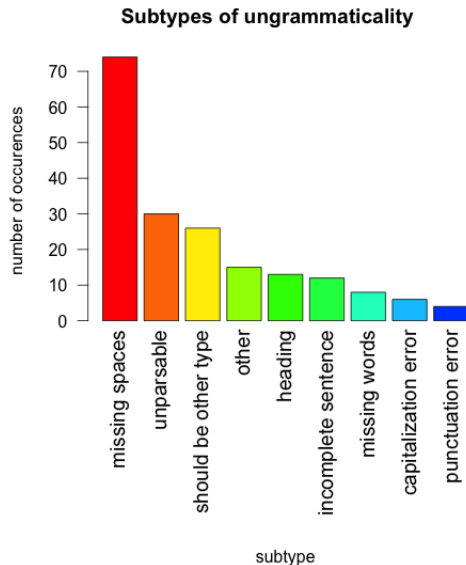
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- ▶ Entity level:
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 - ▶ PRN-ANT, PRN+MISLA
 - ▶ ACR-EXPL

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 - ▶ FM-EXPL, SM+EXPL
 - ▶ DNP-REF, INP+REF
 - ▶ PRN-ANT, PRN+MISLA
 - ▶ 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.”*

Unknown Tokens

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 = **UnknownTokens**_{source}
- ▶ Otherwise \rightarrow **UnknownTokens**_{general}

- ▶ Tokens from (parts of) Gigaword = **UnknownTokens_{gw}**

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- ▶ + Wikipedia = **UnknownTokens_{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 (Breiman, 2001) to train decision trees

Features:

- ▶ classification from **UnknownTokens**

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Features:

- ▶ classification from **UnknownTokens**
- ▶ perplexity scores from language model trained on Gigaword
- ▶ 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

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)

Detecting Datelines

Regular expression:

UTC |

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Precision	Recall	F-Score
90.3%	91.1 %	90.7%

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.

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

Unigrams

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- ▶ Cardinality of intersection between sets

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- ▶ Normalize by sentence length

Unigrams

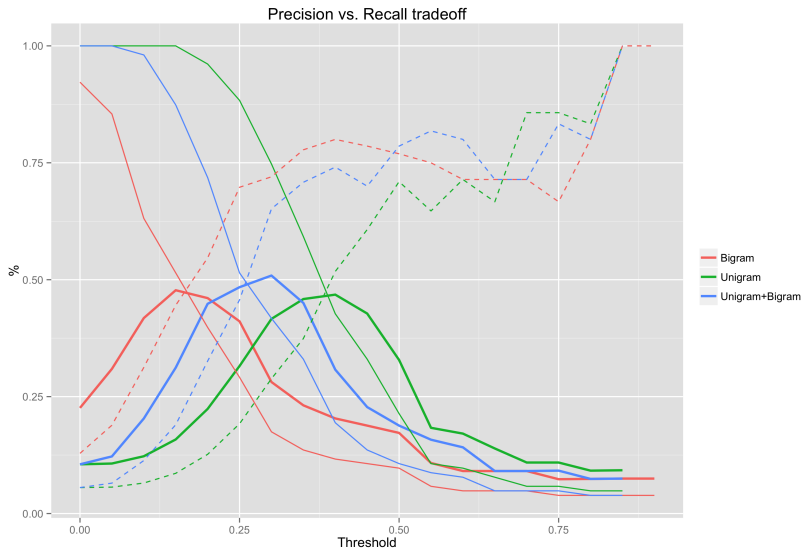
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- ▶ Cardinality of intersection between sets
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Variations: **Bigrams**, **Combined**

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%

LQVCorpus

- ▶ small
- ▶ inconsistent
- ▶ clause-level annotation
- ▶ same annotation for different violations

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- ▶ clause-level annotation
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Methods

- ▶ tailored to corpus
- ▶ room for improvement

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?

Ungrammaticality

- ▶ 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

Methods for:

- ▶ detecting ungrammaticality
- ▶ detecting datelines
- ▶ detecting redundancies

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Adapted annotation scheme, better for automatic processing

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Adapted annotation scheme, better for automatic processing

Tool will be made available to annotate with our methods

- 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.
- Owczarzak, K. and Dang, H. T. (2011). Overview of the tac 2011 summarization track: Guided task and aesop task. In *Proceedings of the Text Analysis Conference (TAC 2011)*, Gaithersburg, Maryland, USA, November.