

Using argumentative structure to grade persuasive essays

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Data Set

Using
argumentative
structure to
grade
persuasive
essays

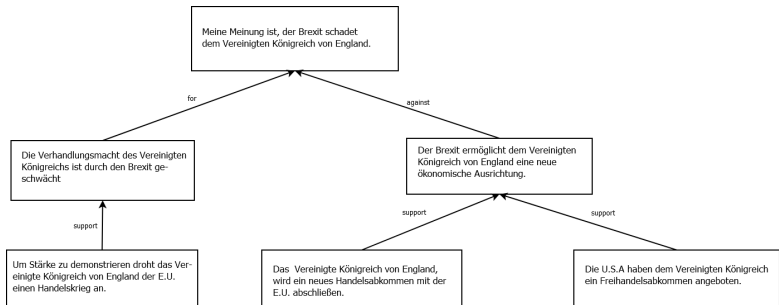
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Element	Count
Words	119,043
Sentences	4,047
Paragraphs	133
Argument Units	1,324
Major Claims	34
Claims	286
Premises	1,004
Spelling Anomaly	130
Median Words per Argument Unit	15.3

Arguments

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Grading

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	very good (1)	good (2)	poor (3)	very poor (4)
number	3	6	12	18

Experimental Setup

Using
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- DKPro
 - Core
 - TC
 - Uby
- LanguageTool
- Weka

Baseline Features

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AdjRatioFeature
AdvRatioFeature
ArtRatioFeature
CardRatioFeature
ConjRatioFeature
FutureVerbRatio
FutureVsPastVerbRatio
LongTokenRatio
NRatioFeature
NrofChars
NrofCharsPerSentence

NrofCharsPerToken
NrofSentences
NrofTokens
ORatioFeature
PastVerbRatio
PpRatioFeature
PrRatioFeature
PuncRatioFeature
ShortTokenRatio
VRatioFeature

Argumentative Features

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- RatioArgumentQuestion
- RatioArgumentSentence
- RatioClaimParagraphs
- RatioSentenceNonArgSent
- RatioSentenceNonQuestion
- RatioSpellingAnomalyWords
- NrDisconnectedArgs
- NrOfArguments
- NrOfClaims
- NrOfMajorClaims
- NrOPremises
- NrOfQuestionAsClaim

Results

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All Features

mark	p	r	f1
1	1	0.6	0.75
2	0.833	0.833	0.833
3	0.667	0.6	0.632
4	0.773	0.895	0.829
avrg.	0.87	0.86	0.858

Results

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Baseline Features only

mark	p	r	f1
1	0	0	0
2	0	0	0
3	0.545	0.6	0.571
4	0.721	0.838	0.775
avrg.	0.476	0.545	0.508

Results

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Argument-based Features

mark	p	r	f1
1	1	0.6	0.75
2	0.833	0.833	0.833
3	0.700	0.700	0.700
4	0.810	0.895	0.850
avrg.	0.87	0.86	0.858

Isights – Good Essays

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- Use premises cautiously
- Focus on few major claims

Isights – Bad Essays

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- Many spelling errors
- Inconsistent use of tense
- Overly long words
- High number of major claims
- High number of disconnected arguments

Conclusions

Using
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- Argumentative structure to determine good essays
- General linguistic features to determine bad essays
- Argument Structure + Essay Grading based on German data

Future Work

Using
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grade
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- More Data
- Other Features
- Metaphors

Thanks

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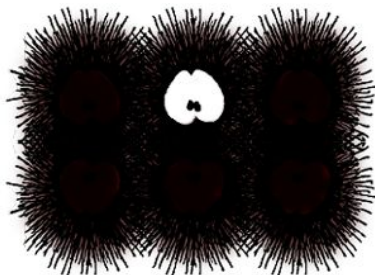
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- German Institute for Educational Research and Educational Information (DIPF), Frankfurt
- You for your attention

Fragen?

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Find our resources at:

- <https://b2drop.eudat.eu/s/tr5spZeyRcW20VB>
- <https://b2drop.eudat.eu/s/mTyUTJrCNy04I3e>
- <https://github.com/hdaSprachtechnologie>