

Tree Kernel-based Negation and Speculation Scope Detection with Structured Syntactic Parse Features

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Abstract

1 Introduction

not

seems

but something

not

not expensive
possible

not something

not

the possible future scenarios

*The chair is **not** expensive but comfortable*
Considering all that we have seen, what are now
*the **possible** future scenarios ?*

* Corresponding author

2 Related Work

2.1 Heuristic Rule based Methods

2.2 Machine Learning based Methods

3 Corpus

		Abstract	Paper	Clinical
Nega- tion				
Specu- lation				

<p><i>These findings</i> speculation <i>indicate that</i> <i>corticosteroid resistance in bronchial</i> <i>asthma</i> negation <i>can not</i> <i>be explained by abnormalities in corticosteroid receptor char-</i> <i>acteristics</i></p>
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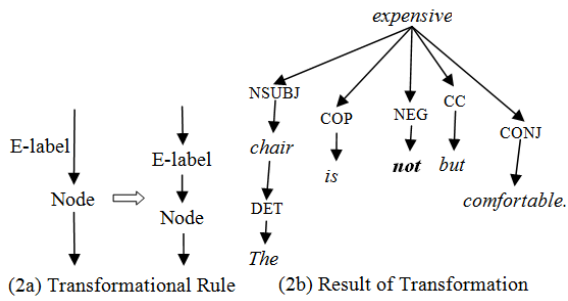
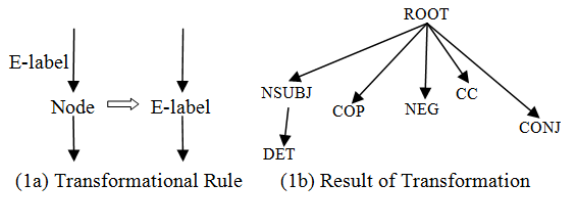
4 Methodology

4.1 Flat Syntactic Features

Basic Features

Feature	Remark
B1	
B2	
B3	
B4	
B5	
B6	

Constituent Syntactic Features



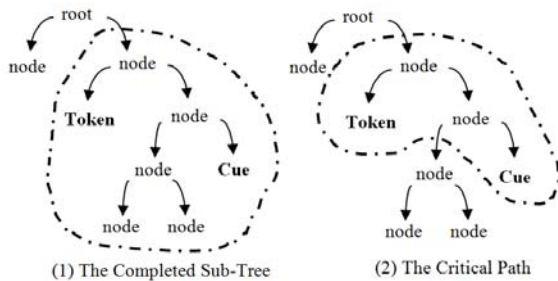
4.3 Part-of-Speech Based Classification Optimization

is *chair*

*TCF-1 contained a single DNA box in the **putative** mammalian sex-determining gene SRY .
The circadian rhythm of plasma cortisol **either** disappeared **or** was inverted .*

is *chair*

*putative mammalian sex-determining gene SRY either...or...
disappeared or was inverted*



suggest

suggested

An age-related decrease

*These results **suggest** that the genes might be involved in terminal granulocyte differentiation .*

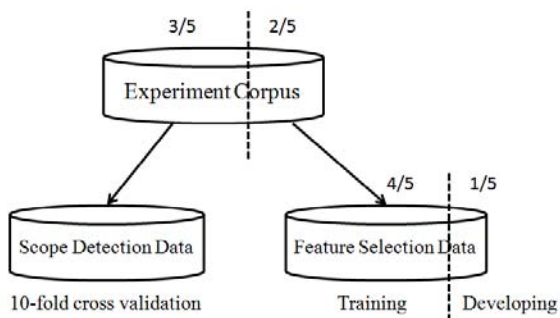
*An age-related decrease was **suggested** between subjects younger than 20 years .*

Constituent and Dependency Parser

5 Experiments and Results

5.1 Experimental Setting

Support Vector Machine Classifier



5.2 Results on Flat Syntactic Features

χ P

Negation	Features	P	R	F	PCS
Speculation	Features	P	R	F	PCS

Features	P	R	F	PCS

χ^2 P

Features	P	R	F	PCS

5.4 Results on Part-of-Speech Based Classification

5.3 Results on Structured Syntactic Parse Features

Negation	System	P	R	F	PCS
Speculation	System	P	R	F	PCS

χ^2 P

χ P

Cue's POS	B1-B6						CS1-CS10										DS1-DS5					PCS
	1	2	3	4	5	6	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	
	✓				✓	✓					✓						✓	✓	✓	✓	✓	
	✓				✓	✓				✓				✓	✓		✓	✓	✓	✓	✓	✓
	✓				✓					✓				✓	✓							✓
			✓	✓	✓	✓	✓	✓		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓
	✓				✓	✓	✓			✓				✓			✓		✓			
					✓	✓	✓	✓		✓	✓						✓					✓
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					✓	✓	✓	✓		✓	✓						✓	✓	✓	✓	✓	✓
					✓	✓	✓	✓		✓	✓						✓	✓	✓	✓	✓	✓

6 Conclusion

5.5 Results of Comparison Experiments

Acknowledgments

Negation	System	Abstract	Paper	Clinical
Speculation	System	Abstract	Paper	Clinical

References

- short papers* *Proceedings of ACL-HLT* *In Proceedings of the 11th Conference of the European Chapter of the Association for Computational Linguistics*
- Biomedical Informatics* *Journal of* *Proceedings of COLING*
- Proceedings of ACL* *Proceedings of EMNLP* *Proceedings of NAACL*
- Proceedings of EACL* *In Proceedings of the Fourteenth Conference on Computational Natural Language Learning: Shared Task*
- CoNLL: Shared Task* *Proceedings of* *Proceedings of BioNLP*
- SIGIR Workshop: Text Analysis and Search for Bioinformatics* *Proceedings of IJCNLP, Companion volume*
- Medical Informatics Association* *Journal of the American* *Computational Linguistics*
- Proceedings of EMNLP* *BMC Bioinformatics*
- Proceedings of EMNLP*
- Proceedings of CoNLL* *In Proceedings of the 2007 Joint Conference on Empirical Methods in Natural Language Processing and Computational Natural Language Learning*
- Proceedings of the BioNLP Workshop*
- CoNLL Shared Task* *Proceedings of*