

(Chinese) Requirement Analyzing and Modeling Based on Domain- Specific Semantic Framework

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Self-Introduction

- **Tong Li** received the Master degrees in software engineering from Tsinghua University. Currently he is a PhD student in the ICT doctoral school in University of Trento. His research interests focus on requirement modeling and agent-oriented reasoning. He is working on the topic about security requirement evolution.
- Hobbies: jogging, swimming, ping-pong, basket ball, badminton...

Outline

- Background
- Research Ideas
- Domain Semantic Framework
- Semi-automatic modeling Process
- Experiment
- Related Work
- Conclusion

Background

- Software Requirements are often specified in natural language.
- However...
 - Ambiguous
 - Incomplete
 - Inconsistent

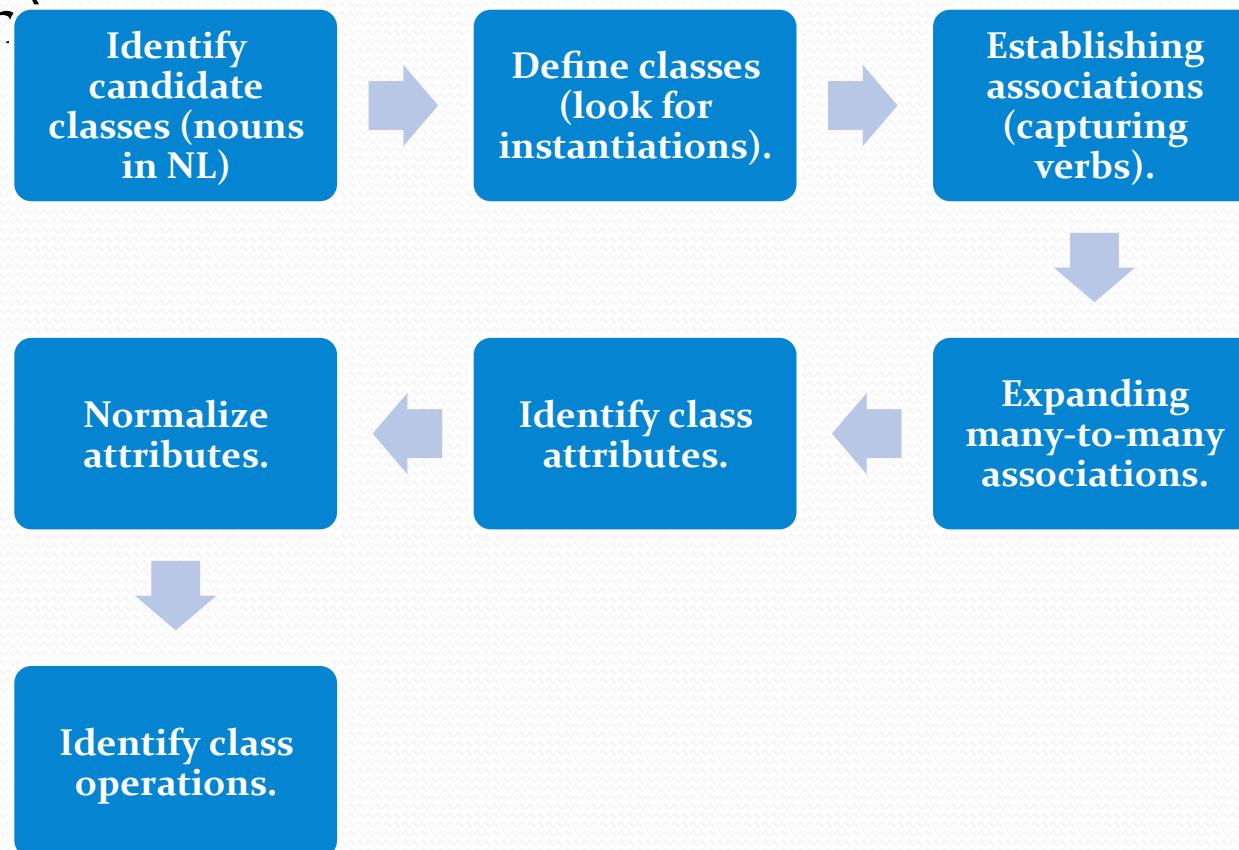
Background

- Model-driven Development Engineering
 - UML, Goal Model, ...



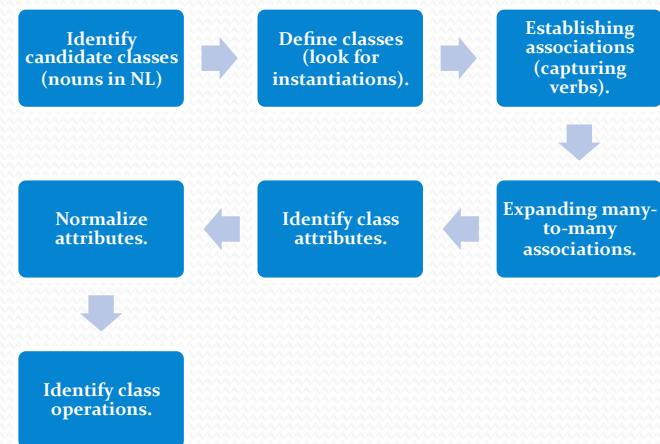
Related Work

- The KRB seven-step method (Kapur, Ravindra and Brown)



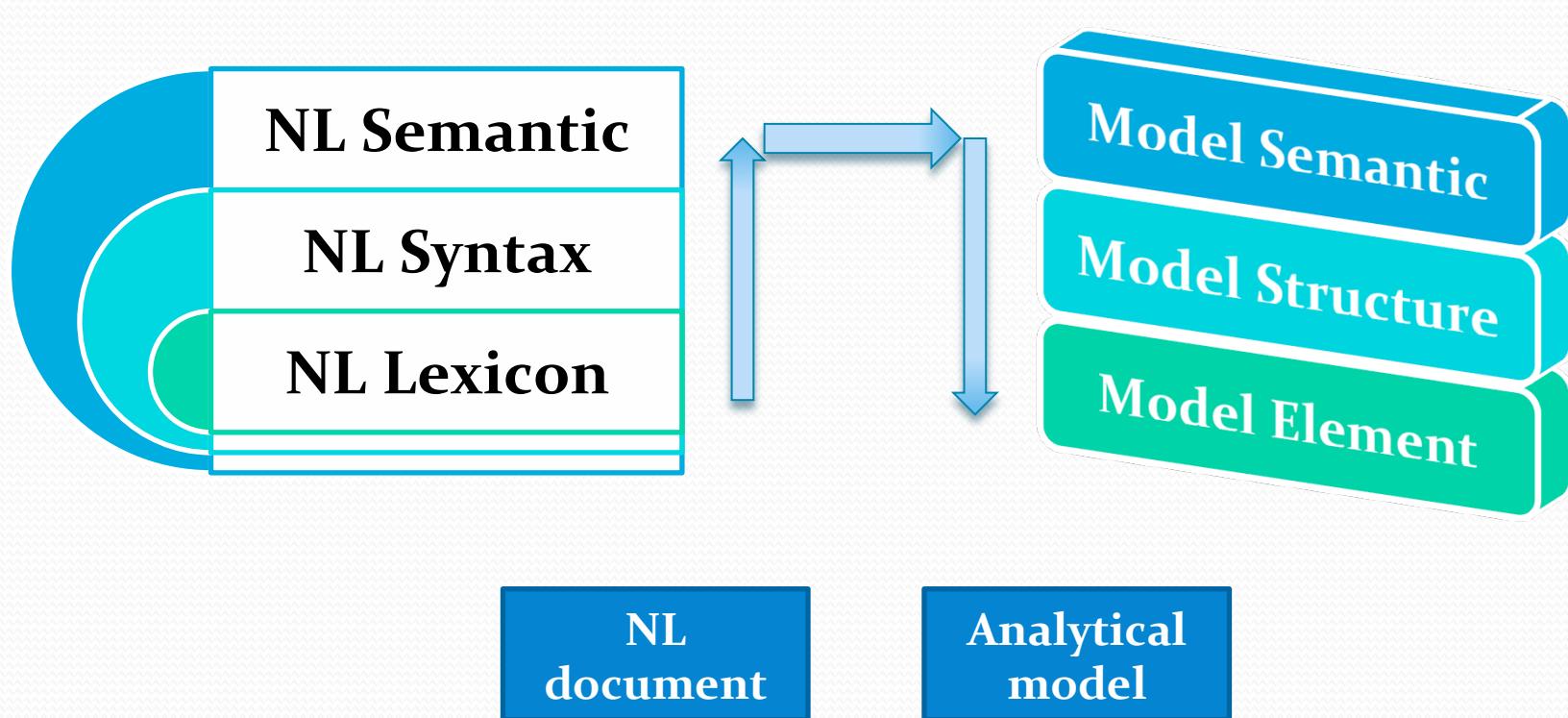
Related Work

- The KRB seven-step method (Kapur, Ravindra and Brown)
- L.Mich => NL-OOPs
- H.M. Harmain et al. => CM-Builder
- Delisle et al. => DIPETT-HAIKU
- J. Börstler => RECORD
- ...



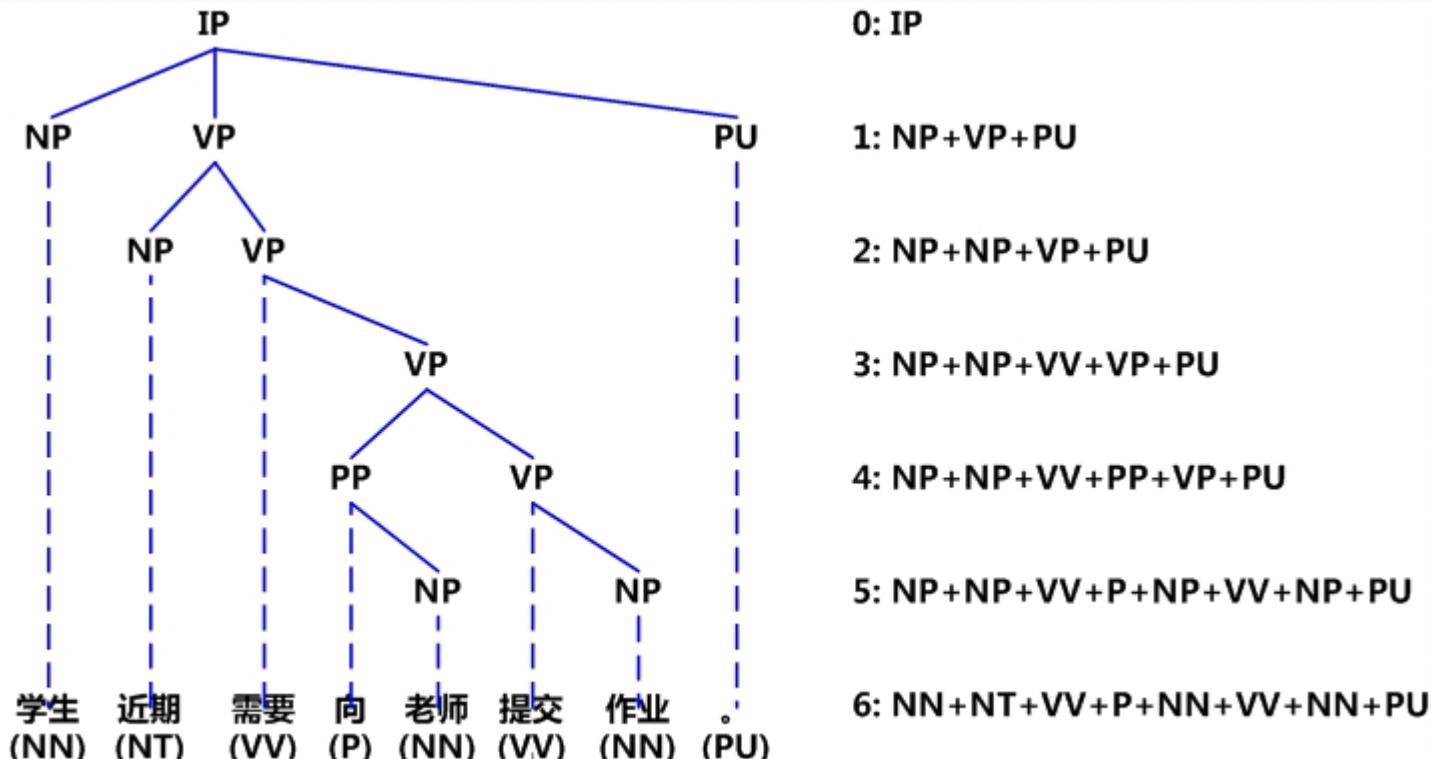
Research Ideas

- Develop a better way to translate NL into model



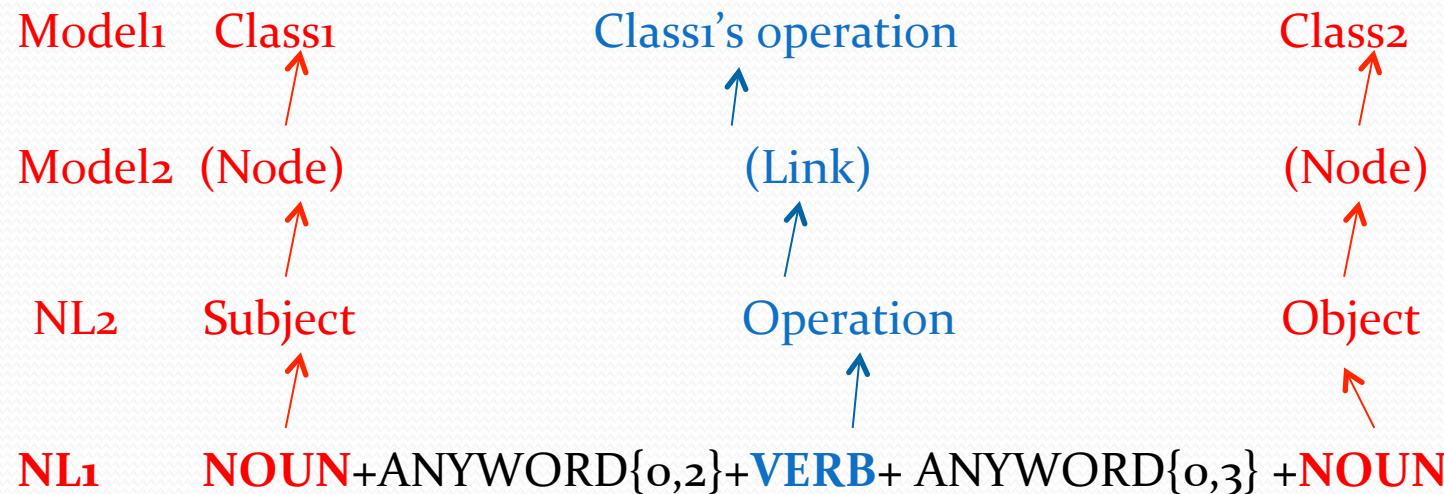
Domain Semantic Framework

- Shallow semantic parsing (semantic role labeling)



Domain Semantic Framework

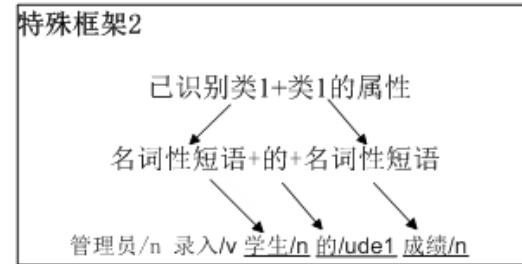
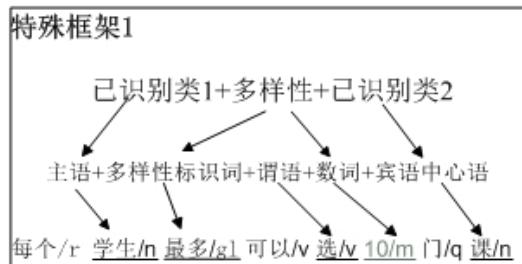
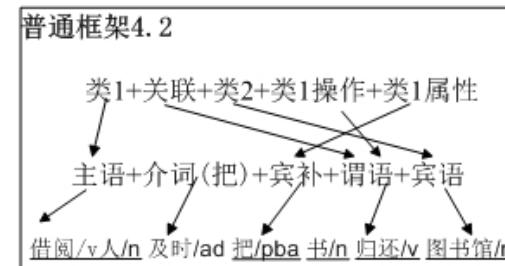
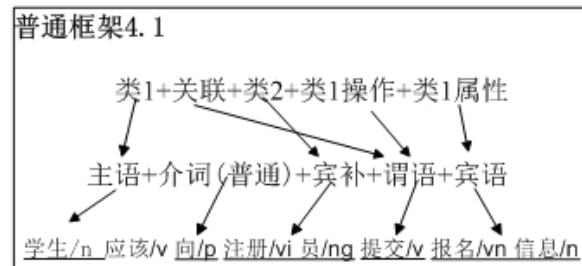
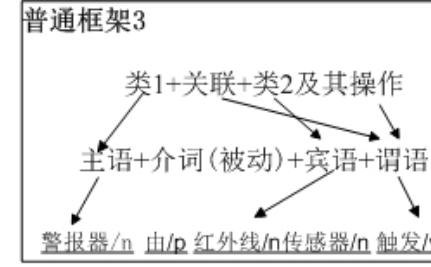
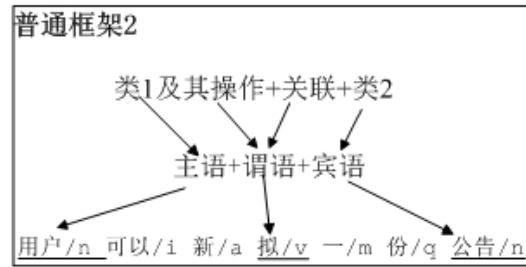
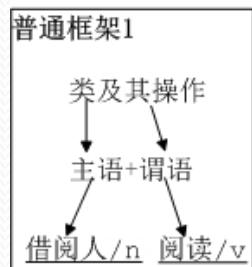
- Sentence pattern



Consideration Issues:

- 1) Model semantics
- 2) Language grammar
- 3) User language custom

Domain Semantic Framework



Semi-automatic Modeling Process

Pre-processing

- Domain Words Extraction
- Pronouns Disambiguation

NLP

- Word Segmentation and Part of Speech Tagging
- Shallow Semantic Parsing

Model Extraction

- Fuzzy Match
- Model Building

Model Improvement

- Smart questionnaire

Experiment

- Support tool: CREAT(Chinese Requirement Elicitation and Analysis Tool)

Element Document	Class		Relation		Attribute		Operation	
	Precise	Recall	Precise	Recall	Precise	Recall	Precise	Recall
1	60%	100%	60%	86.6%	73.3%	55%	72.2%	86.6%
2	62.5%	100%	66.6%	100%	50%	33.3%	72.2%	100%
3	100%	100%	100%	100%	0%	0%	70%	100%
4	41.6%	83.3%	33.3%	100%	100%	33.3%	88.8%	100%
Avarage	66%	95.8%	64.9%	96.6%	55.8%	30.4%	75.8%	96.65%

Conclusion

- Propose domain specific semantic framework to extract model from natural language text.
- Proposes a semi-automated analyzing and modeling methodology which is based on the semantic analysis.
- Implement a modeling tool to support the whole process.



Thanks all!

Open questions

- Is it possible to (semi-)automatically build Goal model?
- If so, how?
- If not, why?