PropBank vs. VerbNet

Only one can remain….

Ok, maybe both can remain….

But first…

:ARGO Wins Oscar for Best Role

LOS ANGELES — The Academy of Motion Picture Arts and Sciences has awarded the 2013 Oscar for Best Role to :ARGO. In thanking the Academy, director Ben Affleck said that the reward for :ARGO was a well-deserved recognition for each and every person who writes a script, directs a movie, acts, films, edits, adds special effects or annotates a movie with subtitles. "Without them, no movie would be possible," he said. "I am truly touched. The Oscar for :ARGO is a terrific tribute to all agents."

Director Ben Affleck accepting the Best Role Oscar for :ARGO on behalf of all agents

Asked to comment on the Oscar for :ARGO, ecstatic members of the Academy of Semantic Annotation Arts and Sciences exclaimed

```
(1 / live-01 :mode imperative
  :ARG0 (a / :ARG0)
  :duration (12 / long))
```

Abstraction and Generalization in Semantic Role Labels: Propbank, VerbNet or both?

Merlo, Van Der Plas, University of Geneva 2009

- PropBank labels don't generalize across verbs, nor to unseen verbs, nor to novel verb senses
  - Shortcomings apparent in Args2-5

- References 2 papers that show that augmenting PropBank labels with VerbNet labels increases generalization of the less frequent labels to new verbs and new domains

- Also references paper (Zapirain) that found PropBank labels to perform better overall

Critique of past studies

- Used a syntactic parser, which favored PropBank

- Too task dependent
  - Task-specific learning-based experiments do not guarantee that the learners be sufficiently powerful to make use of the full generality of the semantic role labels

Semantic Roles & Grammatical Functions: the Thematic Hierarchy

- "Lexical semantic properties described by semantic roles and grammatical functions appear to be distributed according to prominence scales"

- Agent>Experiencer>Goal/Source/Location>Patient

- Most subjects are Agents

- Most objects are Patients or Themes

- Most indirect objects are Goals

- Semantic roles better defined by feature bundles
  - Ex: features sentience and volition have been shown to be useful in distinguishing Proto-Agents from Proto-Patients

  - These features correlate to animacy

Description

- PropBank: easier to learn
  - Reflects relationships between syntax and semantic role labels more strongly than VerbNet

- VerbNet: more informative in general; generalizes better to new role instances

Conclusions

- PropBank more useful for semantic role labeling for learners whose features based on syntactic tree

- VerbNet more syntax-independent
  - Machine translation

Can Semantic Roles Generalize Across Genres?

- Yi, Loper, Palmer 2007

Limitations to PropBank

- Difficult to make inferences/generalizations across verb classes

- Makes training automatic semantic role labeling (SRL) difficult
  - Would need a HUGE amount of data b/c it's so verb-specific
  - Arg0 & Arg1 are consistent across verbs: 85% of all arguments, but Args2-5 difficult

- Limits robustness to training data, difficult to deal with other genres

- PropBank is verb-specific

- VerbNet is not

- Let's get togetha!

- How, you ask?

- 2 parts:
  - Lexical mapping: IDing potential mappings b/w PB and VN for a given word
  - Instance classifier: which mapping should be used, i.e. word sense disambiguation

- This new mapping SRL system based on 4 components:
    1. Pre-processing: filters data through syntactic parser
    2. Argument identification: arg. or non-arg.
    3. Argument classification: assign semantic roles
    4. Post-processing: further selects arguments based on global constraints

- Arg0 maps to Agent-like roles 94% of time

- Arg1 maps to Patient-like roles 82% of time

- Arg0: agent, Arg1: patient, Group1: goal, Group2: extent, Group3: predicate/attrib, Group4: product; Group5: instrument/cause

Group 1	Group 2	Group 3	Group 4	Group 5
Recipient	Extent	Predicate	Patient2	Instrument
Destination	Asset	Attribute	Product	Cause
Location		Theme		Experiencer
Source		Theme1		Actor2
Material		Theme2		
Beneficiary		Topic		

Overall:

System	Precision	Recall	F1
Original	90.65	85.43	87.97
Mapped	88.85	84.56	86.65

Table 1: Overall SRL System performance using the PropBank tag set ("Original") and the augmented tag set ("Mapped")

Args1&2

- Arg1:

Group 1	Group 2	Group 3	Group 4	Group 5
Theme	Source	Patient	Agent	Topic
Theme1	Location	Product	Actor2	
Theme2	Destination	Patient1	Experiencer	Group 6
Predicate	Recipient	Patient2	Cause	Asset
Stimulus	Beneficiary			
Attribute	Material			

Figure 3: Thematic Role Groupings for Arg1 in the experiments on arguments with different verb independency.

- Arg 2:

Group 1	Group 2	Group 3	Group 4	Group 5
Recipient	Extent	Predicate	Patient2	Instrument
Destination	Asset	Attribute	Product	Cause
Location		Theme		Experiencer
Source		Theme1		Actor2
Material		Theme2		
Beneficiary		Topic		

Figure 2: Thematic Role Groupings for the experiments on linked lexical resources; and for Arg2 in the experiments on arguments with different verb independency.

Results

- WSJ:

System	Precision	Recall	F1
Arg1-Original	89.24	77.32	82.85
Arg1-Mapped	90.00	76.35	82.61
Arg2-Original	73.04	57.44	64.31
Arg2-Mapped	84.11	60.55	70.41

- Brown Corpus:

System	Precision	Recall	F1
Arg1-Original	86.01	71.46	78.07
Arg1-Mapped	88.24	71.15	78.78
Arg2-Original	66.74	52.22	58.59
Arg2-Mapped	81.45	58.45	68.06

Conclusion

- Results confirm hypothesis that PropBank labels augmented with VerbNet groups provides for more consistent training instances, which would generalize better to new genres

- Future: map the PropBank-ed Brown Corpus to VerbNet as well, to allow for more thorough testing of hypothesis