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.”

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

(l / live-01 :mode imperative
 :ARGO (a / :ARGO)
 :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
“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
## Overall:

<table>
<thead>
<tr>
<th>System</th>
<th>Precision</th>
<th>Recall</th>
<th>F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original</td>
<td>90.65</td>
<td>85.43</td>
<td>87.97</td>
</tr>
<tr>
<td>Mapped</td>
<td>88.85</td>
<td>84.56</td>
<td>86.65</td>
</tr>
</tbody>
</table>

Table 1: Overall SRL System performance using the PropBank tag set ("Original") and the augmented tag set ("Mapped")
**Args1&2**

- **Arg1:**

  - Table 1: Thematic Role Groupings for Arg1 in the experiments on arguments with different verb independence.

- **Arg2:**

  - Table 2: Thematic Role Groupings for the experiments on linked lexical resources; and for Arg2 in the experiments on arguments with different verb independence.
Results

- **WSJ:**

<table>
<thead>
<tr>
<th>System</th>
<th>Precision</th>
<th>Recall</th>
<th>F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arg1-Original</td>
<td>89.24</td>
<td>77.32</td>
<td>82.85</td>
</tr>
<tr>
<td>Arg1-Mapped</td>
<td>90.00</td>
<td>76.35</td>
<td>82.61</td>
</tr>
<tr>
<td>Arg2-Original</td>
<td>73.04</td>
<td>57.44</td>
<td>64.31</td>
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<tr>
<td>Arg2-Mapped</td>
<td>84.11</td>
<td>60.55</td>
<td>70.41</td>
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</tbody>
</table>

- **Brown Corpus:**

<table>
<thead>
<tr>
<th>System</th>
<th>Precision</th>
<th>Recall</th>
<th>F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arg1-Original</td>
<td>86.01</td>
<td>71.46</td>
<td>78.07</td>
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<tr>
<td>Arg1-Mapped</td>
<td>88.24</td>
<td>71.15</td>
<td>78.78</td>
</tr>
<tr>
<td>Arg2-Original</td>
<td>66.74</td>
<td>52.22</td>
<td>58.59</td>
</tr>
<tr>
<td>Arg2-Mapped</td>
<td>81.45</td>
<td>58.45</td>
<td>68.06</td>
</tr>
</tbody>
</table>
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