ASKNet: Creating and Evaluating Large Scale Integrated Semantic Networks

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6 June, 2008
Goals

- Extract info from multiple natural language sources.
- Combine info into single unified resource.
- Develop methodology for evaluating resulting resources.
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- Extract info from multiple natural language sources.
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Parsing: Clark & Curran Parser

- Based on CCG lexicalised grammar formalism.
- Lexicalised grammar & Supertagger using finite-state tagging techniques combine to make an efficient and robust parser.
- Built in Named Entity Recognition tool.
Semantic Analysis: Boxer

- Semantic Analysis based on Discourse Representation Theory.

Sample output for input sentence: “John scored a great goal.”
The Network Structure
Information Integration

- Combining document level fragments into a cohesive network.
- Greatly increases the potential usefulness of networks.
- Often overlooked in other automated approaches.
Residents of Region C have Symptom A.
Residents of Region C have Symptom A. Person E, authorised to Chemical F into Water Supply.
Residents of Region C have a symptom A.

City D is located in Region C.

Person E is authorised to add Chemical F into the Water Supply.

City D's mayor is in charge of Person E.
Introduction

Tools

The Network

Information Integration

Evaluation

Conclusion
Introduction

The Network

Information Integration

Evaluation

Conclusion

- City D located to Person E
- Residents of Region C have Symptom A
- Chemical F authorised into Water Supply
- Symptom A associated with Disease B
The Update Algorithm

- The Core of ASKNet's information integration.
- Based on Spreading Activation theory. \((Collins & Loftus 1975)\)
- Determines semantic similarity between nodes.
- Localises to small area of the network.
Evaluation

- Build networks based on DUC documents.
- Define network “core” to be evaluated.
- Build core.
- Human analysis of core precision.
### Evaluation Results

<table>
<thead>
<tr>
<th>Topic</th>
<th>Eval 1</th>
<th>Eval 2</th>
<th>Eval 3</th>
<th>Avg</th>
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</thead>
<tbody>
<tr>
<td>Elian Gonzalez</td>
<td>88.2%</td>
<td>70.1%</td>
<td>75.0%</td>
<td>77.6%</td>
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<tr>
<td>Galileo Probe</td>
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<td>Viruses</td>
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<td>71.9%</td>
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<tr>
<td>Vladimir Putin</td>
<td>90.3%</td>
<td>82.8%</td>
<td>94.7%</td>
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<tr>
<td>West Bank</td>
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<tr>
<td><strong>Average Precision:</strong></td>
<td></td>
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<td></td>
<td><strong>79.1%</strong></td>
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</tbody>
</table>
Conclusion

- ASKNet able to combine info from multiple texts into a single resource.
- Novel evaluation metric.
- Promising results: almost 80% precision for network core.
Future Work

- Task based evaluation.
- New domains (bio-medical, web pages).
- Novel uses for networks.

All evaluation materials are available at:
www.brianharrington.net/asknet