CS 378 Lecture 21

Today
- QA intro
- Knowledge base QA
- Semantic parsing
- Combinatory Categorial grammar (CCG)

Recap: Attention in seq2seq models

\[
\text{attention weights (probs)} \quad \alpha = \text{softmax}(h^T W x_i) \\
\overline{c} = \sum_i \alpha_i \overline{x}_i \\
\prod_{\text{Je}}
\]
Announcements

- A5 due Thursday
- Final proj

Question Answering

1. When was Samuel L Jackson born?
   “factoid” question

How to answer? Use a knowledge base

question → query in a formal language → execute that

want a summary/description information retrieval (IR)
3) Who was the villain in Iron Man 1?

Somewhere in the middle

Knowledge base probably doesn’t have “movie villains”

But there is a short answer!

Solution: combination of IR (fetch relevant webpages) + extract info

Q → Google → ⌊ ⌋

Obadiah Stane... serves as the main antagonist in Iron Man 1.

Final project

Today: Question #1
**Knowledge Base QA**

1. Convert question to a formal semantic representation
2. Execute that against a KB

KB: database of info

<table>
<thead>
<tr>
<th>name</th>
<th>birthday</th>
<th>movies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samuel L</td>
<td>12/21/48</td>
<td>Pulp Fiction, Captain Marvel</td>
</tr>
<tr>
<td>Jackson</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brie Larson</td>
<td>10/1/89</td>
<td>Captain Marvel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How to do this with python?

```python
map(lambda r: r.bday, filter(lambda r: r.name == "Samuel L Jackson"))
```

Goal: map from Q to this piece of code
Use a formal representation called lambda calculus

\[ \lambda d. \text{bday}(d, \text{Samuel L Jackson}) \]

What movies did Brie Larson star in?

\[ \lambda m. \text{movie}(m) \wedge \text{stars In}(m, \text{Brie Larson}) \]