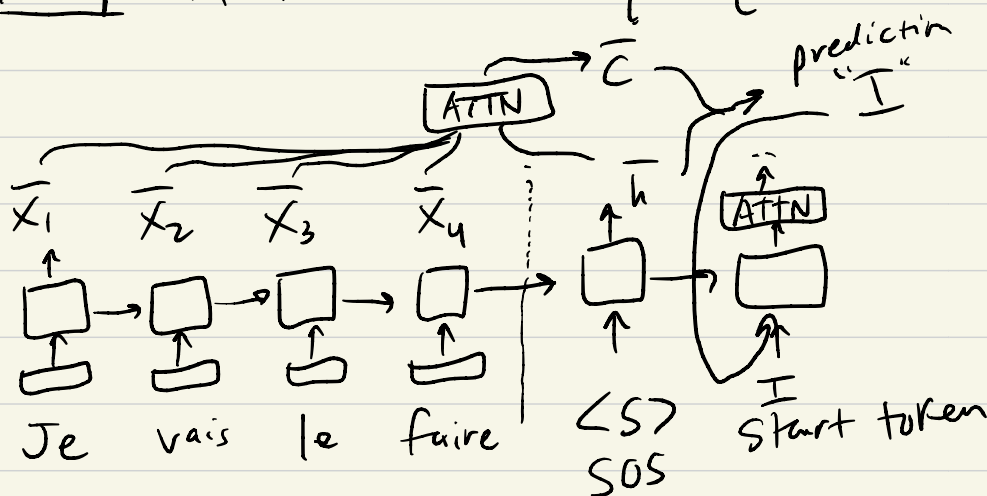# CS 378 Lecture 21

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

Recap Attention in seq2seq models

attention weights (probs) $\alpha = \text{softmax}_i(\bar{h}^T W \bar{x}_i)$

$$\bar{c} = \sum \alpha_i \bar{x}_i$$

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 → execute that
formal language   to get answer

② Who is Iron Man?   ✗ out of
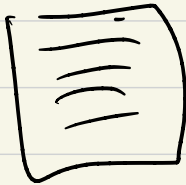want a summary/description   scope
information retrieval (IR)

(3) Who was the villain in Iron Man 1?

Some where 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 →   Answer
   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

name	birthday	movies
Samuel L Jackson	12/21/48	Pulp Fiction, Captain Marvel,...
Brie Larson	10/1/89	Captain Marvel,...

How to do this with python?

$$map(\lambda r : r.bday, \; filter(\lambda r : r.name = \text{"Samuel L Jackson"}))$$

↙ rows

Goal: map from Q to this piece of code

Use a formal representation called
lambda calculus

$\lambda d.$ bday $(d,$ Samuel L Jackson$)$

$\underset{\text{predicate}}{\underbrace{\big(}}$

What movies did Brie Larson star in?

$\lambda m.$ movie $(m) \wedge$ StarsIn $(m,$ Brie Larson$)$