Definition Learning

FutureAI Final Project

Colin McDonnell

how humans learn

definition

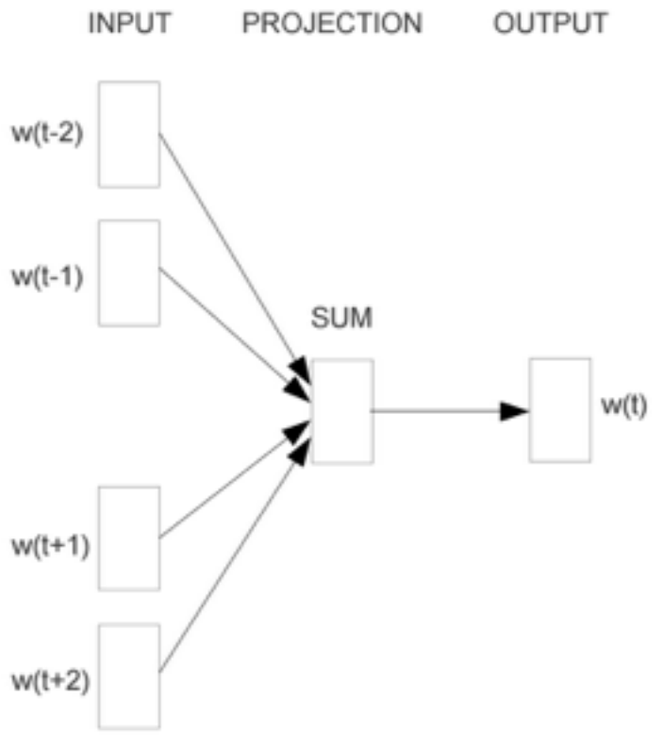
see a few usage examples

how machines learn

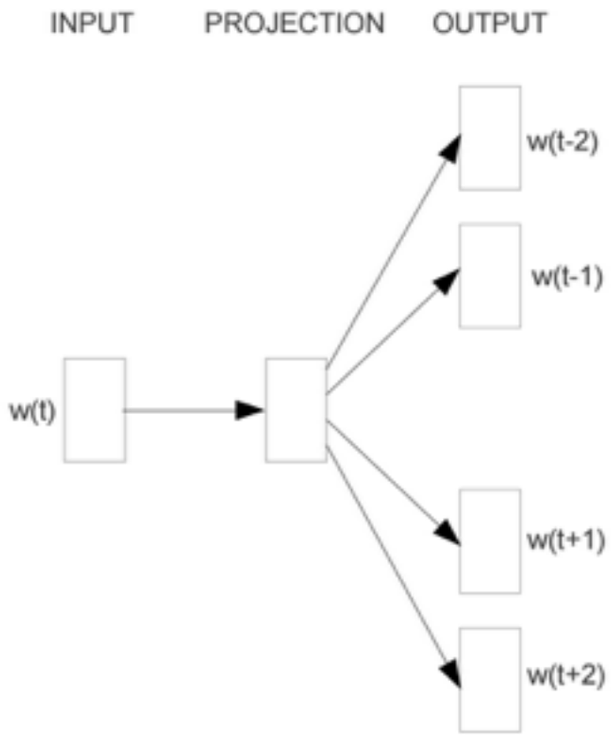
prediction

see a few hundred million usage examples

how machines learn



CBOW



Skip-gram

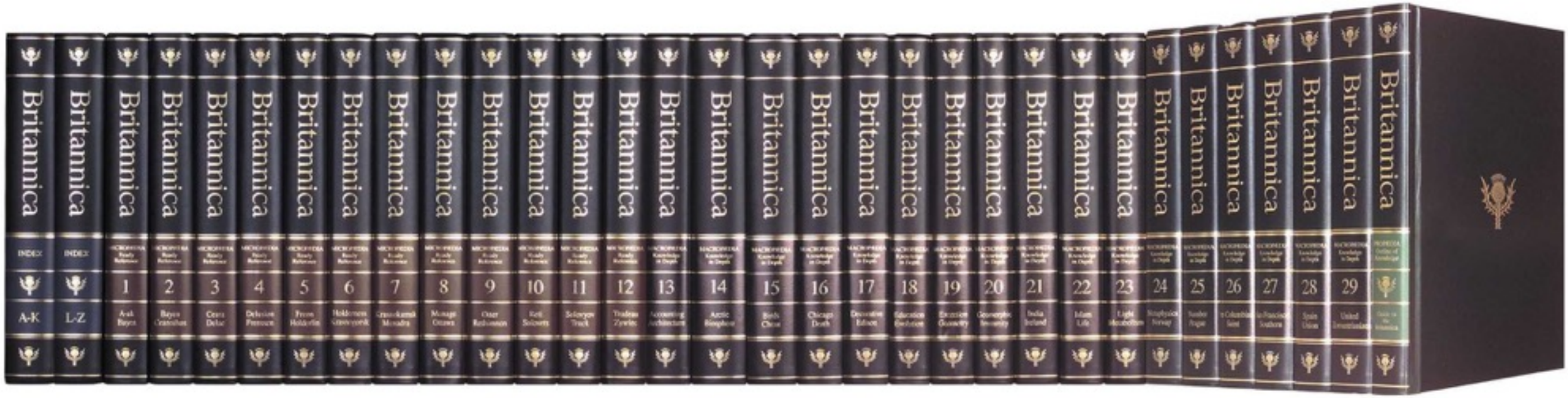
how machines learn

Billion Words Corpus

x2000

how machines learn

Billion Words Corpus



x23

goal

teach machines to learn like us

approach

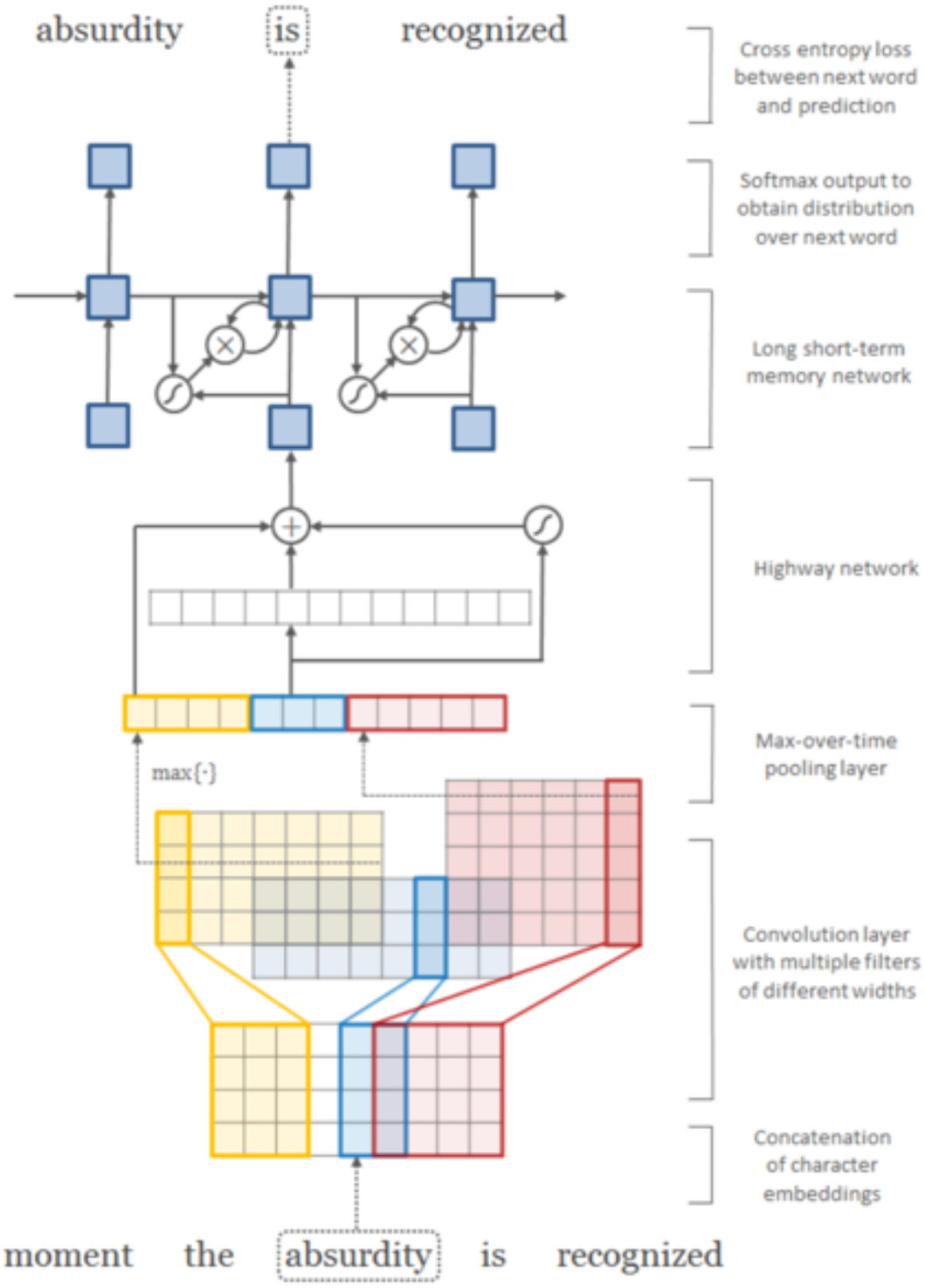
download Webster's Dictionary

```
{    defn : ["extending", "far", "down", "from", "the", "top", "or", “surface”],
     word : “deep”  }
```

pass definition words into network one at a time

final activation should be close to true word embedding

how to handle variable length inputs

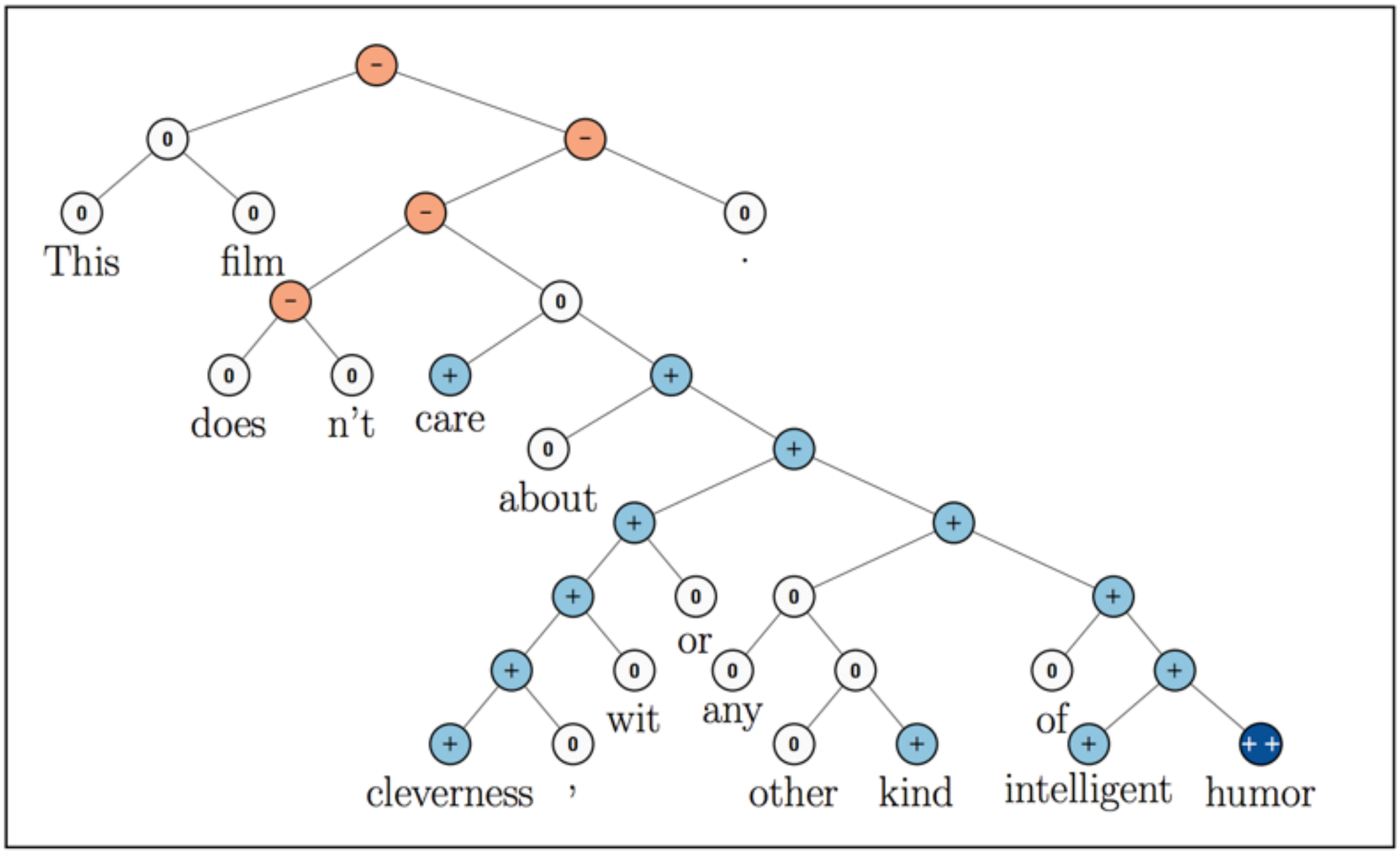


Character-Aware Neural Language Models

Yoon Kim, Yacine Jernite, David Sontag, Alexander M. Rush

(Submitted on 26 Aug 2015 (v1), last revised 1 Dec 2015 (this version, v4))

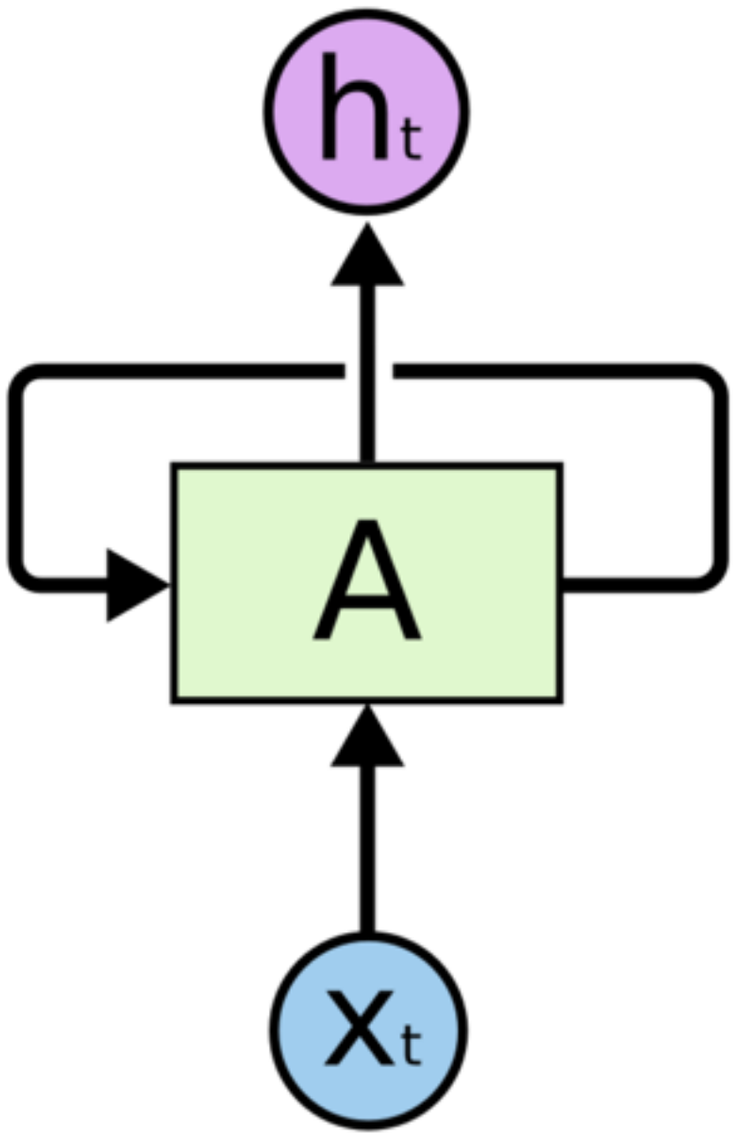
how to handle variable length inputs



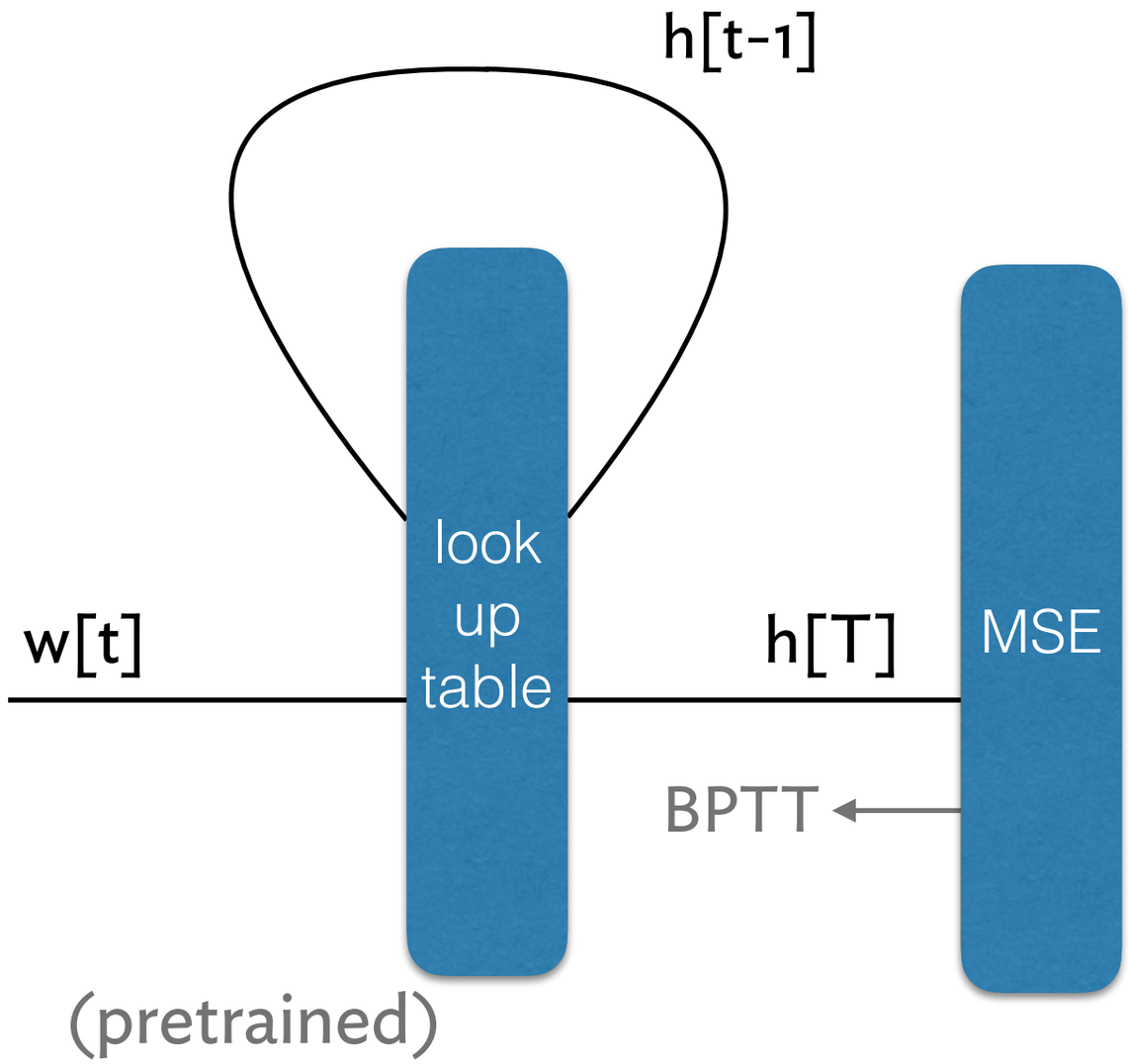
Recursive Deep Models for Semantic Compositionality Over a Sentiment Treebank

Richard Socher, Alex Perelygin, Jean Y. Wu, Jason Chuang, Christopher D. Manning, Andrew Y. Ng and Christopher Potts
Stanford University, Stanford, CA 94305, USA

how to handle variable length inputs



architecture



results

days of continuous failure and misery

results

evaluation

train on half of the dataset

see mean squared error of predicted embeddings for words in test set

calculate perplexity

test embeddings on analogical reasoning tasks

future work

curriculum learning: order matters

DAGify the dictionary

find axiomatic subset of language

learn that subset in an unsupervised way or with innate biases

pair with “definition detector” for high-impact updates

Turing Test system

working memory

- hierarchical SFA with increasing time constants

long-term memory

- definition learning + omni-scale skip-gram

recurrent attention mechanism

- over working memory
- over long term memory: associational vector space
- over internal output buffer (DRAW-style)
- over decision to output

text generation from vector representation

- train on SAT grammar questions, use as training signal
- self-play for AI chatbots?