“I want to talk to you”

Language models for poetry

Outline

- Methods
- Language Models
- What I did
- What others did
- What else

Methods

- Rule-Based
  - Case-based reasoning [Gervas, 2000]
  - Template-based generation [Toivanen et al., 2012]
  - Constraint Satisfaction [Toivanen et al., 2013]
- Statistical Approaches

Language Model

- Language Models allow us to predict the probability of observing a sentence. i.e. $P(w_1,\ldots,w_m) = \prod P(w_i|w_1,\ldots,w_{i-1})$
- we speak in sequences, RNNs learn sequences, ergo RNNs learn how we speak.
  - "He went to buy some bread"

    w_1 ..... w_{i-1} w_i
- **Andrej Karparthy** has a great post that demonstrates what language models are capable of.
- His models generate anything from Shakespeare to Linux Code.

```c
static int indicate_policy(void)
{
    int error;
    if (fd == MARN_EPT) {
        /*
         * The kernel blank will coeld it to userspace.
         */
        if (ss->segment < mem_total)
          unblock_graph_and_set_blocked();
        else
          ret = 1;
        goto bail;
    }
    segaddr = in_SB(in.addr);
    selector = seg / 16;
    setup_works = true;
    for (i = 0; i < blocks; i++) {
        seq = buf[i++];
        bpf = bd->bd.next + i * search;
        if (fd) {
          current = blocked;
        }
    }
    rw->name = "Getjbbregs";
    bprm_self_clearl(&iv->version);
    regs->new = blocks[(BPF_STATS << info->historidac)] | PFMR_CLOBATHINC_SECONDS << 12;
    return segtable;
}
```

474MB of C code

3 Layers LSTMs

10 Billion params

few days on GPU

source:http://karpathy.github.io/2015/05/21/rnn-effectiveness/

Language Models (cont'd)

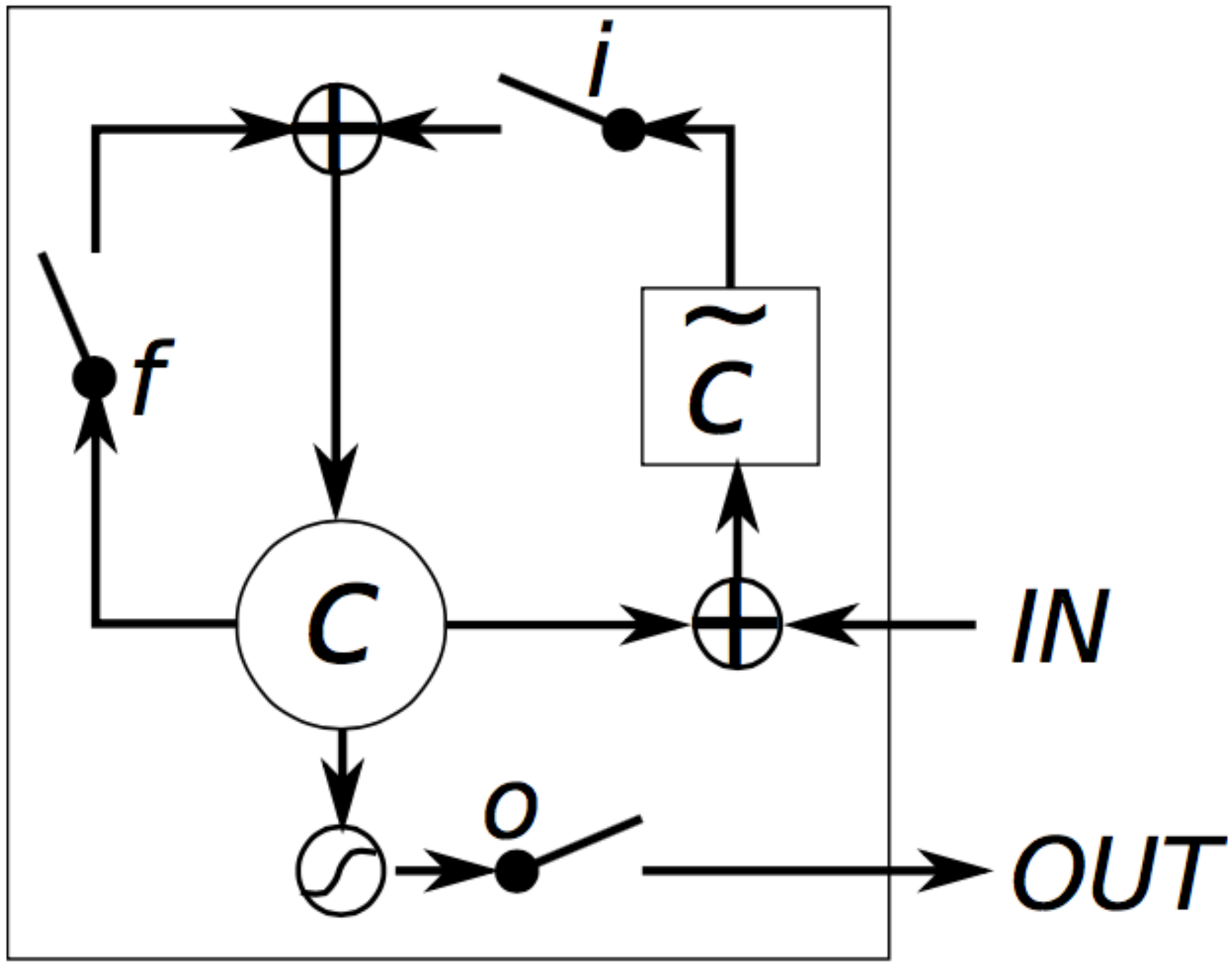
- Language Models allow us to predict the probability of observing a sentence. i.e. $P(w_1,\ldots,w_m) = \prod P(w_i|w_1,\ldots,w_{i-1})$

- use this language model to generate text as well as scoring mechanism (choose between candidates for an input sequence)

- long-term dependency problem –> next slide

Go Deeper or Go Home

- LSTMs
- GRUs
- …



What I Did

Language Models: Beatrix

- Beatrix is gonna be a famous poet like “Hafez” + “Sa’di” + “khayam” + …

- The Big Question, Data?!

- The Big Answer:
  - 120 Mb Data Set
  - 1,384,003 verse
  - 11,779,034 sequences

Ganjoor

Language Models: Beatrix

start چون درگذرم به باده شوئید مرا ***middle*** تلقین ز شراب ناب گوئید مرا ***end***

رباعی۵

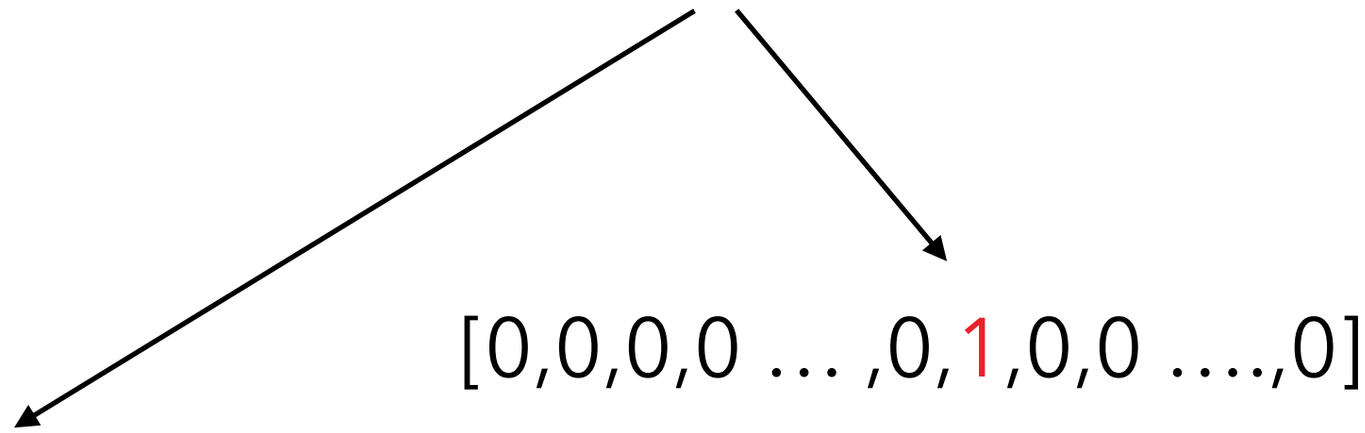
sequence of
length 5

start Ah, with the Grape my fading Life provide
middle and wash my Body whence the Life has died **end**

Language Models: Beatrix

with the Grape my fading

چون درگذرم به باده شوئید مرا



[0,0,0,0 … ,0,1,0,0 ….,0]

[-0.00449447, -0.00310097, 0.02421786, …]

word2vec: word & phrase representation

Language Models: Beatrix

start مرد هنرور mid راضی به هر سوکه دراین unk end

start ازآن که دراین unk mid زبیم وبه زیر وزبر end

start چون تورا به هر دوعالم mid که تا به نزدیک و...

start the artist mid satisfied by all in unk end

start .... in unk mid from fear and above and beneath end

start since you in both worlds mid that close

after 4 iterations

start رازساحره‌ی گناهانشان بشنیدی mid به هرسو به زیر وباغ وحور end

start سمین گفت نامه‌ام چوحاجت هواخواهان کلاه mid بشتابی که روزمیرسد خدایانگاه دولت end

start ببخشش ای رحیمای کریم mid ابن الکریم ابن المرالعلم الله end

start مردم ازنورآن جان باشد mid چون نگاری است که این معانی می‌یابد end

start کوته شده ست فاصله دست mid به یک دم ازآن زلف تو end

start heard mysteries behind the illusions of their sins mid every direction, paradise and angles end

start “my letter the need of servants” said Simin mid hurry, as the god of earth appeared end

start forgive my sins god almighty mid king of mankind, the lord of mankind end

start out of the reach of my hand mid is a brew of your hair end

after 10 iterations

What Others Did

- “I want to talk to you”: See the creepy, romantic poetry that came out of a Google AI system [Bowman et al., 2016]

- Automatically Generating Rhythmic Verse with Neural Networks [Hopkins et al., 2016]

- Andrej Karparthy’s blog post

Generating Sentences from a Continuous Space[Bowman et al.,2016]

- Google Brain was trying to find a way to make its search and apps understand and adapt the way people speak by feeding 2,865 romance novels to an AI system.

- The researchers presented the system with two sentences from the books and asked it to generate sentences that could create a meaningful progression between the two.

- might say: Create 13 sentences that morph from “I’m fine” to “But you need to talk to me now.”

- General LM generates sentences one word at a time and does not work from an explicit global sentence representation

- A VAE for sentence: single layer LSTM for encoder -> generating coherent and diverse sentences

Generating Sentences from a Continuous Space[Bowman et al.,2016]

no.
he said.
“no,” he said.
“no,” i said.
“i know,” she said.
“thank you,” she said.
“come with me,” she said.
“talk to me,” she said.
“don’t worry about it,” she said.

he was silent for a long moment.
he was silent for a moment.
it was quiet for a moment.
it was dark and cold.
there was a pause.
it was my turn.

Automatically Generating Rhythmic Verse

- The first approach uses a neural language model trained on a phonetic encoding to learn an implicit representation of both the form and content of English poetry.

- This model can learn poetic devices such as **rhyme**, **rhythm** and **alliteration**. ("Peter Piper picked a peck of pickled peppers")

- + **assonance** (Some v***o***dka that'll jumpst***ar***t my h***ear***t quicker than a sh***o***ck when I get sh***o***cked at the h***o***spital by the d***o***ctor when I'm n***o***t co***o***perating… - Eminem, Without Me)

- Phonetic encoding (repr by 40 basic acoustic signs)

Automatically Generating Rhythmic Verse

Table 3.1: Phonetic Encodings

Word	Character #	Phonetics	Phoneme #
Blizzard	8	B L IH Z ER D	6
Urchin	6	ER CH AH N	4
Proffered	9	P R AA F ER D	6

word -> phonetic encoder -> LSTMs -> Softmax

What is written (content) + How it is written (form)

Automatically Generating Rhythmic Verse

The morning flames of them your virtues hold though fears
those music when her beating cold

———————————

And humble and their fit flees are wits size but that one
made and made thy step me lies

———————————

He thinks to right as death thou never come I must beneath
the silent tears shall come

———————————

Cool light the golden dark in any way the birds a shade a
laughter turn away

———————————

Then adding wastes retreating white as thine She watched
what eyes are breathing awe what shine

———————————

But sometimes shines so covered how the beak Alone in
pleasant skies no more to seek

Language Models: Nietzsche

philosopher; porere the the the the the the serese the the the the the the the the the the the the the the the the the the the the the the the the the the ther of andere of the the the the the the the the the the the the the the the the the the the the the the the the the the the the ses the the the sothe the the the the the the th …

after 1 iterations

perhaps" in short, these of the spirit weirs to get along all the"
general usual and give superior to livit, and a state of a such pressure of
coeprmhendity the things which to believe that this is a religious effect: and
has always be nothing before the belief in general to the moral entire plato, also the
amouration of value to the
present connection of which he is good greater
to experience is so that i

after 56 iterations

What Else

- Something that captures both content and form.
- Which means learning both orthographic and phonological features.
- Phonetic based word embeddings may help.
- rhythmic long-short-term-memories 🙄🤔

Thanks