

- Draw $(x, y) \sim D$
- \uparrow
 sentence
 \uparrow
 parse tree

Current parser π

stack = $\{\}$, buffer = < sentence > } σ

$$\hat{a} \leftarrow \pi(\sigma)$$

$a^* \leftarrow$ best possible a from σ

minimal achievable loss.

execute \hat{a}

add (σ, a^*) to training data

repeat

BRUTE FORCE SEARCH.

$S = \langle \text{root} \rangle$

$b = \langle \text{he wrote her a letter .} \rangle$

Shift

$S = \langle \text{root, he} \rangle$

$b = \langle \text{wrote ...} \rangle$

LA_{sb}:

$S = \langle \text{root} \rangle$

$b = \langle \text{wrote ...} \rangle \quad A = \{ (\text{wrote} \xrightarrow{\text{sb}} \text{he}) \}$

RA_{prod}

$S = \langle \text{root} \xrightarrow{\text{wrote}} \rangle$

$b = \langle \text{her a ...} \rangle \quad A = \{ (\text{wrote} \rightarrow \text{he}), (\text{root} \rightarrow \text{wrote}) \}$

$a^* = RA_{\text{JOBJ}}$

$\hat{a} = \pi(\dots) = \text{SHIFT} \rightarrow \begin{matrix} \text{makes } \text{wrote} \rightarrow \text{her} \\ \text{impossible.} \end{matrix}$

$S = \langle \text{root, wrote, her} \rangle \quad b = \langle \text{a letter .} \rangle \quad A = \{ \dots \}$

$a^* = ?$

Suppose $|a^*| > 1$

① Randomize over possible a^* .

② Pick the one that π "likes"

π : 1st: Reduce, 2nd: Shift, 3rd: RA, 4th: LA
 $a^* = \{ \text{Shift, LA} \}$

① What else (tasks) admit ~~an optimal~~
an efficiently computable optimal action

② What if you can't?

③ @ sequence generation with string edit
distance as loss function.

④ ???

ref: the cute cat plays fetch .

sys: the cat [plays fetch .
[cute plays fetch .] ?

sys: cute cat the [

① Data as demonstrator.

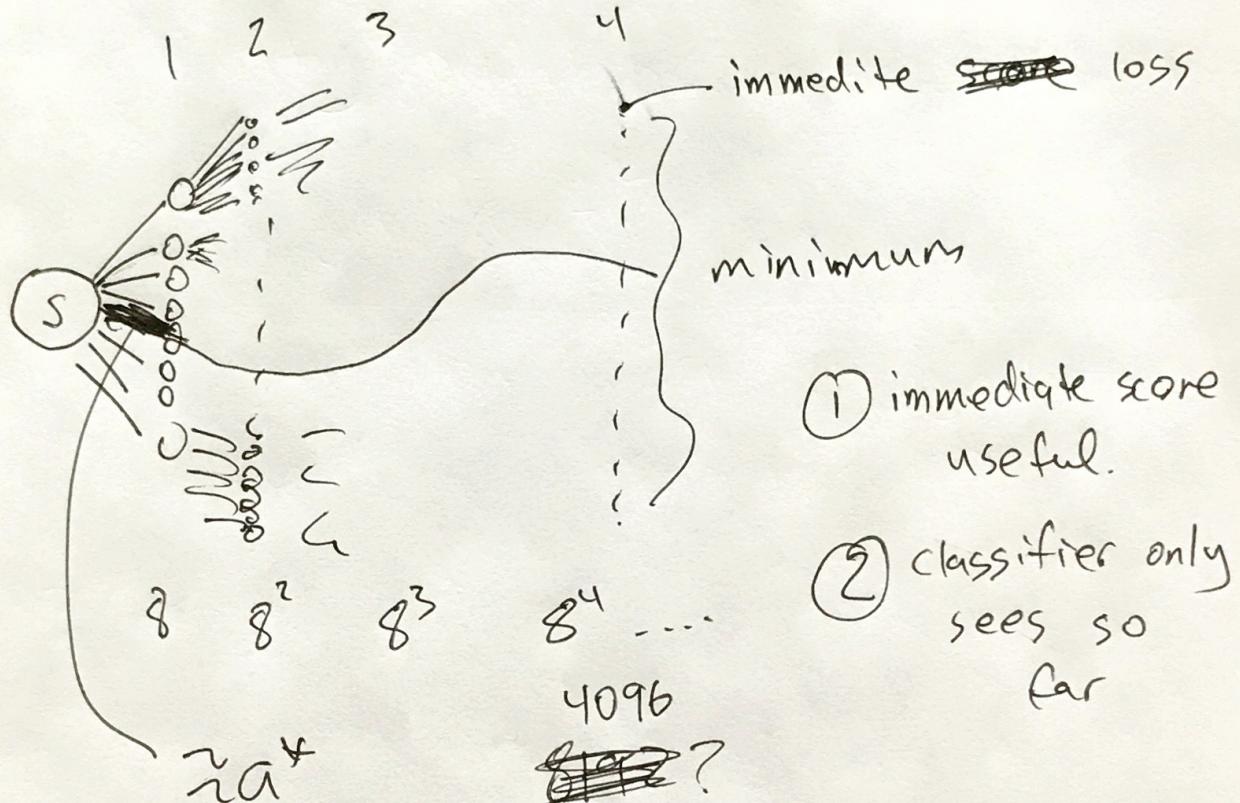
the cat cat

cute cat the plays

② complete current suffix

the cat [plays

② what if you can't?

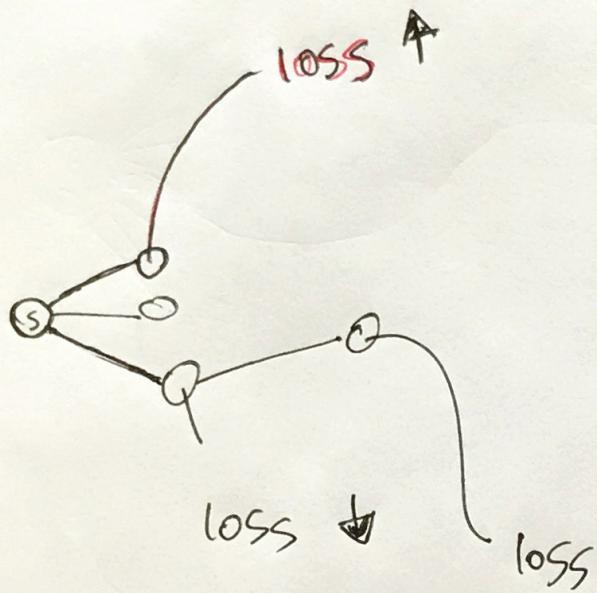


Ⓐ explore bad paths less

... so we can ...

Ⓑ explore good paths more deeply

Solution : Monte-Carlo tree search.



Alpha Go, Alpha Zero

"reinforcement learning"

- ① optimal action after potential errors
- ② depur: compute efficiently
- ③ other problems: some heuristic
 - ① hand-built, ② MCTS