Learning a Game Commentary Generator with Grounded Move Expressions

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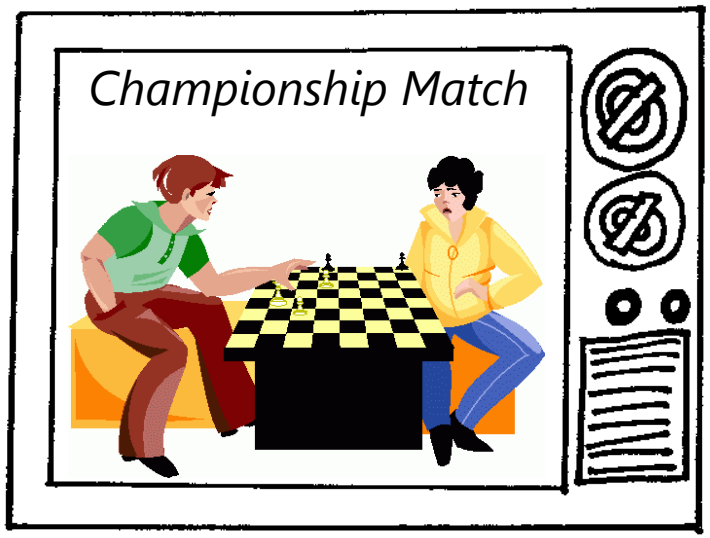
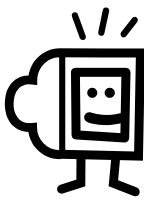
- Using computer game players as
  - an opponent player
    - Chess: stronger than top human players
    - Shogi: as strong as top human players
  - a commentator
    - to know which player is better
    - to know which move is the best

Computer Player as a Teacher



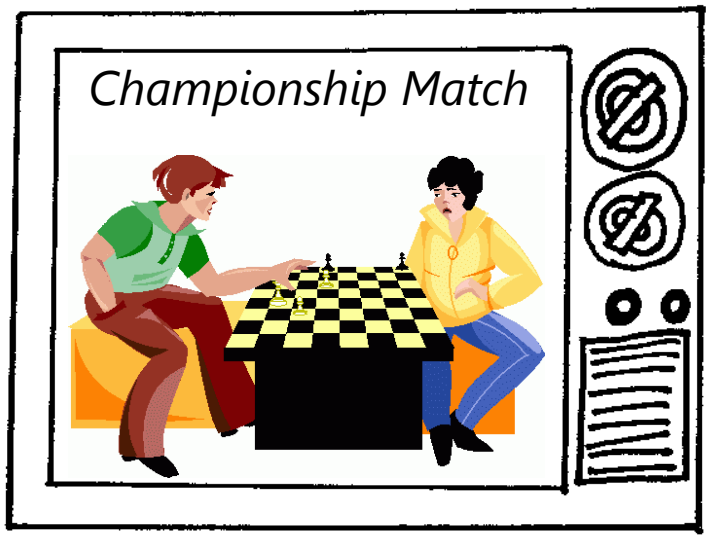


Search Result:
P-4K (+300)
Mate in 15 moves

Bla... ...ase...

Computer
CANNOT Say!!

Human Player as a Teacher



Black is better.
The next move will be P-4K.
White will be mated.

Black is better because…

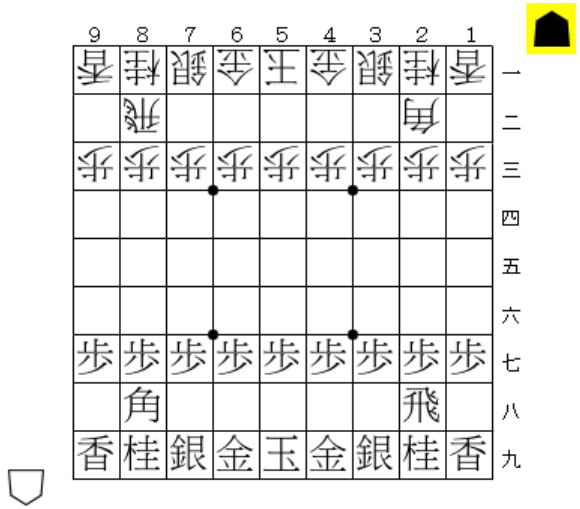
Natural language is easy to understand for humans

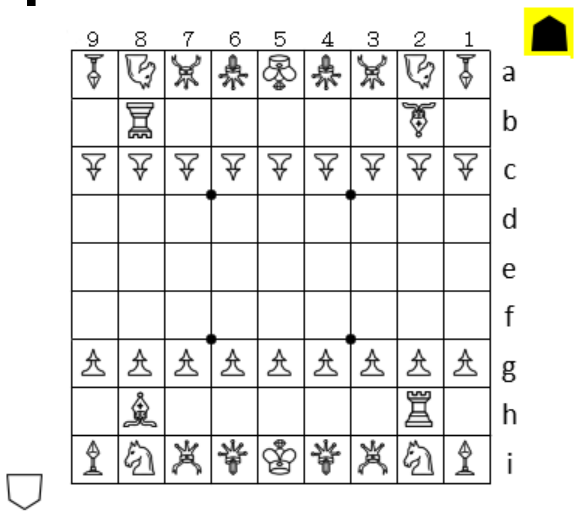
Related Work

- Template-base comment generation [Kaneko, 2012]
  - ex.) *Black will mate from <MOVE>.*
- Our approach:
  - To generate a variety of comments

Shogi

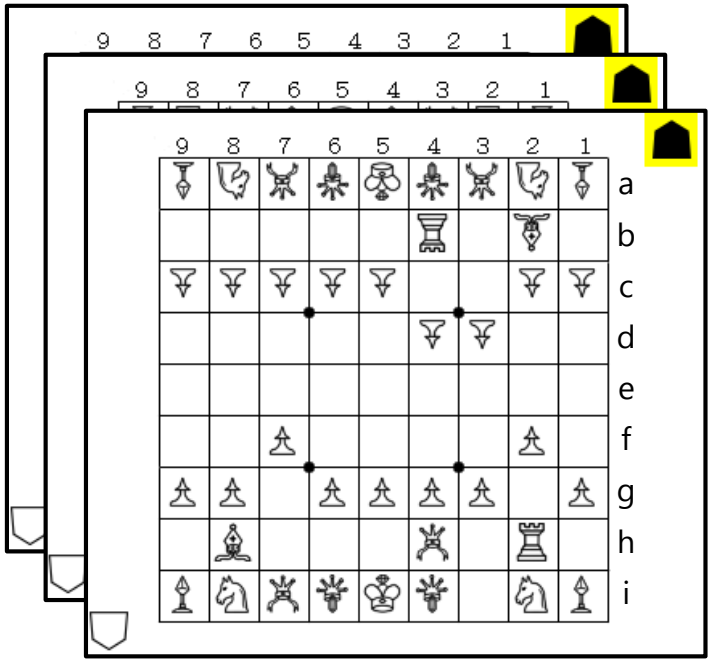
- also known as Japanese chess





9×9 board
to capture the opponent's King (same as Chess)
Comments are written in Japanese

Previous Work [kameko et al., 2014]



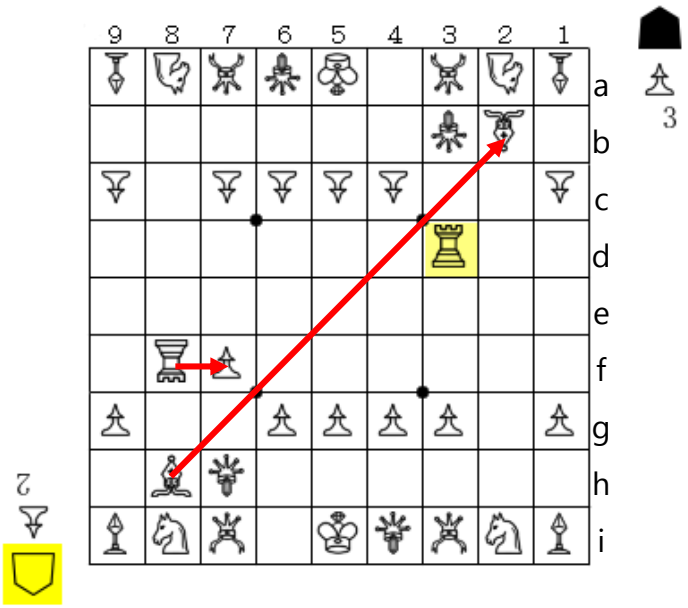
Game states

広瀬は四間に
飛車を振る
(Hirose selected forth-file Rook.)

Commentaries

Automatically Comment Generation Model

Move Expressions and Game State



In this position, if White plays Rx7f to mirror Black, Black will play Bx2b+ and White cannot capture the moved bishop, so White will lose.

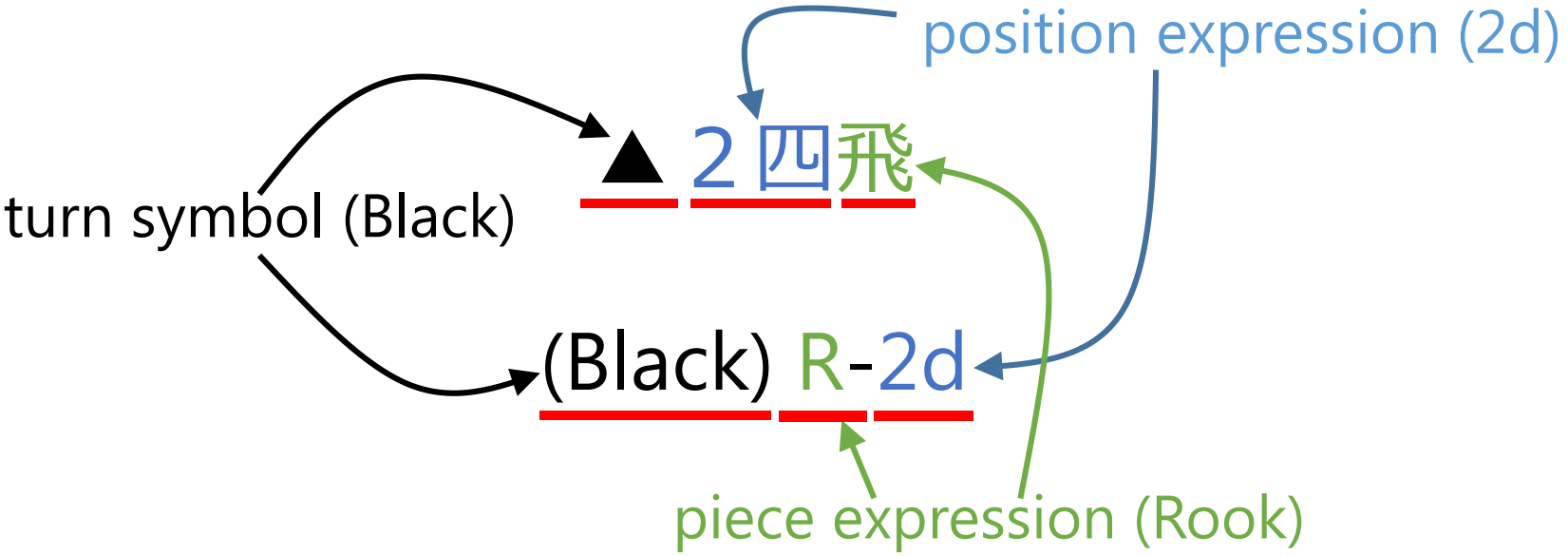
ここで△７六飛のマネ将棋は▲

NOT for the current position

わってしまう。

P-8f
|
Rx8f
|
Rx3d ← (current) *In this position*
|
Rx7f ← *to mirror Black*
|
Bx2b+ ← (after the move,) *White cannot capture the moved bishop*

Move Expression

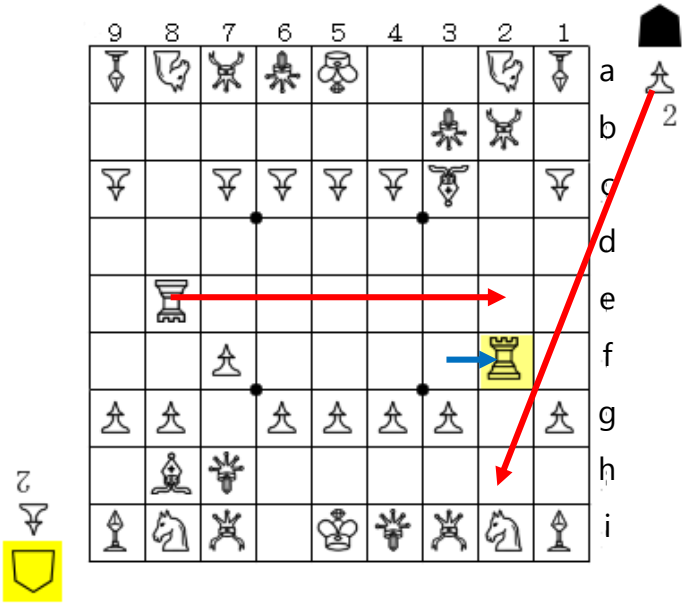


+other information
(promotion, dropping and disambiguation)

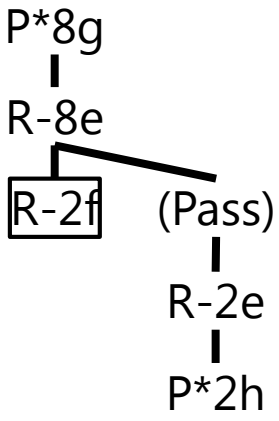
Proposed Method

- Acquisition of state-comment pairs
  - Mapping move expressions to the game tree
- Comment generation
  - Training a model using state-comment pairs

Mapping Move Expressions

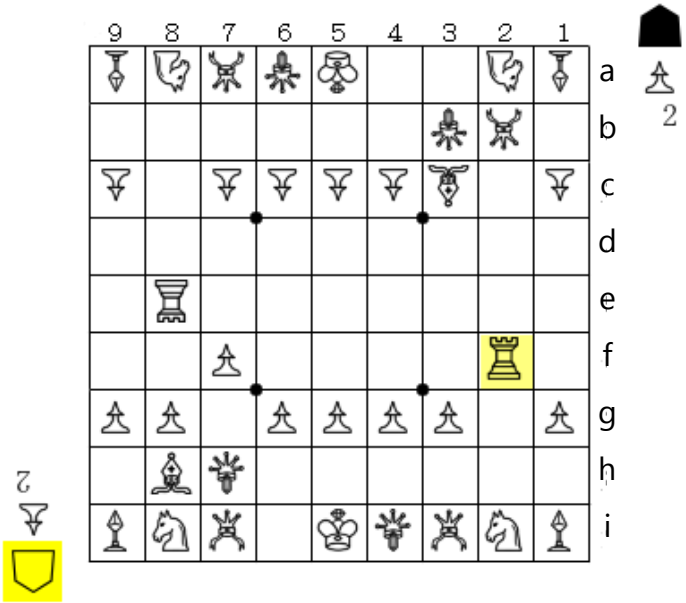


*If White plays R-2e to turn the rook, Black has to play P*2h.*



Mapping Move Expressions

- Input: a position, comments, and the previous two moves



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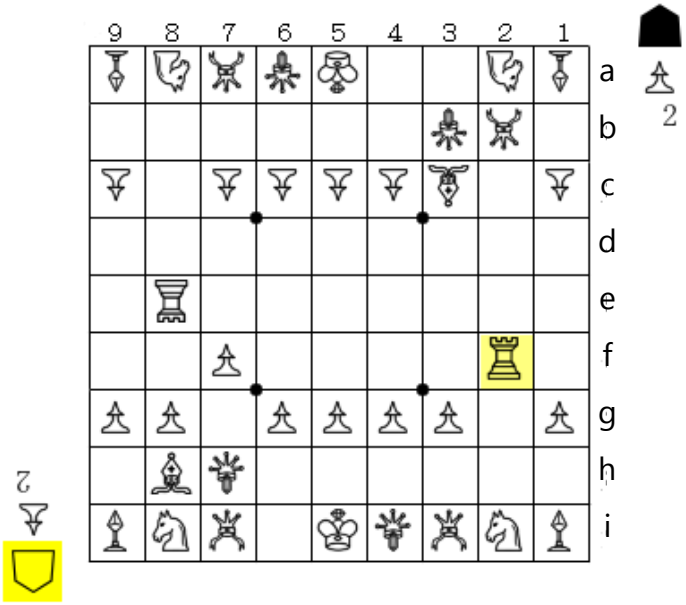
P*8g
R-8e
R-2f

Mapping Move Expressions

- Listing up the legal trees (candidate trees)



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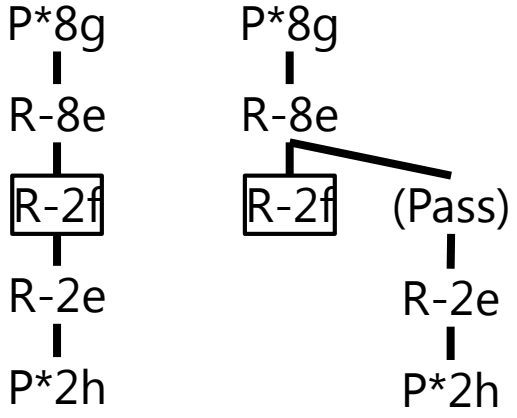
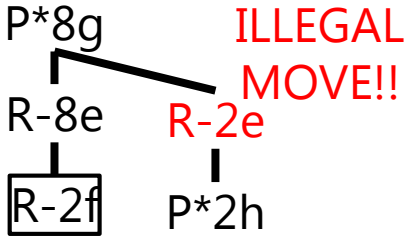
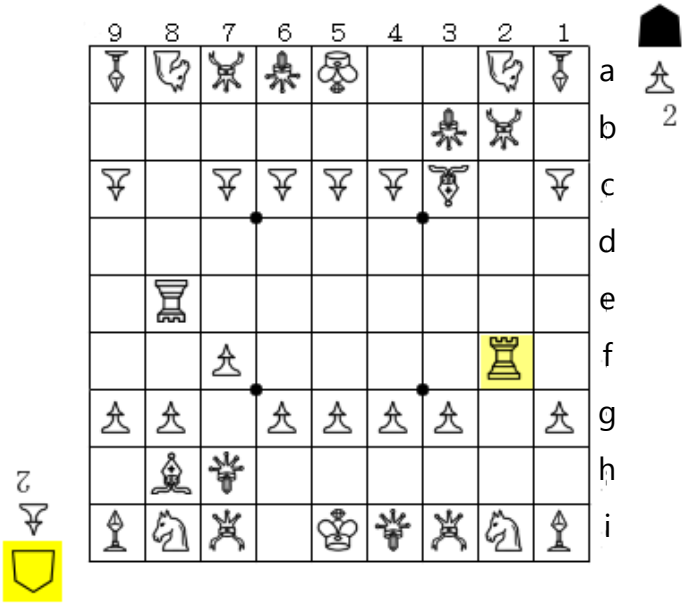




Mapping Move Expressions

- Selecting the right tree (commented tree)



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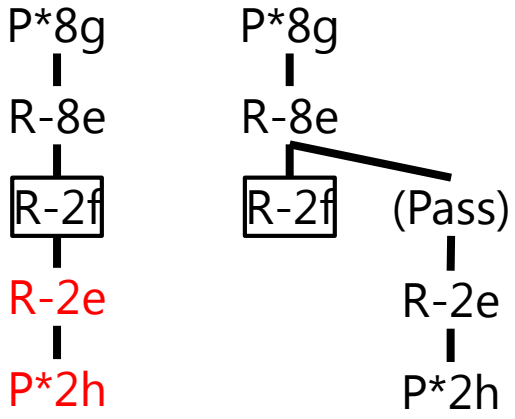
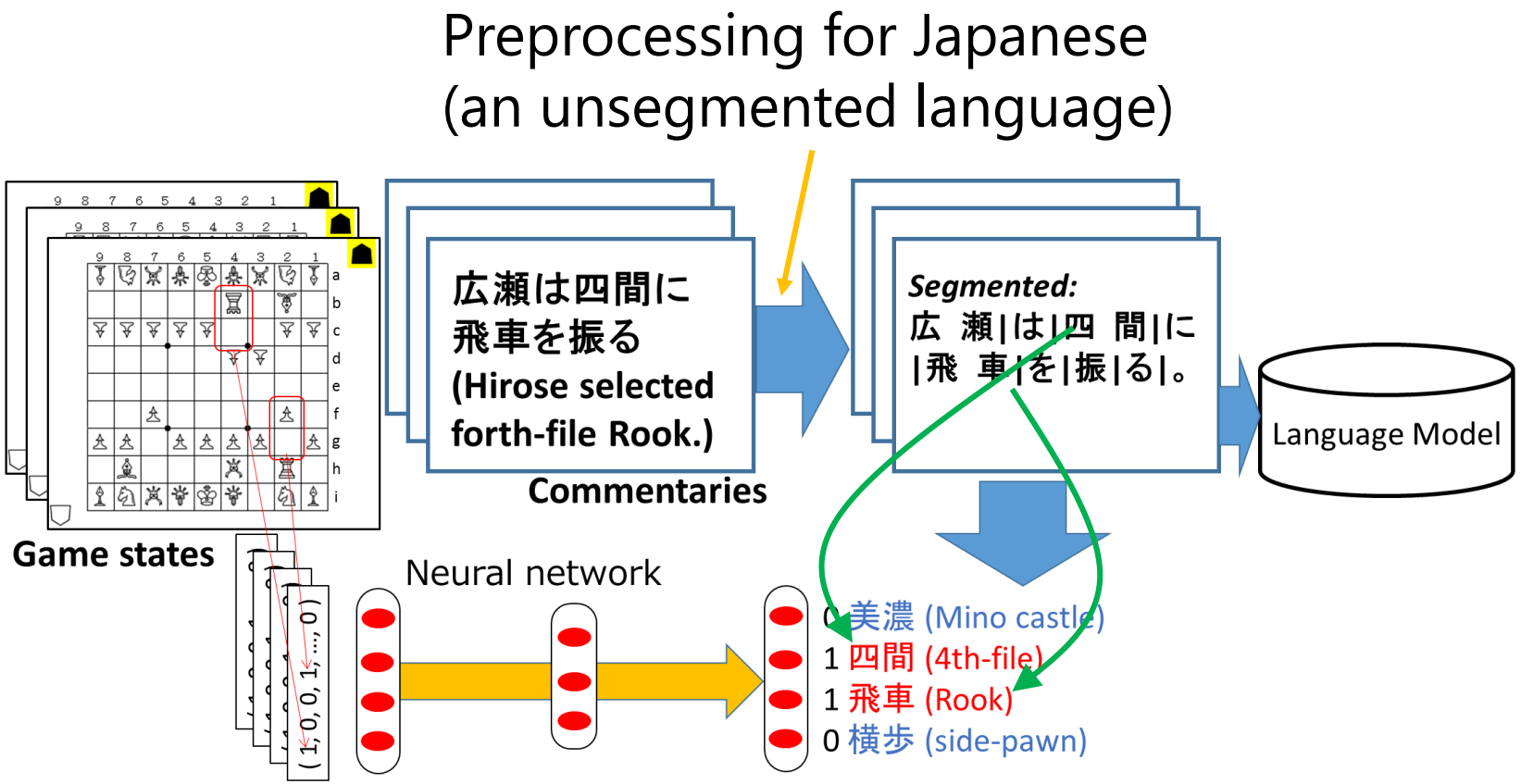


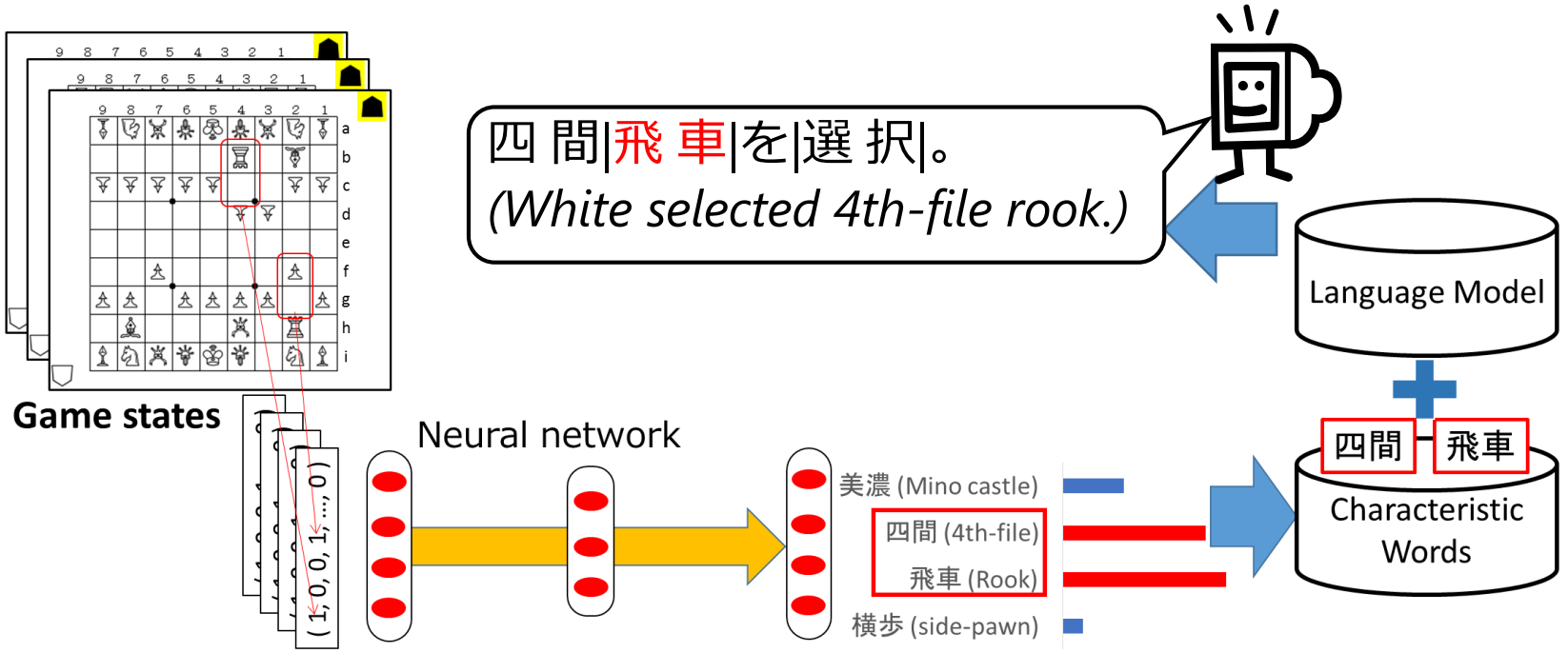
BAD MOVES!!

by a computer program

Overview (Training)



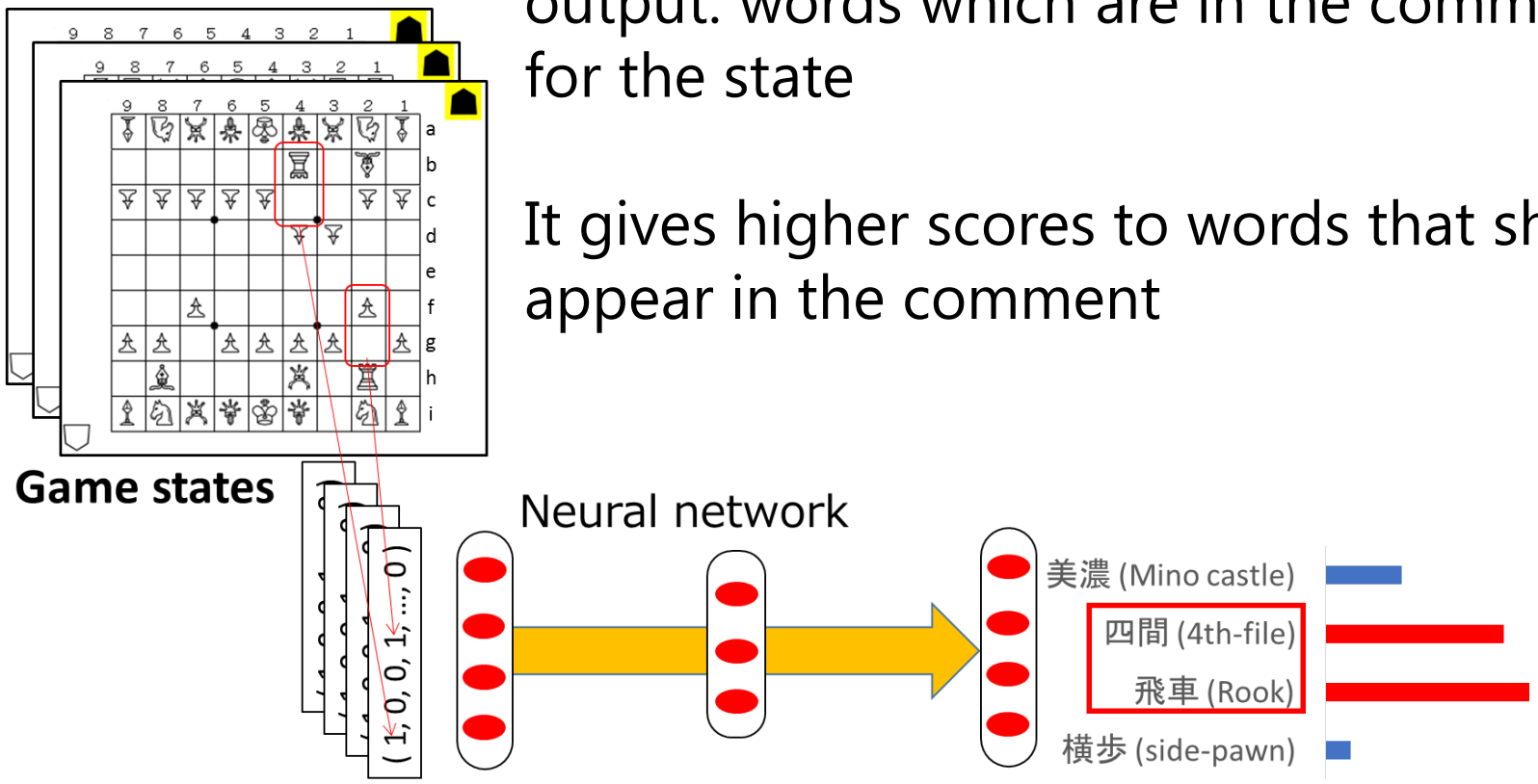
Overview (Generation)



Multi-layer Perceptron

input: a game state
output: words which are in the comment for the state

It gives higher scores to words that should appear in the comment



Log-Linear Language Model

maximize $P(S \mid p)$

$$\simeq P(S_N \mid length(S_N) = n)$$

$$\times \prod_i P(w_i \mid p, w_{i-2}, w_{i-1})$$

$S = w_1, w_2, \ldots, w_n$: a sentence

w_i: i^{th} word of the sentence S

p: a game state (a position or a move)

This is →

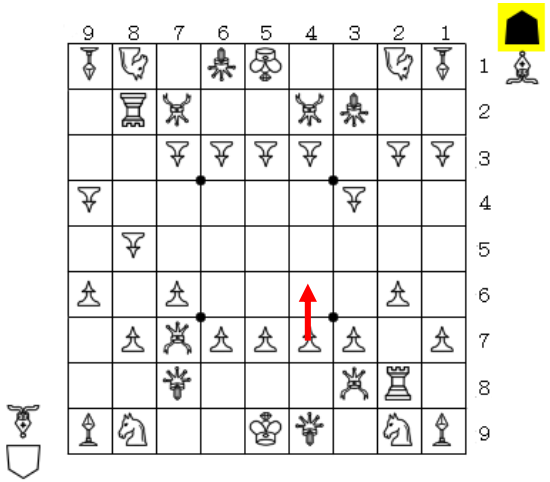
a, an, the, … : ☺

do, walk, … : ☹

Corpus

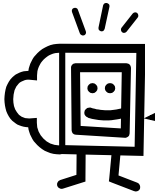
- Game records with comments by human experts
  - Championship matches and preliminary tournaments
  - about 300,000 comments (includes noisy comments)
    - → We acquired 44,166 trees

Generated Comments



Move: P-4f

Word	Score	Word	Score
腰掛け (reclining)	0.99	指 (action)	0.99
方 (plan)	0.99	銀 (silver)	0.98



▲４六歩から腰掛け銀を目指す指し方もあるところだが、
(Black can play P-4f and aim for reclining-silver strategy, but...)

Our system can generate correct sentences for some positions

Summary and Discussion

- We have generated commentaries of Shogi game
  - The error rate is very high

- Future work
  - using richer information when generating
    - result of searching