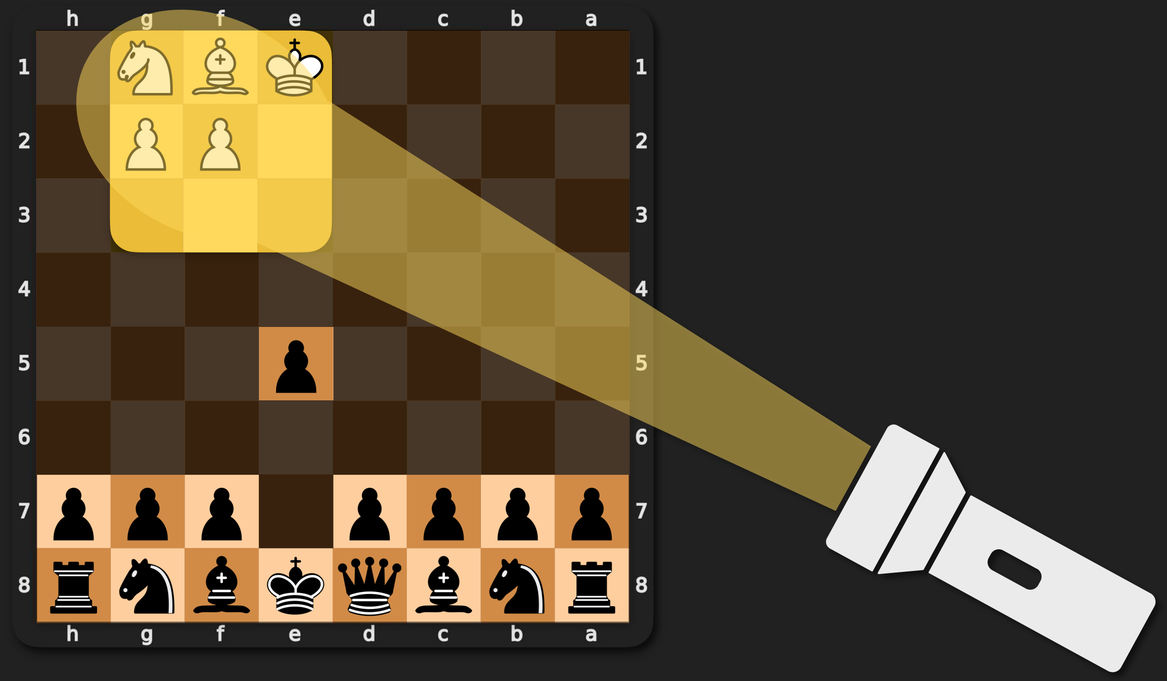
IMPERFECT INFORMATION GAMES

PUSHING PAWNS IN THE DARK

ANVAY SHAH



FOR CS217 (PROF. SWAPRAVA NATH)

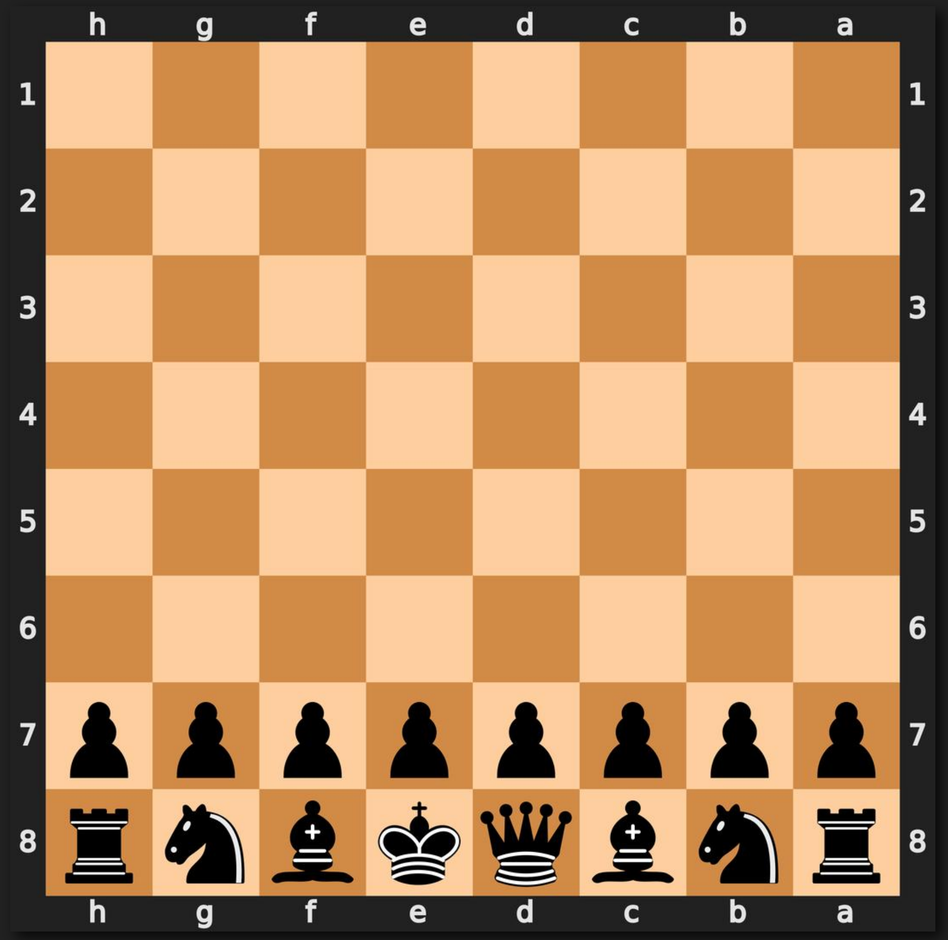
RECONNAISSANCE BLIND CHESS

Imperfect Information version of Chess

Information gained from 3 x 3 sense move

Capture opponent King to win

Null moves, Checks, Captures…



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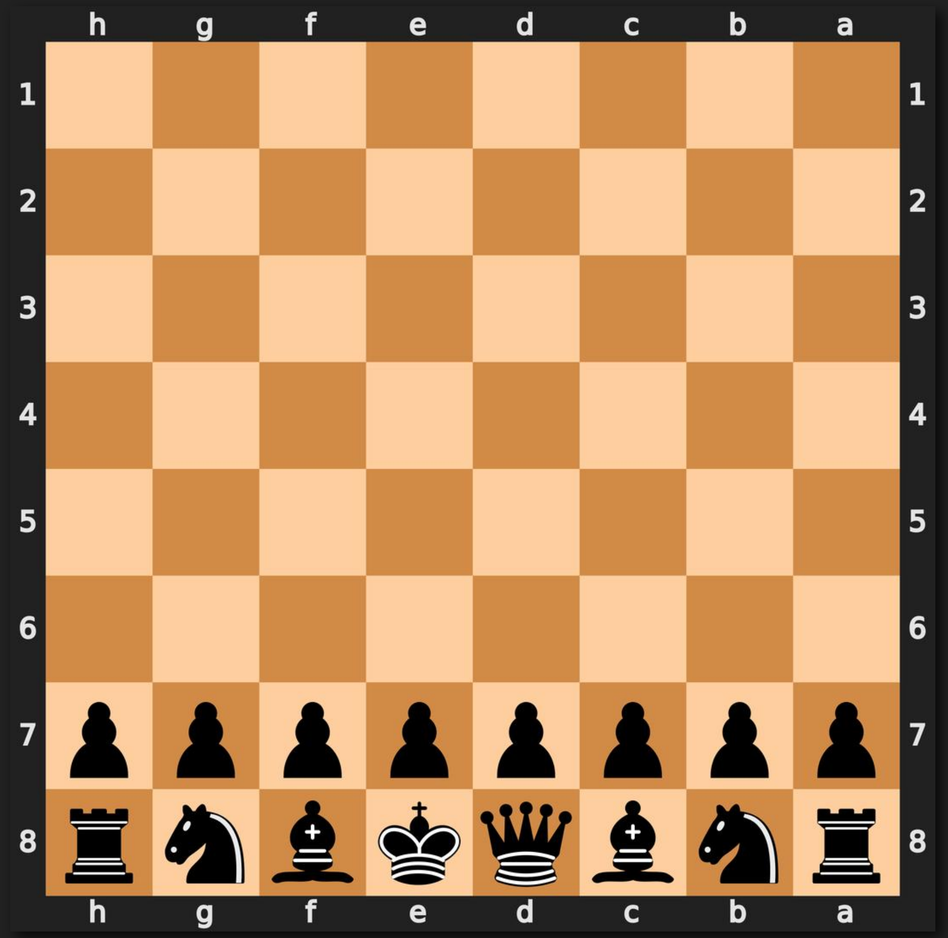

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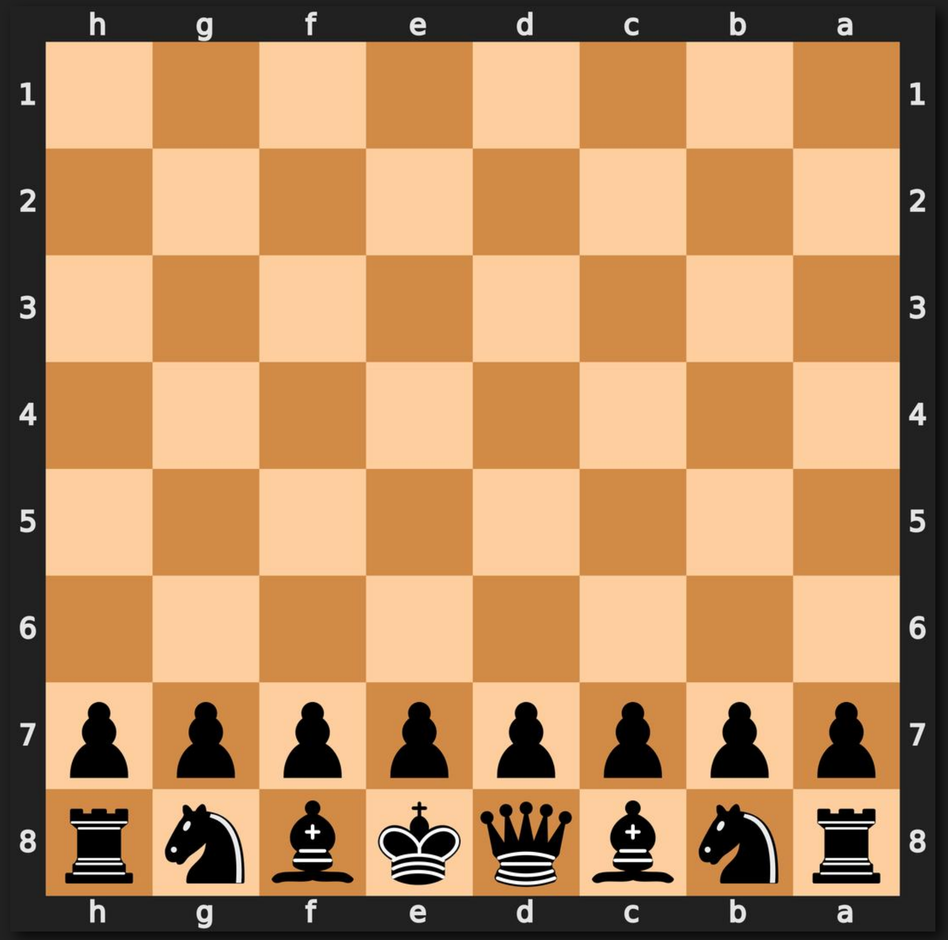

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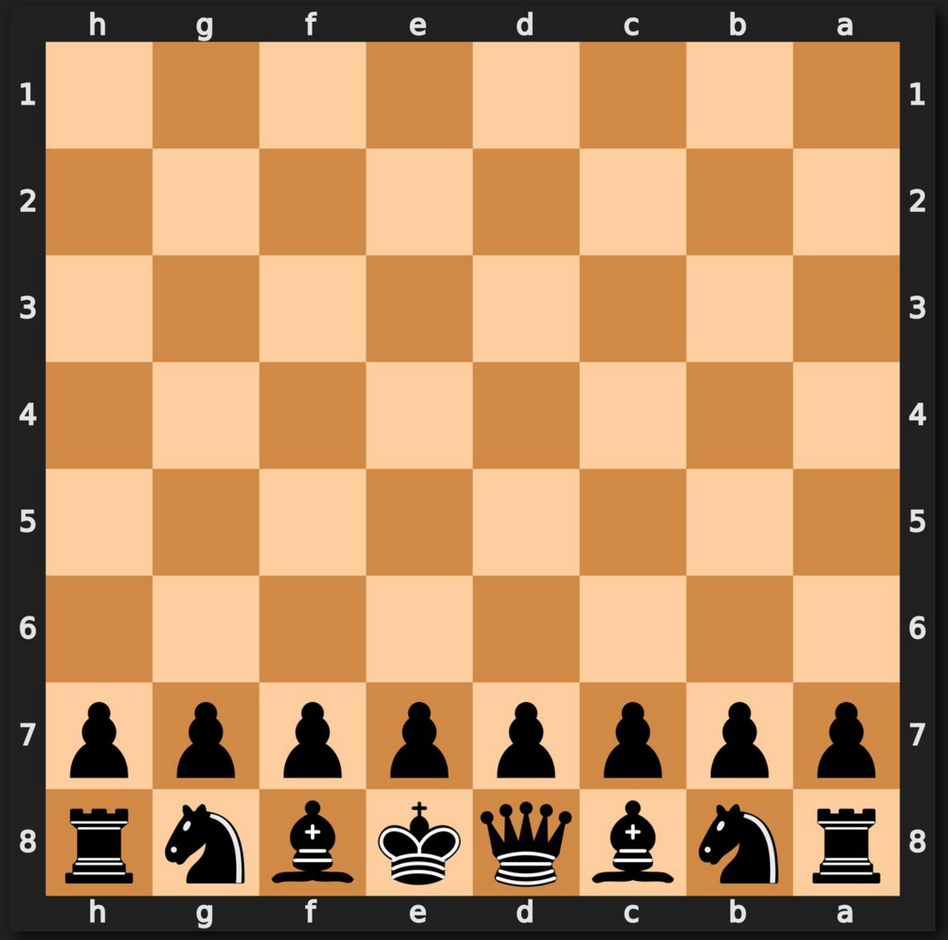
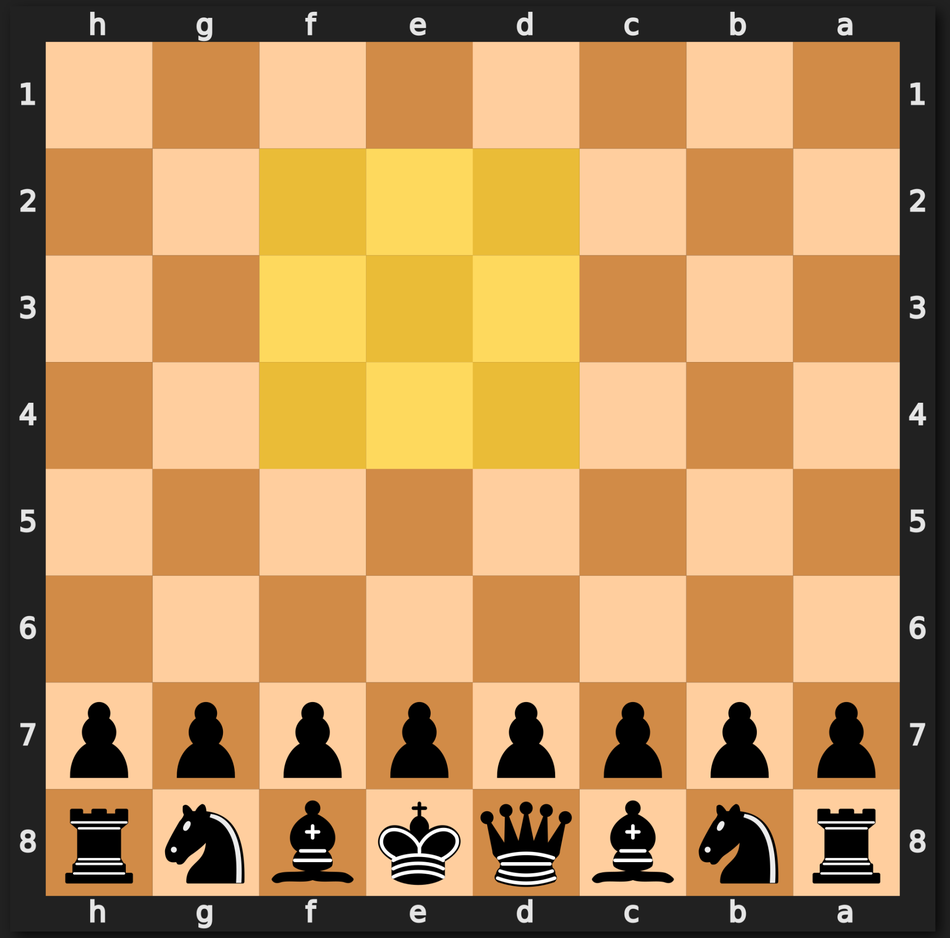


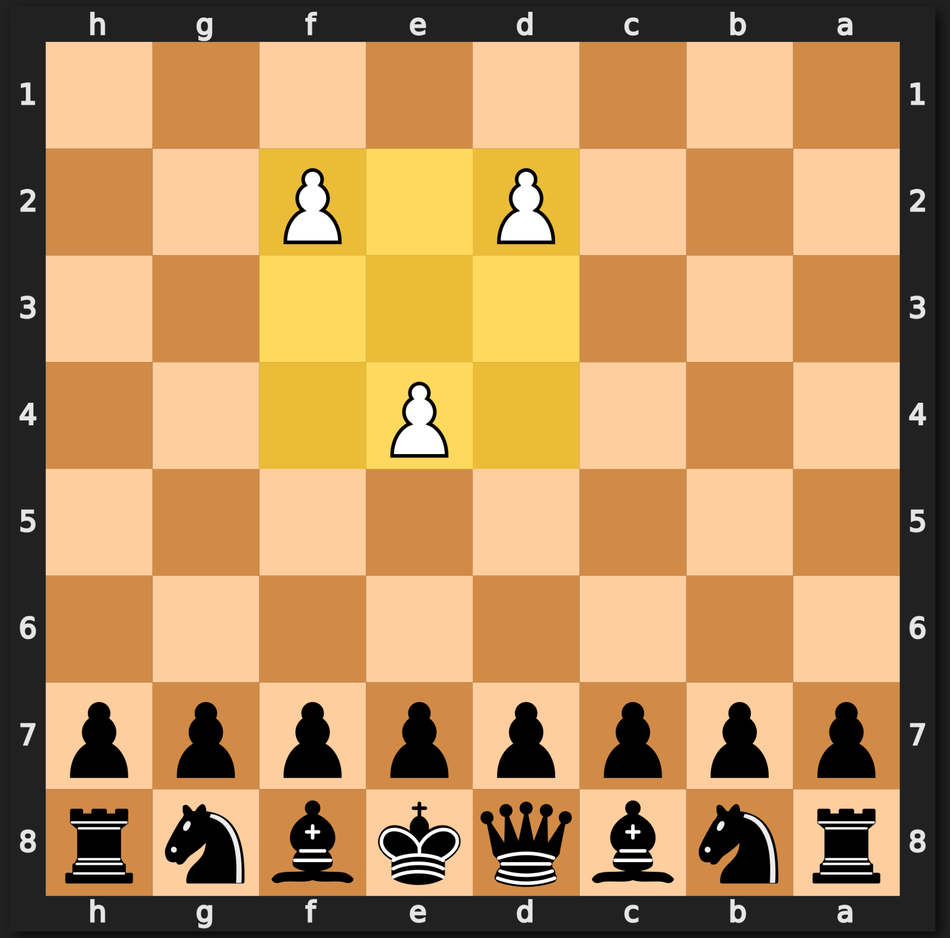
RECONNAISSANCE BLIND CHESS

Black chooses sense region e3



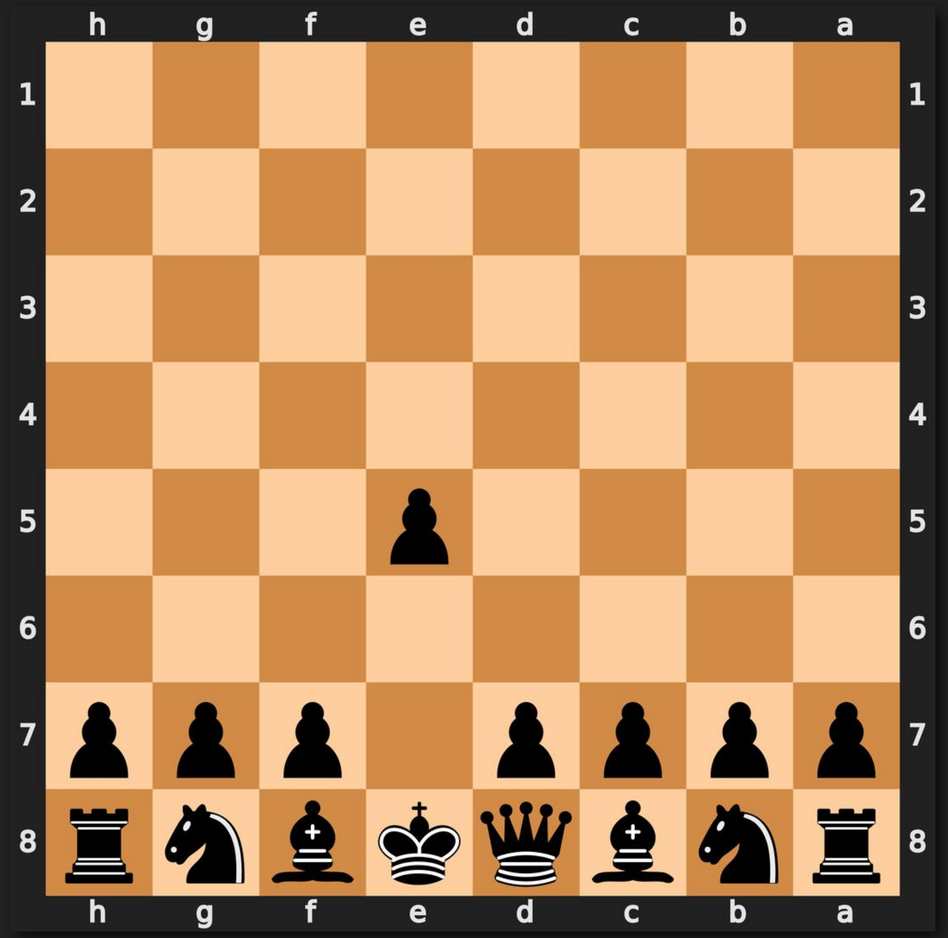
RECONNAISSANCE BLIND CHESS

Information gained from sense



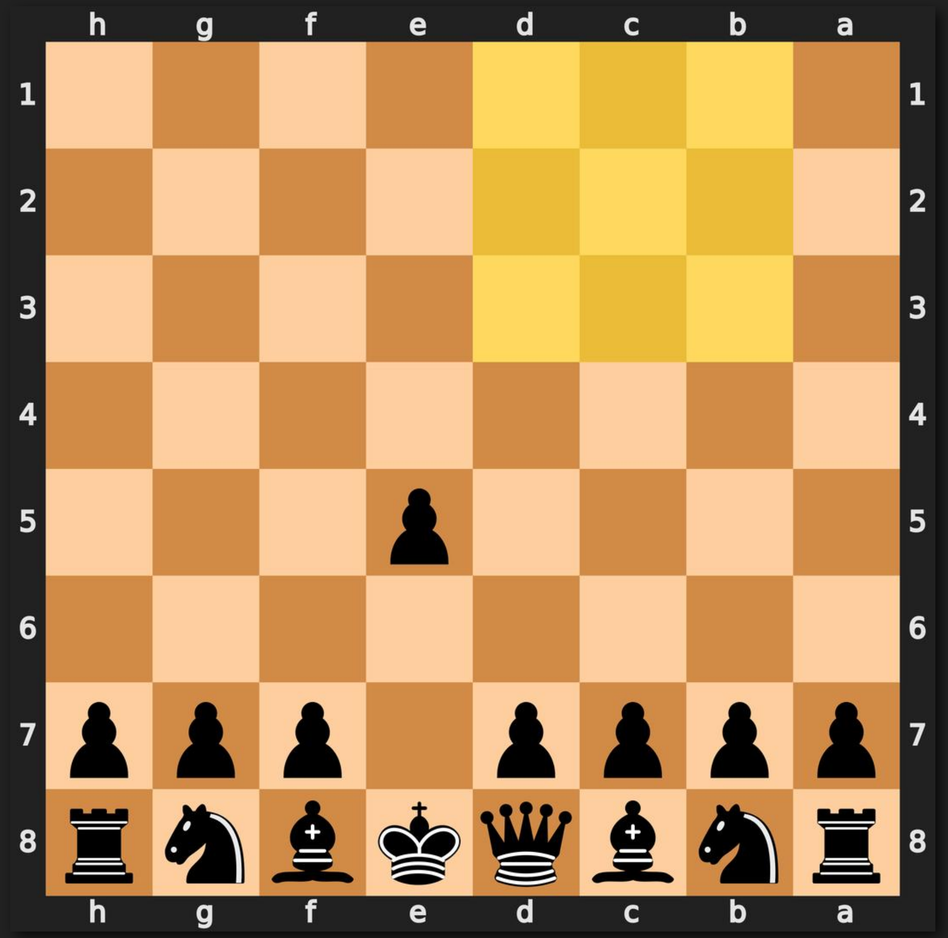
RECONNAISSANCE BLIND CHESS

Black plays e7e5



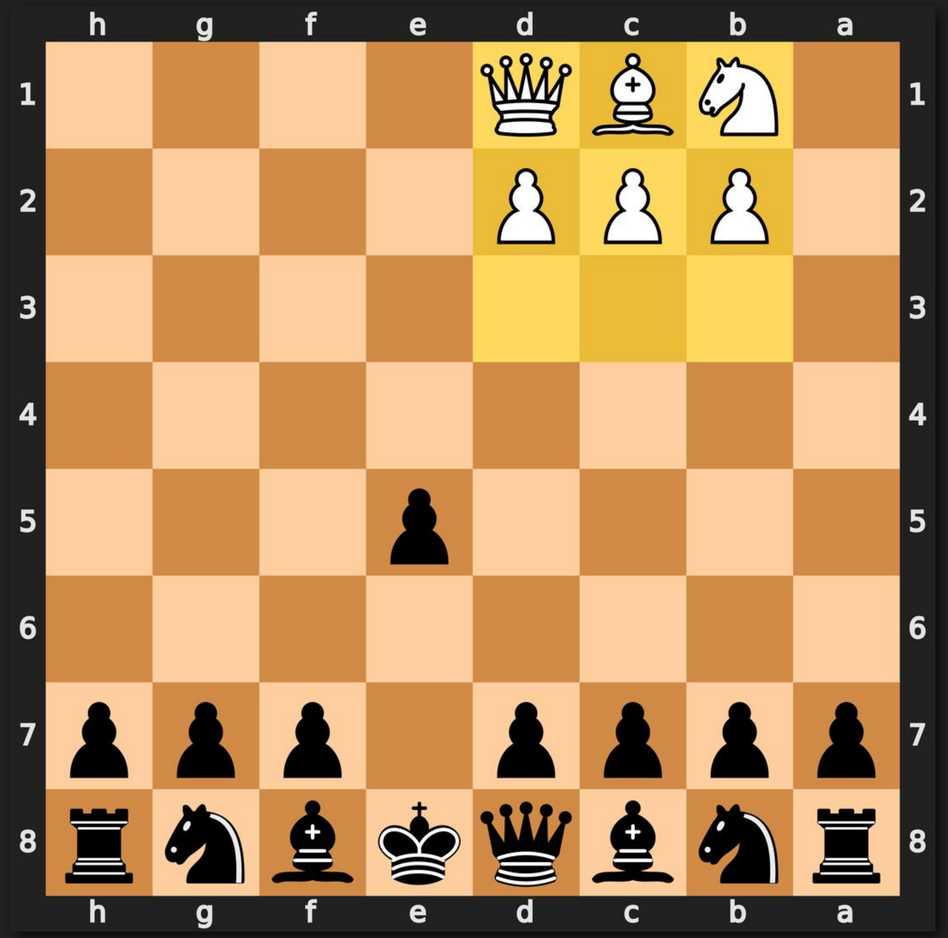
RECONNAISSANCE BLIND CHESS

Black chooses sense region c2



RECONNAISSANCE BLIND CHESS

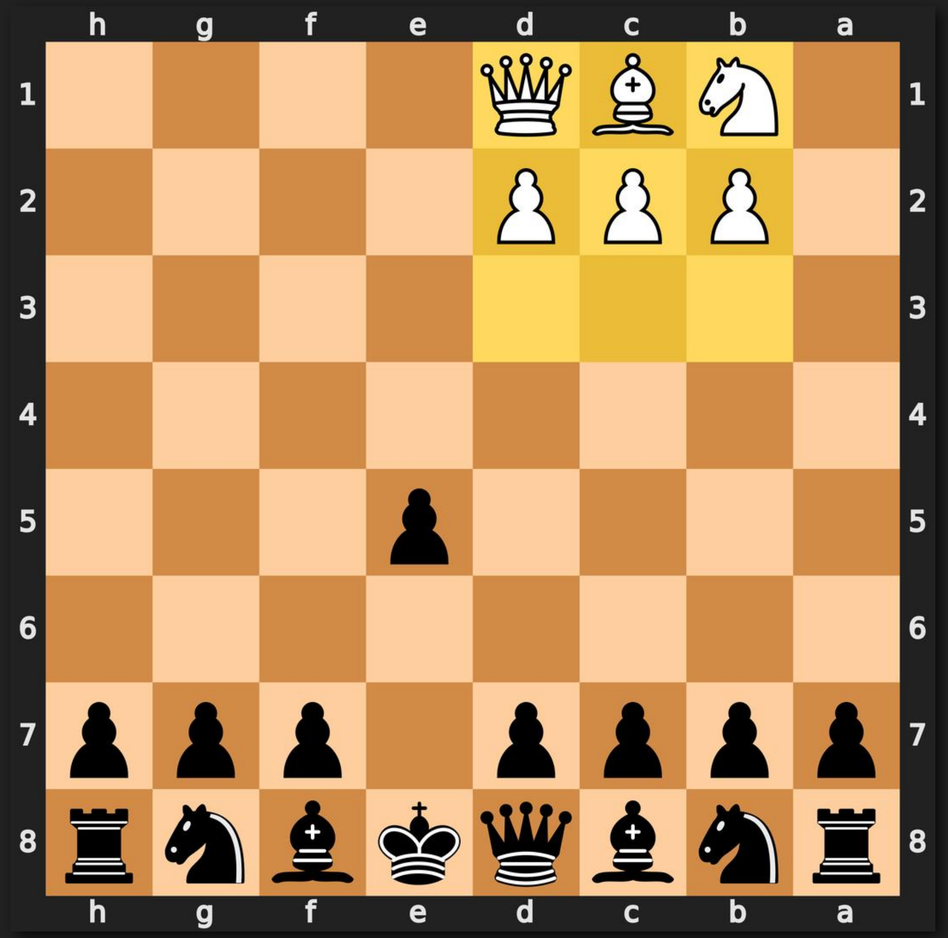
No new information gained from sense!



RECONNAISSANCE BLIND CHESS

Where should Black move next?

What would you play?



RECONNAISSANCE BLIND CHESS

Given current history:

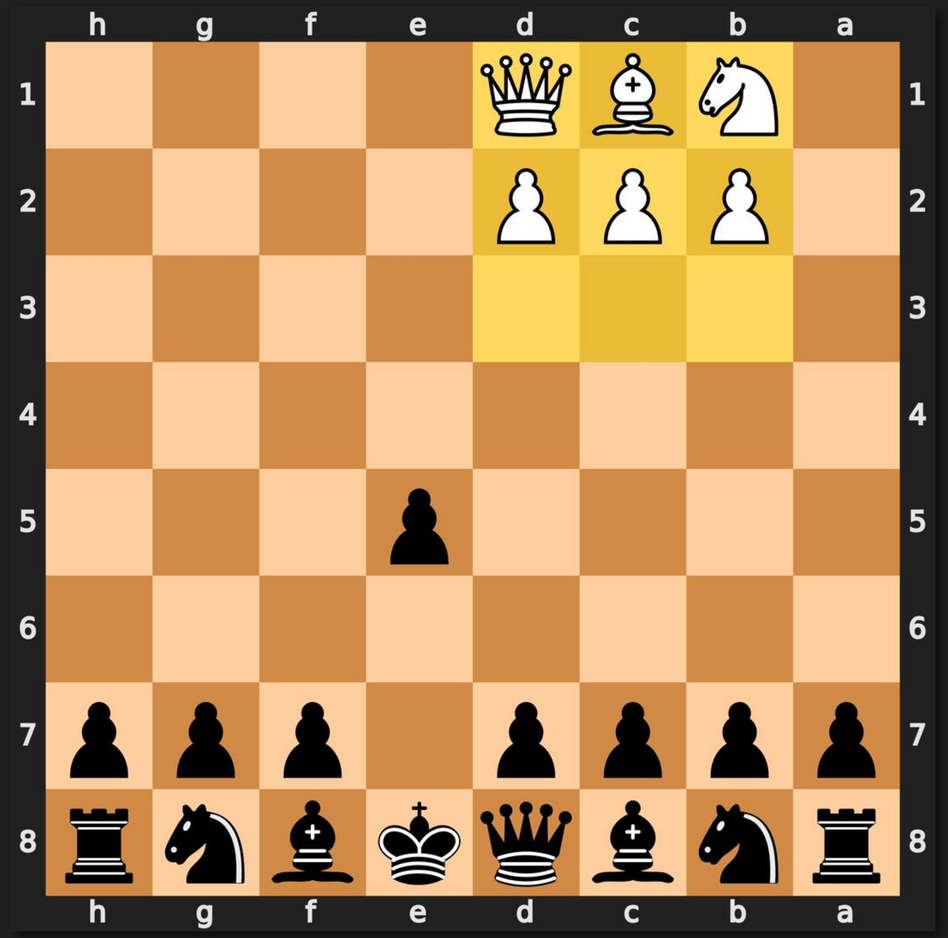
sense e3,

observe Pe4,

move e7e5,

sense c2,

observe no new information



RBC IS HARD.

10^{68} opponent histories aliased into agent's information set

Number of decision points — 10^{139} information sets

Average game horizon of 50-60, can go into 100s

Private versus public/shared information:
Almost all information in RBC is private

OUR AGENT FOR RBC – FIANCHETTO

NeurIPS RBC Tournament Standings											
2021						2022					
Rank	Bot Name	Elo Rating	W	D	L	Rank	Bot Name	Elo Rating	W	D	L
1	**Fianchetto**	**1769**	**931**	**0**	**89**	1	StrangeFish2	1762	905	10	105
2	StrangeFish2	1662	876	0	144	**2**	**Fianchetto**	**1644**	**837**	**15**	**168**
3	penumbra	1584	823	0	197	3	Kevin	1623	825	0	195
4	Kevin	1544	793	0	227	4	Châteaux	1621	825	2	193
5	Oracle	1503	760	0	260	5	ROOKie	1551	776	8	236

RBC Resources — https://rbc.jhuapl.edu/ to play against, learn about or build RBC bots

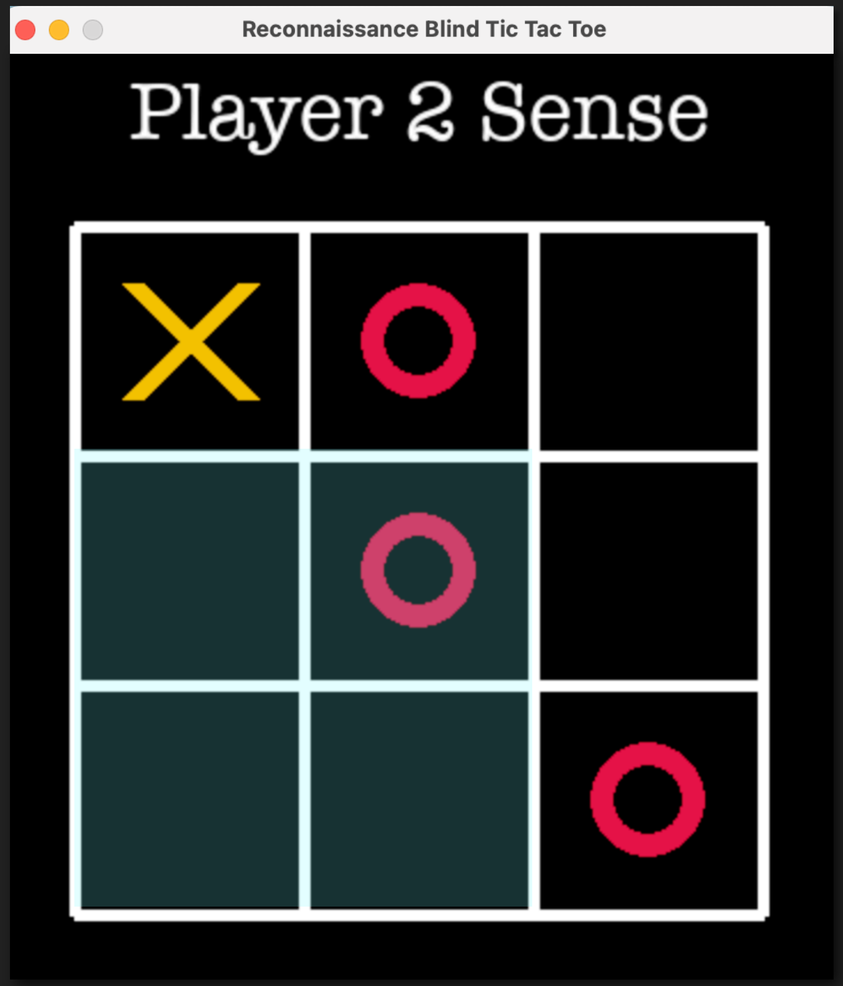
Joint work with Mohammad Taufeeque, Nitish Tongia, Puranjay Datta and Prof. Shivaram Kalyanakrishnan

RECONNAISSANCE BLIND TIC TAC TOE

Standard Tic Tac Toe rules

2 x 2 sense region

Instant loss if you play in the same cell as your opponent



RECONNAISSANCE BLIND TIC TAC TOE

Can you beat our agent?

Joint work with Ramsundar Anandanarayanan and Prof. Shivaram Kalyanakrishnan