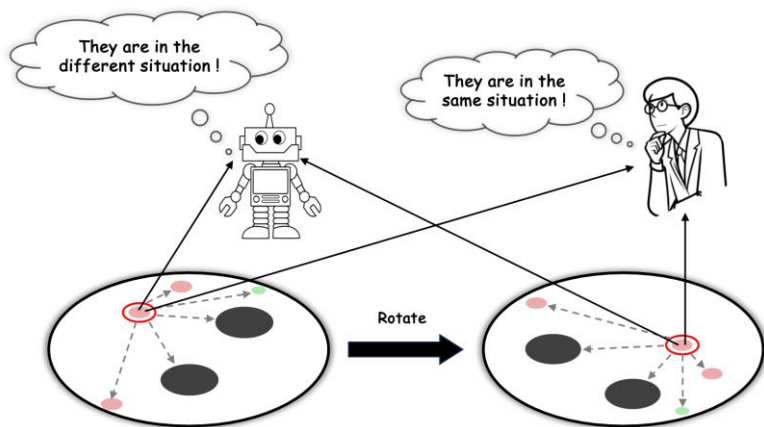


RDHNet: Addressing Rotational and Permutational Symmetries in Continuous Multi-Agent Systems

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Problem:

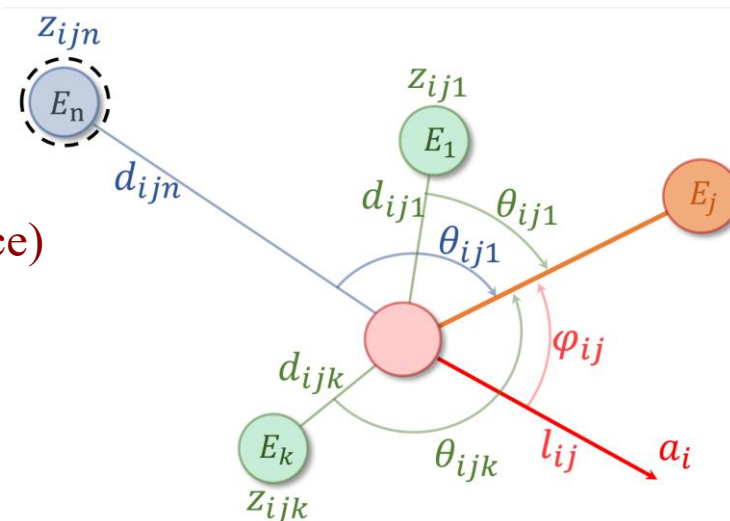


Human can easily perceive the equivalence between the 2 states.

However, the robot (AI) can not!

Idea:

Regardless of the state's rotation, the variables (angle and distance) shown in the figure remain unchanged in the polar coordinate system where the zero axis is defined by the agent and entity j .



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Final Performance

Table 2 The Mean and Standard of Returns.

Task	RDHNet (Ours)	COMIX	COVDN	FACMAC	MADDPG	IDDPG
cn(3 agent)	-36.50±0.80	-49.48±3.19	-39.65±1.93	-172.66±36.52	-48.11±3.79	-62.20±3.70
cn(5 agent)	-48.17±3.73	-76.54±7.76	-69.69±3.84	-141.53±33.84	-80.95±3.75	-92.11±8365
cn(7 agent)	-61.91±4.05	-97.41±9.47	-88.91±2.36	-211.83±115.19	-97.43±4.28	-117.51±15.39
pp(3 predator)	115.41±17.23	74.64±56.78	125.44±28.60	22.26±23.88	20.63±39.21	7.01±8.5
pp(6 predator)	280.80±16.35	15.39±9.26	65.82±55.98	38.86±45.96	8.43±4.96	13.03±4.01
pp(9 predator)	178.80±25.48	34.20±16.13	30.00±8.57	24.20±4.87	19.20±3.97	50.60±13.95

Training Performance

