BILHR Q-Learning Report

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At the beginning, we define the 5 states for goal keeper and 5 states for foot state.

The numbers of action are 3 (kick ball, move in, move out).

Move in: increase the foot state (ex: 3+1=4)

Move out: decrease the foot state (ex: 3-1=2)

Kick ball: After kicking state, give the random initial foot state

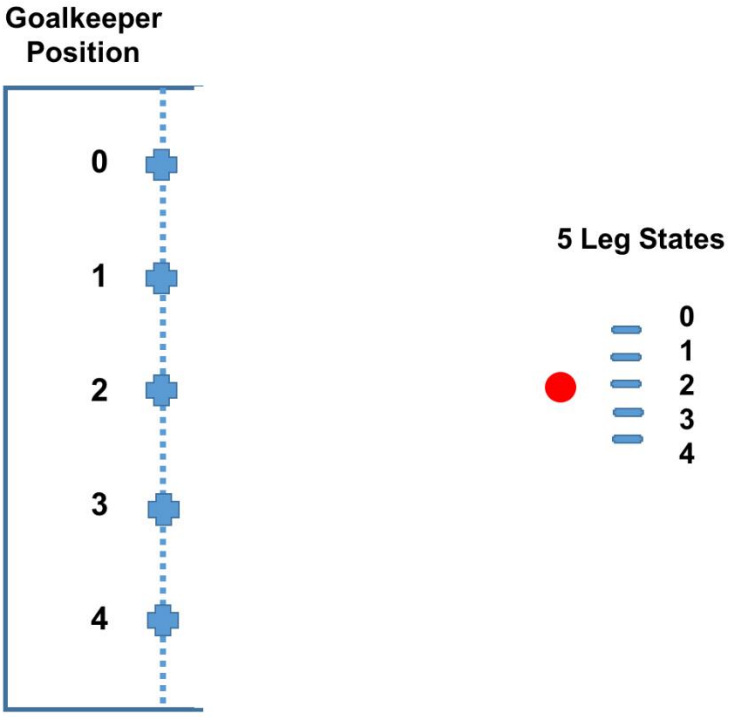

Fig1. The states of goal keeper and foot

The processes of training Q table are demonstrated as below.

(P.S. Q table is recorded in the first row because different states are in five different folders. Ex: Q_table_goalkeeper_0)

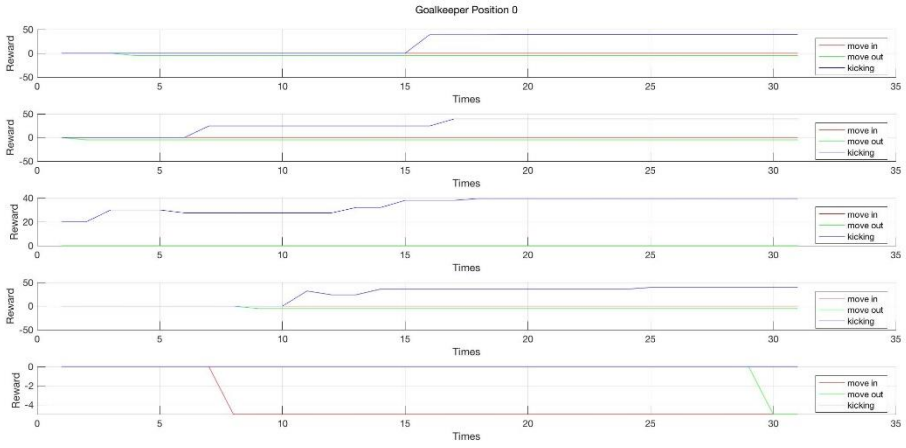

Fig2. The state 1 of goal keeper

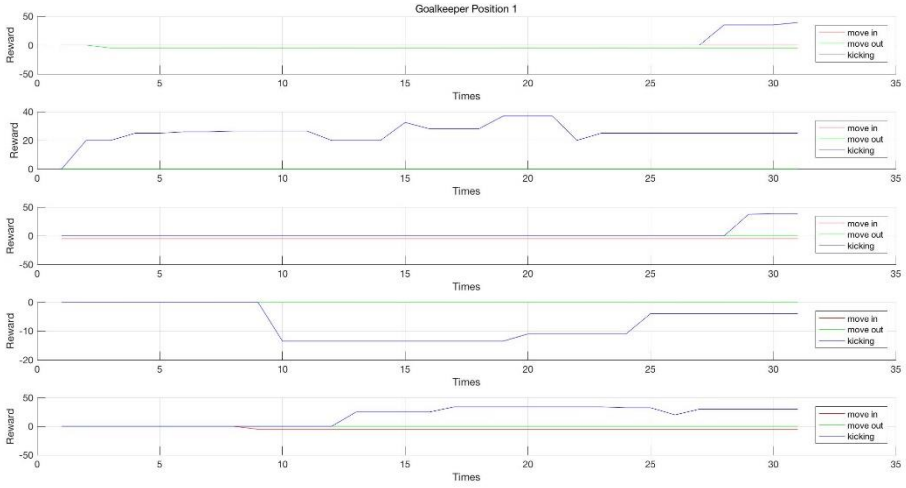

Fig3. The state 2 of goal keeper

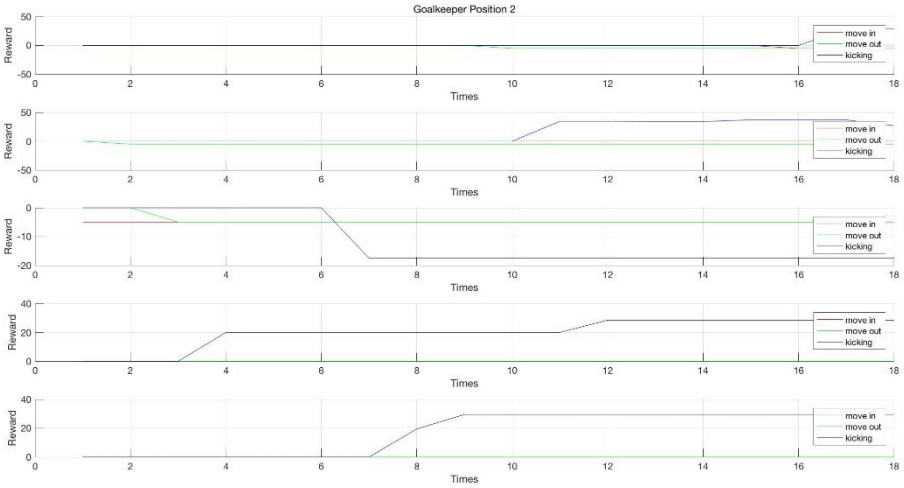

Fig3. The state 2 of goal keeper

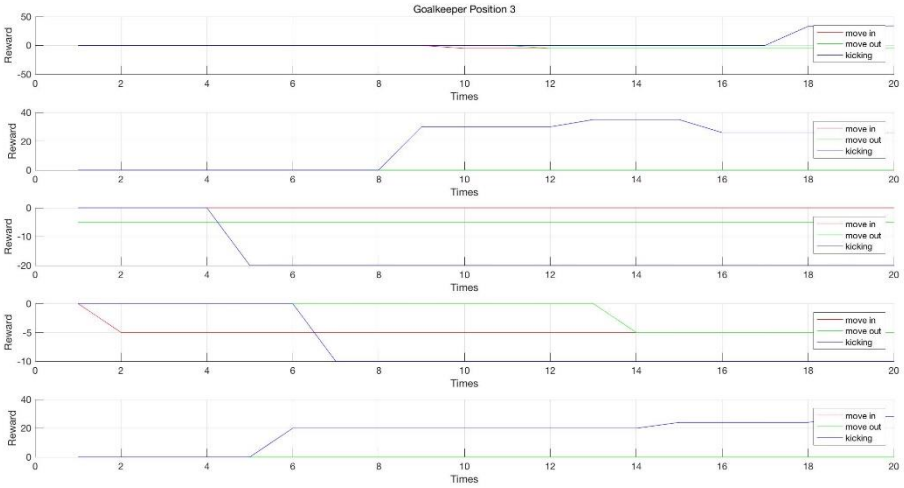

Fig4. The state 3 of goal keeper

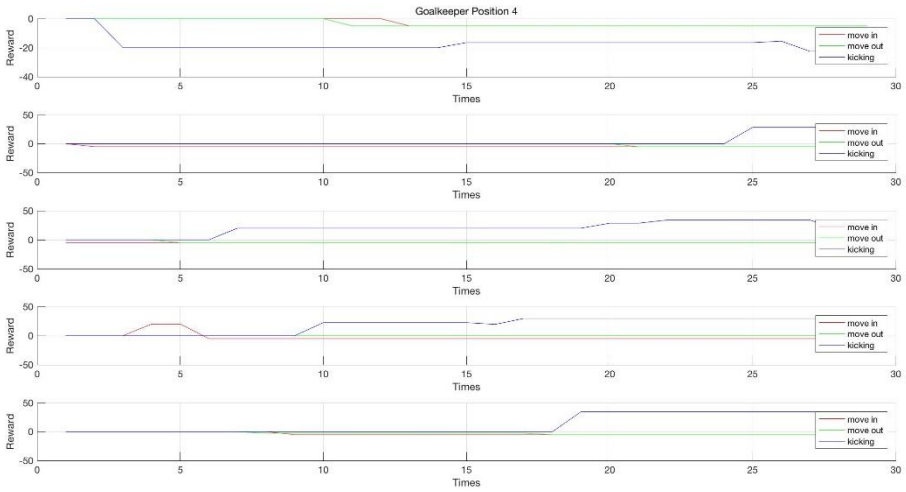

Fig5. The state 4 of goal keeper

Sometimes, the tendency of Q table is not the same (keeping increasing and decreasing). Because the vibration of every kicking still will affect the accuracy, it will be given inappropriate rewards.

But, the Q table still can gradually become better and perfect after a great number of training.

In conclusion, the Nao Robot will detect the position of goal keeper to choose the shortest distance to kick the ball.