- 1. Description of the game: There are two paddles in the game screen, which are located ...
- 2. Equations for the policy.
- 3. The action taken by the agent is up.
- 4. The values of input variables and their gradients are

	$y_{ m ball,1}$	$x_{ m ball,1}$	$y_{ m ball,2}$	$x_{\rm ball,2}$	$y_{ m ball,3}$	$x_{ m ball,3}$	$y_{ m ball,4}$	
Value	8.31e-01	7.48e-01	7.99e-01	8.03e-01	7.49e-01	8.54e-01	6.99e-01	
Gradient	-3.08e-10	-7.51e-10	-3.90e-10	-5.15e-10	-2.72e-10	-4.21e-10	-7.76e-10	

## **Ball's Motion**

The values of  $y_{ball,1}$ ,  $y_{ball,2}$ ,  $y_{ball,3}$ , and  $y_{ball,4}$  show a decreasing trend, indicating the ball is moving upwards. The gradients for  $y_{ball,1}$  to  $y_{ball,4}$  with respect to the "up" action are negative but very small (in the order of e-10). This suggests that while the ball's y-position influences the decision, it is not the most dominant factor.

## **Opponent's Position**

The values of  $y_{\rm opponent,1}$  to  $y_{\rm opponent,4}$  also show a general trend of moving upwards. The gradients for  $y_{\rm opponent,1}$  to  $y_{\rm opponent,4}$  are positive and significantly larger (in the order of e-8). This implies that the opponent's position is a more influential factor in deciding to move up.

## **Agent's Position**

The y-positions of the agent  $(y_{agent,1} \text{ to } y_{agent,4})$  show a downward trend overall, but the decision is to move up. The gradients for  $y_{agent,1}$  to  $y_{agent,4}$  are positive, with  $y_{agent,4}$  having a relatively larger gradient. This indicates that the agent's current position significantly influences the decision to move up.

## Conclusion

The decision to move "up" is likely influenced by a combination of factors:

- The ball's upward trajectory, as indicated by the decreasing y-coordinates of the ball.
- The opponent's paddle also moving upwards, possibly to intercept or hit the ball.
- The agent's position is lower than the ball's trajectory, necessitating an upward movement to intercept or hit the ball back.

Frame 1 Frame 2 Frame 3 Frame 4