Architectures of Intelligence
Homework 4

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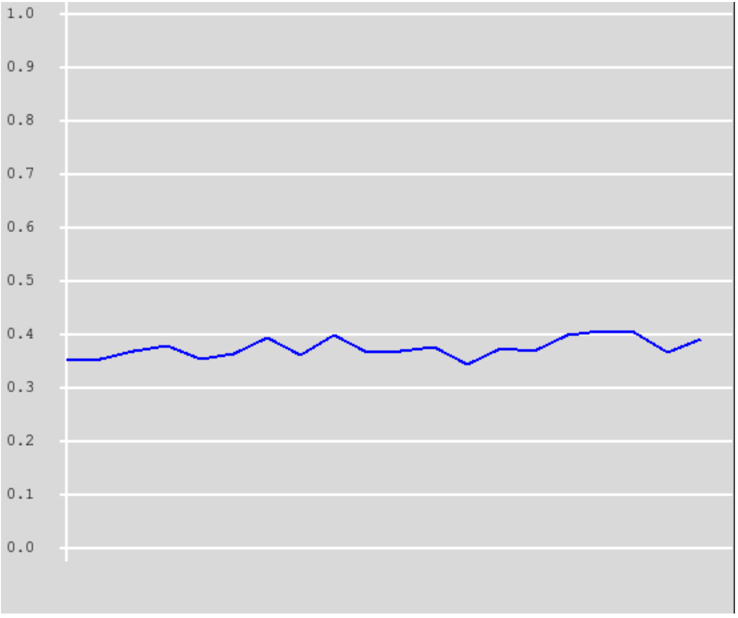
1 (a)

Show the learning of your model in a graph like the one above.



Textual representation of the image: ((0.3612 0.3776 0.3658 0.39300004) (0.351 0.355 0.368 0.379 0.353 0.365 0.395 0.362 0.4 0.366 0.368 0.376 0.344 0.373 0.368 0.398 0.406 0.404 0.366 0.391))

2 (b)

Describe which information you store in memory, and explain why. Also indicate what information you use to retrieve a past experience.

Information stored in memory:

•MC1	First card our model gets.
•MC2	Second card our model gets.
•MRESULT	Result of our hit/stay choice.
•ACTION	The action belonging to that choice.

MC1 and MC2 are used to retrieve a more accurate (instead of just MC1) game-state from DM. MRESULT is used for debugging purposes to check whether the model learns the correct action with a certain hand. ACTION is saved to give the model a key to press if it remembers what action it took previously with the same hand.

MC1 and MC2 are used to retrieve past experiences. This gives the model some more information about the current state of the game than just the first card and can be better used to determine the correct action.

3 (c)

Describe how you changed the 'should-hit' and 'should-stay' productions, and explain why.

For the 'should-hit' production:
The only additions to this production are that we now also check the model's second card, and a test to determine whether the model should actually hit or not. This test it simply a check whether the model's total hand has a lower value than that of the opponent. If so, the model is allowed to hit. This is a somewhat naive approach, but it is sufficient to reach a point where the model wins 39% of the games played.

For the 'should-stay' production:
The only addition to this production is that we now also save the second card to our learned information. This production did not need a lot of modification, as it simply needs to get fired when the model's total hand is greater than that of the opponent. This happens because the should-hit production has a much higher utility function, and would thus be fired first. Only when the should-hit production's test fails (whether the model's total is lower than that of the opponent's) should this production get fired.

4 (d)

Discuss whether this is a plausible model of playing black jack, and why/why not.

This is a plausible model for playing black jack, after the model has learned a lot of different hands, as the model emulates a simple playing strategy, which is getting a higher total hand value than that of the opponent.

This is similar to the way we normally play black jack, except for the fact that we explicitly know not to exceed 21 points and can do simple probability calculations to determine whether to hit or not is a good choice.

The model however, does learn not to exceed 21 points implicitly, thanks to the learned information about when to hit. But learning this information implicitly takes a lot of hands to learn.

Thus the model is a plausible model for playing black jack, if it learns a lot of information about what action to take with a certain hand.