Othello Game AI Using Temporal Difference Learning

1.0 About

This project is to create an a.i. to play Othello game which can learn by it's mistake. First it plays with random parameters and after a while it learns to play well by learning from opponents moves. To learn the rules of Othello game go to, http://en.wikipedia.org/wiki/Reversi

2.0 Implementation

This a.i. uses temporal difference learning to learn by its mistakes. In the game a state is defined as an 8x8 grid with 'yellow' (a.i.) and 'green' (human) dots.

And it use three parameters for learning.

Θ_1 – maximum score that human can get by next move.
Θ_2 - maximum score that a.i. can get by next move.
Θ_3 – proportion between number of black moves and number of white moves.

These are used to calculate prediction (V) values for a given state.

$$V(s) = A.\Theta_1 + B.\Theta_2 + C.\Theta_3$$

Next state (or next move) from a given state is calculated by finding all possible moves form that state , getting the V values for all that states and getting the state which has the maximum V value. After each move the new V value will be calculated and used both V values are used to modify the parameters.

$$A_{new} = A_{old} + .(V_{old}(s) - V_{new}(s)) * \Theta_1$$

When the new V values are calculated 100 will be added to the v value if the a.i. get the maximum score in the final move and 100 will subtracted if the a.i. get the maximum score in the final move. More information Temporal Difference Learning,

http://en.wikipedia.org/wiki/Temporal_difference_learning

3.0 Prerequisites

This script is written in python. Install 'python' and 'Tkinter' to run the script. (use synaptic package manager in Ubuntu to install them.)

4.0 Running the Application

Use fallowing command to run the application.

Python othello_main.py

To add a dot click on an empty square. If it is an available move the dot will be added.

5.0 Author

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6.0 Screen Shots

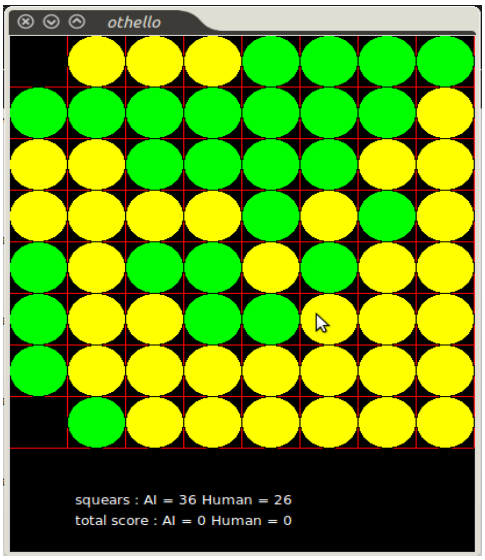

Figure 5.0

7.0 Licenses