Tetris is a puzzle game created by mathematician Alexey Pajitnov in 1984. Since its initial release, Tetris has become one of the world's most popular and best recognized video games. Tetris was the first piece of entertainment software exported from the USSR to the United States, and in 1989 was bundled with Nintendo's immensely popular Game Boy handheld device. In 2007, Tetris placed second in game reviewer IGN's “100 Greatest Video Games of All Time” and in 2010, Jonas Neubauer was crowned Tetris World Champion. Presently, Tetris holds Guinness World Records for the Most Ported Computer Game and Most Downloaded Mobile Phone Game. Due to its persistent popularity, many people have analyzed the game of Tetris from a scientific perspective.

In 1992, John Brzustowski, a student at the University of Waterloo, published a Master's thesis entitled Can You Win At Tetris?[2]. In the thesis, Brzustowski attempts to identify a strategy for playing Tetris such that the game is guaranteed to never end. Brzustowski finds a series of alternating S and Z tetrominoes that when generated inevitably lead to the termination of any Tetris game. Heidi Burgiel[3] builds on Brzustowski's work and shows that given enough time, any pseudo-random algorithm that allows at least some probability for each tetromino at every time step will eventually generate an S and Z series that will end even optimally played games. Furthermore, Demaine, Hohenberger, and Liben-Nowell[6] show that a relaxed version of Tetris is NP-complete and that it is impractical to search the game's full state space to select optimal actions. However, this information has not stopped hobbyists and academics from building Tetris playing agents.

In 2003, Colin Fahey gained notoriety for building a robot capable of playing Tetris using a webcam. On his website, Fahey presents a lengthy analysis and history of Tetris. Within his analysis, Fahey credits Pierre Dellacherie as the developer of the best one-piece Tetris playing algorithm in the world. A one-piece algorithm is any Tetris agent that has access only to the game board and the tetromino currently in play. The one-piece problem, which arises in most
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Written by Justus Robertson
Monday, 27 February 2012 18:42 - Last Updated Monday, 27 February 2012 18:58

Tetris implementations, is significantly harder than even the Tetris instance that Demaine et al. proved to be NP-complete. This additional complication arises from the uncertainty introduced by the game's pseudo-random tetromino generator and further hinders Tetris playing algorithms from searching through the present game's future state space. In light of this, most academic work in developing Tetris playing agents has focused on using probabilistic methods to learn gameplay strategies. Unfortunately, these advanced approaches have yet to consistently outperform Dellacherie's original hand-coded heuristic.

In 2005, Donald Carr[4] presented a summary of past attempts to apply genetic algorithms and reinforcement learning to create Tetris playing agents. In his report, Carr concludes that despite past failed attempts, reinforcement learning is an appropriate tool to guide Tetris play. That same year, Böhm, Kókai, and Mandl[1] presented a genetic algorithm that performs on average just below Dellacherie's hand-coded heuristic. In 2006, Szita and Lőrincz[7] applied a cross-entropy learning method to the Tetris problem. However, the method proved to be less effective than Böhm et al.'s genetic algorithm. Most recently, Chen et al.[5] used Ant Colony Optimization as a method of learning a Tetris playing heuristic, but this method is outperformed by the previous approaches of genetic algorithms and cross-entropy reinforcement learning. At the present time, Dellacherie's original hand-coded algorithm remains the highest scoring artificial Tetris agent in the world (on average) and Tetris remains a stimulating problem to be solved.


