Tetris AI Genetic Algorithm Report

# 1. Algorithm Explanation

The code implements a Genetic Algorithm (GA) to evolve a set of 7 weights that score board states in a Tetris game.   
These weights are used to evaluate the desirability of moves during gameplay.  
Each chromosome is a list of 7 real-valued weights corresponding to game features.  
Fitness is evaluated based on the final score from simulating a game using the chromosome.  
Selection keeps the top 50% performers. Crossover combines genes from pairs of parents.  
Mutation randomly changes genes in some chromosomes to explore new areas.

# 2. Feature Weights

Features:  
- max\_h: Maximum height of the board  
- lines\_removed: Number of lines removed  
- new\_holes: Number of new holes created  
- blocking\_blocks: Blocks that cover holes  
- piece\_sides: Contact points between the piece and existing blocks  
- floor\_sides: Contact with floor  
- wall\_sides: Contact with walls

# 3. Progress Graph

The following graph shows the scores of the best and second-best chromosomes across generations:

A graph with blue and orange lines

AI-generated content may be incorrect.

# 4. Best Chromosomes & Final Scores

Seed: 42  
  
Best Chromosome:  
[-1.027729043337363,1.9428432495883108,-4.3781465463691305,-8.824516280064627,8.73309175424988,-1.13738509893086,4.253804176938216]  
Score: 6832.09677  
  
Final Evaluation Score (2000 steps): 11152.4

# 6. Conclusion

The Tetris AI using Genetic Algorithm successfully evolves weight vectors that produce stronger gameplay.   
It learns to prioritize survival and maximize score using only simulation-based feedback.