

CS3243 Tutorial 1

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1 Introduction

Tetris is likely to be one of the world's most famous and popular games. In this report, we describe how we devise an agent to play the game of Tetris. We use an agent that greedily picks the best possible next state from a given state, whilst using a heuristic function to approximate the value of a state. To train our heuristic function, we use a novel algorithm that is a combination of the well known Genetic Algorithm and Particle Swarm Algorithm. Our agent manages to clear 5 million lines on average with a max of 12 million lines, demonstrating that our algorithm is effective.

2 Agent Strategy

Our agent uses a linear weighted sum of features as the heuristic function for a given state. Given a state and a piece, the agent computes the heuristic function for all the possible next states, and then greedily picks the next state with the maximum heuristic value.

//Insert Math equation

3 Features

We used the following features for our heuristic function:

- Altitude Difference: The difference between the height of the highest column and the height of the lowest column
- Number of Columns With Holes: The number of columns with holes, where a hole is defined as an empty square directly beneath a filled square
- Height of the highest column
- Number of holes in the entire board
- Number of wells: The number of columns that have a height less than that of the 2 adjacent columns
- Rows cleared: The number of rows cleared for that particular move
- Total Column Height: The sum of the heights of all the columns
- Total Column Height Difference: The sum of the difference of heights between adjacent columns
- Column Transition:
- Deepest Well:
- Row Transition:

- Weighted Block:
- Sum of all Wells:

While running our training algorithms, we noticed that some features were more important an others.
(To be continued)

4 Our Algorithm

(Someone please fill this)

5 Experiments and Analysis

Diagram 1: Learning Diagram 2: Performance of agent

Experimentation 1. Architecture specifications on which the algorithm was implemented 2. The time taken to train 3. The performance of the agent
Analysis

6 Scaling to Big Data

Talk about parallelising algorithm. Mention MPI Get speedup

7 Conclusion