AI Tetris - A CS3243 Project

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1 Introduction

2 Utility Function

We defined the utility function as a linear function F with each feature $f_i \in Features$ having an assigned weight w_i, where $i = 1...n$, with n being the number of features. Each f_i derives a real value from a state s. The function is then defined as:

$$F(s) = \sum_{i=1}^{n} w_i f_i(s)$$

The features f_i used will be explained in depth in Section 3.

3 Features Used

- **RowsCleared** - Number of rows cleared when the piece is put on the board
- **MaxHeightIncrease** - The maximum height increase when the piece is put on the board
- **AvgHeightIncrease** - The average height increase when the piece is put on the board

- **NumHoles** - Number of holes when the piece is put on the board; a hole is defined as an empty cell with a non-empty cell above it.
- **ColumnTransition** - The total number of column transitions. A column transition occurs when an empty cell is adjacent to a filled cell on the same column and vice versa.
- **RowTransition** - The total number of row transitions. A row transition occurs when an empty cell is adjacent to a filled cell on the same row and vice versa.
- **AbsHeightDiff** - The height difference between all the columns.

4 Training Function

5 Implementation

5.1 StateCopy

In order to correctly apply the features, a new `StateCopy` class was created, extending the original `State` class, serving as a clean starting state to apply our features on in order to derive the heuristic value.

Extra variables like `currentRowsCleared` and `previousTop` is also added to the `StateCopy` class in order to obtain the information needed by various features such as the RowsCleared feature and the AverageHeight feature.

Using `StateCopy` also allows us to play moves without affecting the original state of the game.

5.2 Heuristic

Talk about the heuristic class here

5.3 Learning Algo? Learner?

6 Scaling The Algorithm For Big Data

7 Results

8 Conclusion

References

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[2] Albert Einstein. *Zur Elektrodynamik bewegter Körper*. (German) [*On the electrodynamics of moving bodies*]. Annalen der Physik, 322(10):891921, 1905.

[3] Knuth: Computers and Typesetting,
`http://www-cs-faculty.stanford.edu/~uno/abcde.html`