Ghost Team – Memetix

Introduction

This document describes the design for the ghost team entry into the WCCI 2012 PacMan vs Ghosts AI competition run by Essex University. The code was written by Daryl Tose.

Design

The aim of the ghost team is to reduce the scoring area the PacMan has access to. A node is considered to be in the scoring area if the PacMan can get to it before a non-edible Ghost.

Each scoring node scores 100 points. If it contains a pill or power pill, the score is increased by 10 or 50 points respectively. A low score means the ghosts are doing well and have the PacMan cornered.

The nodes at which the PacMan and Ghosts meet are called the event horizon. At times some ghosts will not be contributing to the event horizon, if this is the case, what they do will depend on the game state. An edible ghost will try to move out of the scoring area (i.e. beyond the event horizon) by the shortest route. A hunting ghost will move towards the PacMan if the scoring area doesn't contain a power pill or away from the PacMan if it does. Protecting edible ghosts is given a really high priority (100000 points).

Implementation

Each game tick we check to see if a ghost needs to make a decision, if it does we loop through all possible move combinations for the ghosts. For each combination of ghost moves we then loop through the possible PacMan moves, advance the game and score the resulting position, picking the one giving the PacMan the highest score. As we are looking for the best set of ghost moves we choose the lowest scoring "best" PacMan move. This is effectively a single pass Min/Max algorithm using the scoring heuristic defined above.

The scoring area is found using a breadth first search from each of the ghost locations, stopping when we reach a node a ghost has already visited travelling in the same direction. Fianlly another breadth first search is performed for the PacMan, stopping at power pills or when a hunting ghost is encountered travelling in a different direction to us.

The final code (with comments and visual debug) was only 380 lines long.