

# The "blazi" ORTS client

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May 31, 2007

## 1 Introduction

This is a client for the game1 (resource gathering) category of the ORTS competition held in 2007. The rules can be read on the home page of the competition <sup>1</sup>.

## 2 Pathfinding

The map consist of  $32 \times 32$  tiles which have  $16 \times 16$  points. Pathfinding is performed on the tile level, and the the midpoints of the result path tiles are used for "real" movement.

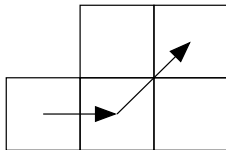


Figure 1: midpoint movement

Only a simple A\* algorithm is used which terminates when any goal tile appears in the open set. Multiple start and goal nodes (tiles) are supported. When extending a

node (from the open set) the cliffs and immobile objects (control center, minerals) are always checked on the adjacent nodes while the mobile objects are taken care only in a short distance.

## 3 Collision handling

Because the movement between the tiles are not so smooth (only a straight line from midpoint to midpoint), collisions can happen frequently.

So each worker checks a tile (in its moving path) in advance. If it is occupied by an other unit (worker or sheep), a path slicing is performed to round around that tile. It is done by the previously mentioned pathfinding algorithm.

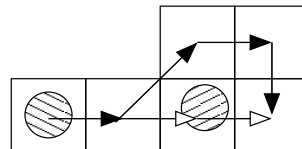


Figure 2: path slicing

<sup>1</sup><http://www.cs.ualberta.ca/~mburo/orts/AIIDE07>

Sometimes it is not enough, because units can collide on the same tile. In this case the worker units try to dodge their obstacle either left or right direction according to the possibilities and their further movement plans.

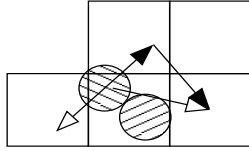


Figure 3: dodging when both left and right directions are free, and the right is chosen because that is closer to the continuation of the worker's planned path

If the worker cannot go to any direction, there is an emergency step back mechanism with which the worker tries to go away from the obstacle.

## 4 Mineral selection

Mineral has to be reserved by the workers. Now only one worker is allowed per mineral to decrease the probability of collisions.

If a worker is close to the control center, it choose among the free minerals (not reserved by other worker) according to their measured distance from the control center. Otherwise (it can happen if a worker gives up reaching a mineral and choose an other one) the worker choose only according to bee-line.

At the beginning the distances between the minerals and the control center are measured according to bee-line, and updated later by the pathfinding algorithm to get a more precise measurement.

## 5 Further plans

The following improvements could increase the effectivity of the client.

A much smoother movement algorithm between the tile midpoints could decrease the number of collisions and making the dodge part unnecessary. It also makes the emergency step back mechanism unnecessary, because that was useful only in the situation when the worker was stuck among minerals.

More intelligent path slicing which find the closer continuation of the remaining part of the path to continue.

Allowing more workers at the same minerals would have the benefit to get more resources from closer minerals. For this the reachable free space around the minerals have to be determined, and the reservation process should be done for them.

Calculating the game state around "interesting" areas to check whether waiting a little is much more beneficial than choosing a farer mineral or taking a longer way. These areas could be the auras of the minerals and important narrow passages.

Determining mines (tight group of minerals) and making bidirectional passages between them and the control center. It could decrease the number of collisions and the processor time used for individual pathfinding of the workers.