Faculty of Engineering
Computer Engineering Department
CMPN 402

Spring 2016

Machine Intelligence
Mini Project
Diamond Mine Game

Objectives

By the end of this mini project, the student should be able to:
- Learn how to use Machine Intelligence techniques for real life applications.
- Practice team work, working under stress, planning and good time management.

Problem Description (Screen Shot follows)

1. It is required to simulate and play the Diamond Mine game. In this game you have a character whose mission is to collect all the diamonds found in the Mine. The mine is represented by an n*m grid. In the mine you have four types of objects that you can face:

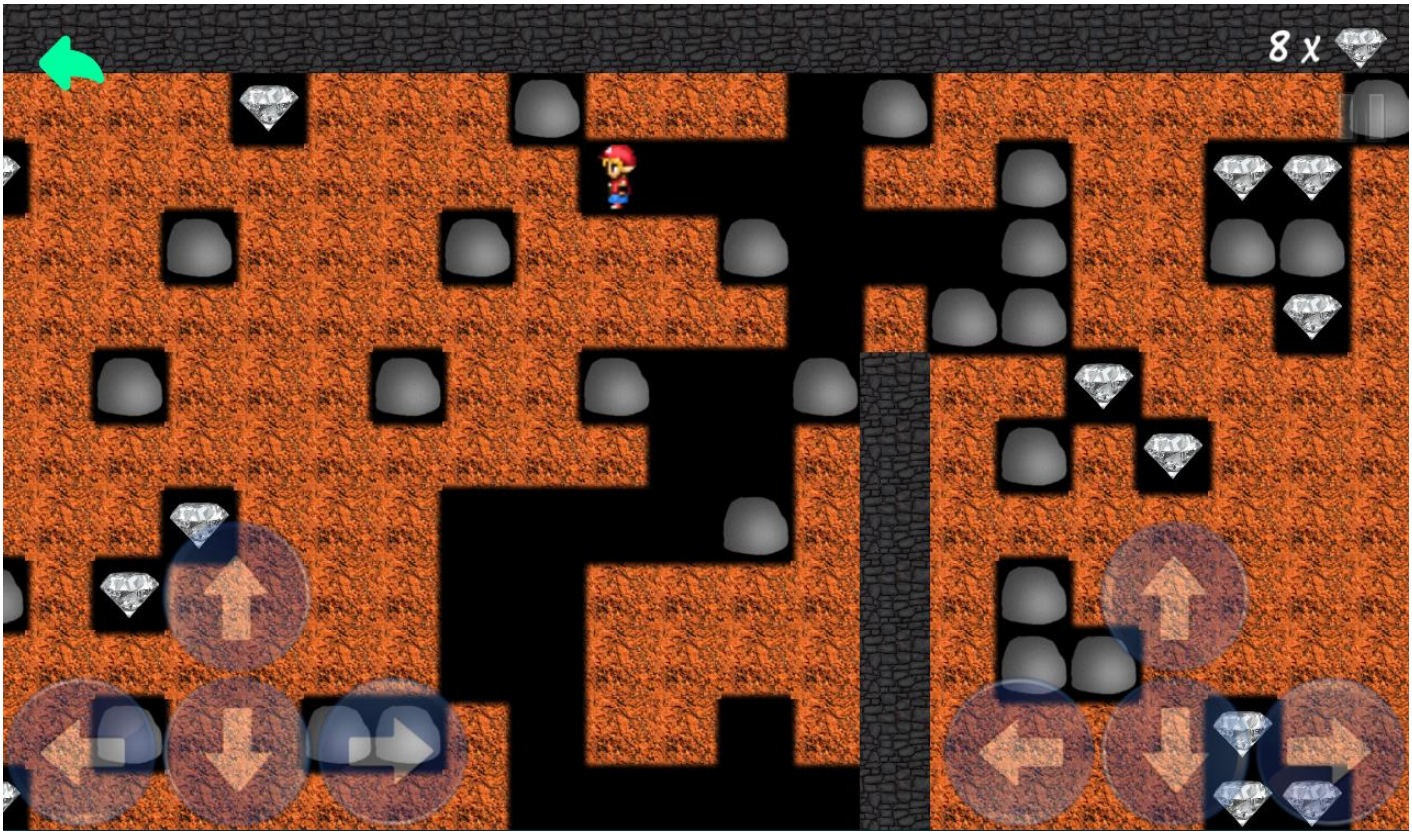
-Diamonds:
The character's goal is to collect all the diamonds found in the mine.

-Penetrable Ground:
The ground of the mine has a brown color. Passing through it simulates digging and removing dirt to have a vacancy to be able to walk.

-Hard Walls:
These are dark grey walls where the character can't penetrate and hence the character should find another path around these walls.

-Rocks:
These are light grey objects that appear in the ground of the mine. Once the part of the ground under a rock disappears (when the character dig through it), the rock falls vertically and hence if the character is under it, the character will be smashed and the game is over.

The following figure is a screenshot of the game.



Basic Requirement.

You are required to compare the performance of the character that adopts each of the following search algorithms to play:

a- Iterative depth deepening
b- A*
c- Simulated annealing
d- Constraint Satisfaction

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Team Members

Min(2 students) and Max (3 students)

Game Display

You are requested to display the game given the following file format:

1. **Size (NXM)**
2. **Initial location of character (x,y) (green square)**
3. **Total number of diamonds D followed by (x,y), coordinates of locations(red squares)**
4. **Total number of rocks R followed by (x,y), coordinates of locations(grey squares)**
5. **Total number of hard (cannot pass through) walls W followed by (x,y) coordinates(black squares)**
6. **The rest of the grid is assumed penetrable ground(brown squares when penetrated become white)**

Modes of operation

1. We will give you an initial setup to be used as a benchmark for algorithm comparison. This comparison will be reported in your final document.

2. Using a different setup, you will be asked to run each of the four algorithms.

   You will be given a time limit not to be exceeded. The program will produce a matrix of results as follows:

Algorithm name	Maximum number of nodes stored at any one time during the execution	Number of diamonds collected	Collected all diamonds or not

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3. **An interactive mode where a user is able to play the game.**

Competition

1- Each team will compete for best simulating annealing results of the initial setup.
2- Each team will compete with the other teams as clarified by the evaluation criterion.

Documentation

Your document is only a report of experience gained, implementation issues you faced and testing results of the initial setup.

Deliverables

Each team is required to deliver the following:

1- A CD that contains:
   a. Software source code.
   b. A commercial to advertise the game
      (maybe a scan of a hard copy and/or color version and/or different video/animation like.)
   c. The final document
2- Hard copy of
   a. Project final documentation

Evaluation Criteria

You must build your project from scratch and no readymade modules will be acceptable

1- 10 % for displaying the game.
2- 5 % for the commercial of the game.
3- 20% for a working product of all 4 algorithms (5% each)
4- 20% for the final document that has the results using the initial setup
5- 10% for generating the matrix of results day of competition
6- 10% for sorted best results of the simulation annealing implementation
7- 10% for a working product in the human interactive mode
8- 5% for sorted best computer/computer competition
9- 5% for sorted best human/computer competition
10- 5% for sorted human/human competition

Important Dates

1- March 15th (team names) sent by email to Eng. Lydia
2- Game display March 29th
3- Complete algorithms April 15th
4- Manual mode April 27th
5- Final Document May 4th
6- CD delivery and Competition May 11th