Logic And Artificial Intelligence Project Thesis.

Circle Packing.

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1 Team Members

# Team Members

Name: George Michael ID: 150485

Name: Mohammad Adel ID: 146876

2 Responsibilities

# Responsibilities

All tasks are divided equally from the design to the implementation across the members of the project, at the end of the project the AI Agent will be able to find a solution for a specific circle packing problem instance with providing the Graphical representation of that solution to the specific problem.

3 Summary

# Summary

The project goal is to arrange and distribute a given list of circles in an infinite two dimensional plane such that the maximum distance between any two circles is minimized as possible by using an intelligent artificial agent, the project goal is to make the agent able to find the closest solution to the given problem if not the optimal given the following two constraints:

1-No two or more circles are overlapped.

2-The rearrangement happens only in the two dimensional infinite plan.

4 Problem Description and Background

# Problem Description and Background

Circle Packing is one of the hardest problems in the field of Geometry, given the above two constrains and a list of radius of circles, the solution to the problem is to minimize the area in which the list of circles will occupy, alternatively, the goal is to minimize the maximum distance between any two given circles.

Let us assume that in the above figure we have a list of Circles with radius list [3,5,10] respectively, so the maximum distance can be easily obtained by configuration of the circles in a straight line one after another without inner-spaces in between.

While the configuration in the above figure the distance between any two circles is minimized than the first configuration, providing a list of n circles to the agent, it should give the closest solution possible if not the optimal to minimize the maximum distance between any two circles.

5 Proposed Technique or Solution

# Proposed Technique or Solution

The AI is a goal based Agent as the number of possible instances are closer to be infinite, Randomization and Probability is the core of the AI agent where an evaluation function is needed to distinguish between instances of the set of all valid solutions, the random walk theory is where the probability is applied, where a number of iterations is needed to ensure that the answer is closer to the optimal solution.

6 Experiments, Results Or Evaluation

# Experiments, Results Or Evaluation

Evaluation Reference:

https://pdfs.semanticscholar.org/9f04/17dbb3379c043da6af2525db3f3f4149c9f6.pdf

7 Software And Tools

# Software And Tools

PyCharm IDE for Python programming language, PyGame Visualizing tool

8 Resources Found

# Resources Found

https://pdfs.semanticscholar.org/9f04/17dbb3379c043da6af2525db3f3f4149c9f6.pdf