

IT-326: Introduction to Artificial Intelligence – Angry Birds

Week 4 –Submission

Team : Finishers

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Code Implementation for previously suggested Strategies

1. Found the Center of mass of the whole structure by assigning different weights to different objects (Wood Ice Stone)

Object	Weight
Wood	30
Ice	25
Stone	50

2. Used the below given formulae for finding the Center of mass

$$X(\text{Numerator}) = \sum (\text{ob}(i).x) * (\text{ob}(i).width) * (\text{ob}(i).height) * (\text{ob}(i).weight)$$
$$X(\text{Denominator}) = \sum (\text{ob}(i).width) * (\text{ob}(i).height) * (\text{ob}(i).weight)$$

$$Y(\text{Numerator}) = \sum (\text{ob}(i).y) * (\text{ob}(i).width) * (\text{ob}(i).height) * (\text{ob}(i).weight)$$
$$Y(\text{Denominator}) = \sum (\text{ob}(i).width) * (\text{ob}(i).height) * (\text{ob}(i).weight)$$

$$(X.cm, Y.cm) = ((X(Numerator)/X(Denominator)), (Y(Numerator)/Y(Denominator)))$$

2. We found the Centre of mass using above formulae and hit the first bird on the center of mass with the least possible angle. Rest of the shooting is done using the old strategy with an Improvement of hitting the pig in highest position which is nearer to the bird so this may cause more destruction on the remaining structure as the destructed structure may move in the direction of motion of the bird.

This is the implementation for hitting the pig which is nearer to the bird from a set of probable hits at same height.

```

int height=10000,max=0;
for(int i=0;i<=pigs.size()-1;i++){
    pig=pigs.get(i);
    if(height>pig.getCenter().y){
        height=pig.getCenter().y;
        max=i;
    }
}
pig=pigs.get(max);
int leastX=10000;
int leastX_maxY=0;
for(int i=0;i<pigs.size();i++){
    if(pig.getCenter().y==height){
        if(pig.getCenter().x<leastX){
            leastX=pig.getCenter().x;
            leastX_maxY=i;
        }
    }
}
pig=pigs.get(leastX_maxY);

```

---This is the Code snippet for finding the Center of mass of the structure to be destroyed.

```
public Point centreOfMass(List<ABObject> blocks){
    int cmx=0,cmy=0;
    int numx=0,dinx=0;
    int numy=0,diny=0;
    for(int i=0;i<blocks.size();i++){
        ABObject block=blocks.get(i);
        Dimension size=block.getSize();
        Point center=block.getCenter();
        if(block.getType().id==10){
            numx=numx+center.x*size.width*size.height*ice_wt;
            dinx+=size.width*size.height*ice_wt;
            numy=numy+center.y*size.width*size.height*ice_wt;
            diny+=size.width*size.height*ice_wt;
            continue;
        }
        if(block.getType().id==11){
            numx=numx+center.x*size.width*size.height*wood_wt;
            dinx+=size.width*size.height*wood_wt;
            numy=numy+center.y*size.width*size.height*wood_wt;
            diny+=size.width*size.height*wood_wt;
            continue;
        }
        if(block.getType().id==12){
            numx=numx+center.x*size.width*size.height*stone_wt;
            dinx+=size.width*size.height*stone_wt;
            numy=numy+center.y*size.width*size.height*stone_wt;
            diny+=size.width*size.height*stone_wt;
            continue;
        }
    }
    //System.out.println("x"+" "+numx/dinx+" "+"y"+numy/diny);
    return new Point(numx/dinx,numy/diny);
}
```

Further Improvements in the Strategy to be coded

The strategy which we have devised is for expecting the next state for a bird after a bird has hit the structure using "Expectimax" of Score routine in the Naïve Agent.java. Randomizing the next state if block is moving along the bird direction. Also we are assigning the strengths of all birds according to their characteristics.

We have two parameters for the three types of objects (Ice Wood Stone), namely

1. Strength to Break ratio.
2. Amount of movement in the direction of the bird

We will have an initial state and then for next state what will happen if the bird is shot at 10 degree, 20 degree, 30 degree and so on. Which will end in a game state where all the pigs will die.