

ECS 170 - Assignment 1
February 5, 2017

Team :

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a) Create an admissible heuristic, document the exact form of the heuristic and show examples that it is consistent. Draw an example of the best case and show that your heuristic underestimates the true cost. (6 points per cost function)

As we learned in class, using the straight line as a heuristic is the worst case heuristic. So, we started considering about all the factors that plays role. We considered factors like distance, height and distance from a line joining the goal and the start points.

This heuristic works for both cost functions.

First step: We took the shortest distance between 2 points as our heuristics function but it wasn't the best case.

Second Case: So, next step that I considered was height between goal state and successor state.

Third Case: we tried using the distance between the successor node and the line between start node and the end node.

Our heuristics function is the addition of all the 3 cases

So, our program chooses the least value of Heuristic function

```
private double getHeuristics(final TerrainMap map, final Point pt1, final Point pt2)
{
    int yd = pt2.y - pt1.y; // y2 - y1 : This is finding the difference in y- axis
    int xd = pt2.x - pt1.x; // x2- x1 : This is to find difference in x- axis

    //this is the straight line distance from the two points
    double dist1 = Math.pow((Math.pow(yd,2) + Math.pow(xd,2)), 0.5 );
    // this is the height difference of the two points
    double ch = map.getTile(pt2) - map.getTile(pt1);
    // this is the diff between the x and y coordinate of the first point squared, divided by 2 raised to
    0.5
```

```
double dl = Math.pow(((Math.pow((pt1.x-pt1.y),2))/2),0.5);

//The heuristic is sum of all three from the above.
double heuristic = dist1 + ch + dl ;
return heuristic;

}
```

Proof of Admissibility :

For two points, for example at P1(250,250) and P2(900,900)
Height of P1 = 5, Height of P2 = 10

dist1 = 5

h = 5

dl = 3.53

Heuristic = 13.53 which will be lower