AI assignment one – Kraken Universe  
  
Part 1 [10pts]

You are the navigator on an escape pod from a larger system ship which was attacked by a space Kraken – a horrid beast which eats ships and of course you whole. The system is 100 parsecs cubed and your ship begins in sector (0,0,0). You must minimise the number of parsecs the ship takes to find the planet system while avoiding Black holes and the Krakens. Black holes, Krakens, and planets put out radiations which are unique for sensors and can be detected in a one square neighbourhood (note neighbourhood is to be defined as a one unit move in the x or y or z direction – no diagonals).

The ship may move one step per turn in its neighbourhood. If a ship visits a sector with the Black hole it is sucked off into nothingness, if it visits a sector with the Kraken then it is crushed and the entire crew is eaten.  
  
The escape pot is equipped with a single Megabomb. Megabombs are highly effective at killing all biological life in a single sector beside the ship with its neighbourhood – they also produce little radiation. Using a megabomb will remove any Kraken or Planet from a neighbouring sector to the ship. Black holes will not be affected by the megabomb as they just suck in all the energy.

Input:

A file with the following format with newlines between them

B – Followed by three integers; is a black hole

K – Followed by three integers; is a Kraken

P – Followed by three integers; is a planetary system which can sustain life

e.g.

B 0 2 0  
K 0 1 3  
P 0 1 4

Output:

The number of moves and the pathway generated by your system or a message saying that it is not a solvable mission; followed by the time utilized by the method to find this solution. If a megabomb is used then the output for a line should be M followed by the location on which it is used.

e.g.

5  
0 0 0  
0 0 1  
0 0 2  
0 0 3  
M 0 1 3  
0 1 3  
0 1 4  
0.2 msec  
  
Implement:

A random search method with 100 attempts taking the least number  
A backtracking search  
Another search method of your choosing (e.g. A-star, Simulated Annealing, etc.)

Compare and contrast the methods using statistical arguments against a number of test maps developed. How did you decide upon these maps as good tests of your method? Justify your selections.

Part 2 [5 pt]

Megabombs have now been rigged to have rocket boosters and can devastate multiple sectors. A megabomb now can be shot up to 3 sectors away and has an explosion radius of 2 sector. A new style megabomb passing through a sector with a black hole will still have no effect; it is sucked into the hole before the detonation. Assume that the ship is megabomb shielded and will not be affected by being part of the blast radius. Run the same experimental method as above – is there any significant changes with this new ability? Can you produce a map where this leads to a significant increase in time savings or can allow an impossible map to be made solvable? Does it make any solvable maps unable to be solved? If so, prove it via a worked example.

Part 3[5 pt]

What arrangements of Krakens, Black holes, and planets are hard to solve or impossible? Produce an argument demonstrating an arraignment which provides for a hard to solve map. Produce an argument demonstrating an arraignment which provides for arrangements for impossible maps. Is there a commonality between impossible arrangements?

What to hand in:

Your source code.

A report answering the questions from above.