QUESTION NO-01 (Marks: 04+08)

a). De fine the term "intelligence"? What is artificial intelligence? How we can prove that a machine is intelligent?

b). Briefly define each of the following with example:
(i). Simple reflex agent (ii). Utility based agent (iii). First Order logic
(iv). Learning Agent (v). Bidirectional Search

Intelligence:

Intelligence can be defined as a general mental ability for reasoning, problem solving, and learning. Because of its general nature, intelligence integrates cognitive functions such as perception, attention, memory, language, or planning.

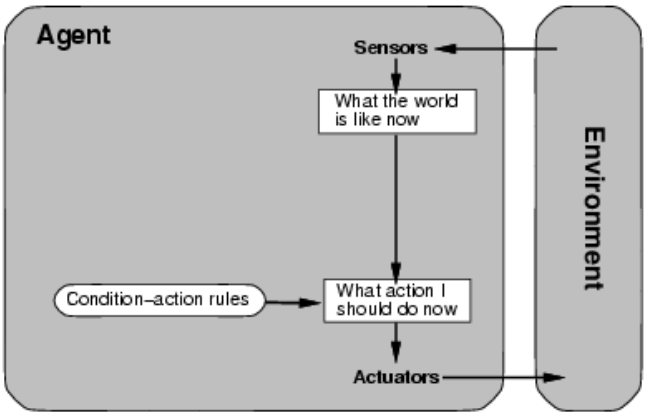
Artificial intelligence:

The study of mental faculties through the use of computational models (charnaik + mcdermot 1980) OR

AI refers to the computational tools (like computer controlled robot) to perform task commonly associated with intelligent beings.

Simple reflex agent

Select action on the basis of current percept, ignoring all past percepts



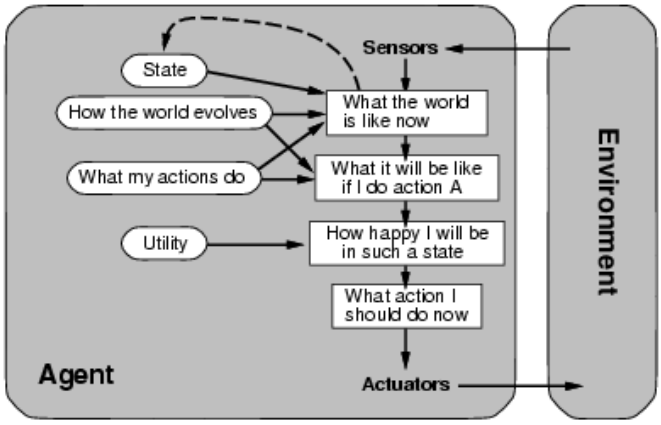
Learning Agent:

Learning is the continuous process is always learn on the basis of your experience.. so same as much as machine is trained performance would be better

Utility-based agent:

The agent uses a utility function to evaluate the desirability of states that could result from each possible action

Where we define a function that returns a value is called utility.



First Order Logic:

Whereas propositional logic assumes world contains facts, first-order logic (like natural language) assumes the world contains

In FOL Sentences are true with respect to a model and an interpretation

• Objects: people, houses, numbers, theories, Ronald McDonald, colors, baseball games, wars, centuries . . .

• Relations: red, round, bogus, prime, multistoried . . ., brother of, bigger than, inside, part of, has color, occurred after, owns, comes between, . . .

• Functions: father of, best friend, third inning of, one more than, end of

Syntax of FOL: Basic elements

Constants KingJohn, 2, UCB, . . .

Predicates Brother, >, . . .

Functions Sqrt, LeftLegOf, . . .

Variables x, y, a, b, . . .

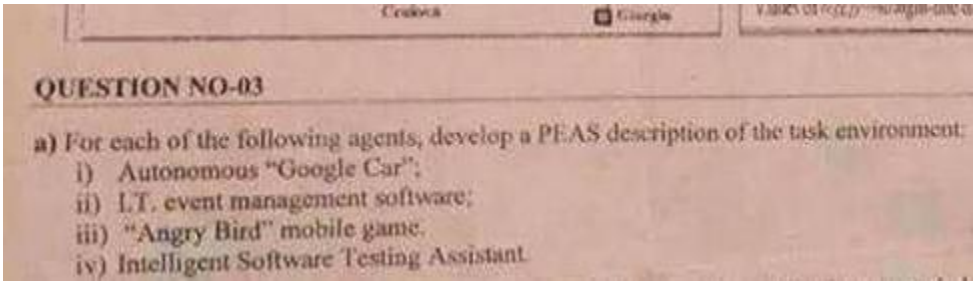
Connectives ∧ ∨ ¬ ⇒ ⇔

Equality =

Quantifiers ∀ ∃

Bidirectional search:

Bidirectional search is a graph search where unlike Breadth First search and Depth First Search, the search begins simultaneously from Source vertex and Goal vertex and ends when the two searches meet somewhere in between in the graph.



QUESTION NO-03

a) For each of the following agents, develop a PEAS description of the task environment:
i) Autonomous "Google Car";
ii) I.T. event management software;
iii) "Angry Bird" mobile game.
iv) Intelligent Software Testing Assistant

Question # 3

A (i)

Performance: Safety, time, legal drive, comfort.

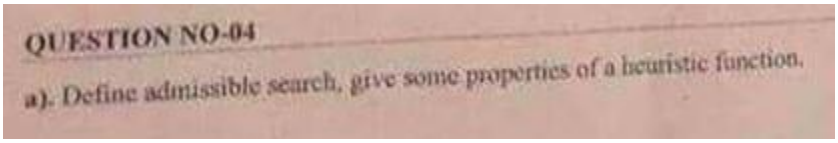
Environment: Roads, other cars, pedestrians, road signs.

Actuators: Steering, accelerator, brake, signal, horn.

Sensors: Camera, sonar, GPS, Speedometer, odometer, accelerometer, engine sensors, keyboard.

A (iii) Angry Birds

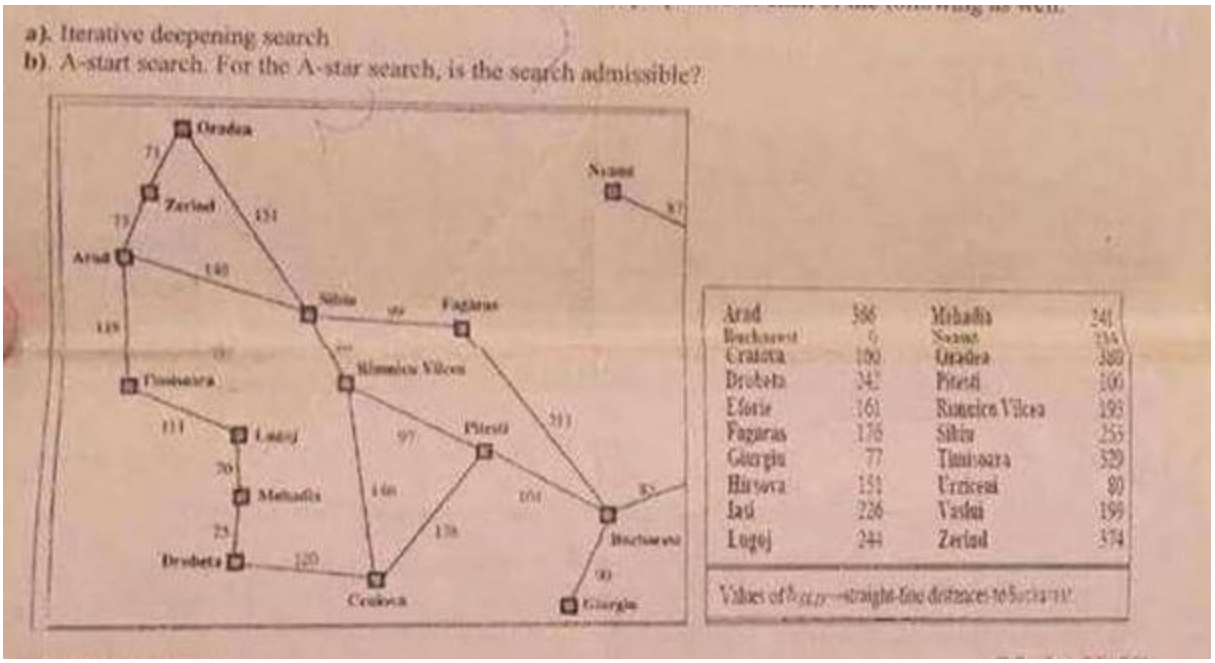
Performance: score (correlated with but not perfectly coupled with: levels cleared, pigs destroyed, buildings destroyed)
Environment: a side-view visual interface, bird selector, slingshot actuator control, post-launch controls (blue and white birds), physical simulation (momentum, penetration, gravity, TNT)
Actuators: which birds to use, draw depth and angle, split point for blue birds, egg drop point for white birds
Sensors: feedback from game – stylized physics sim plus scoring



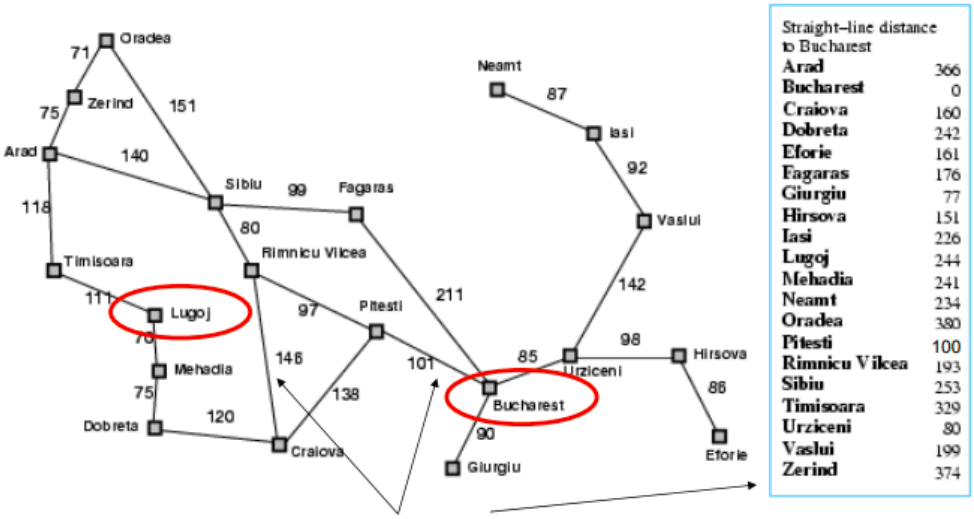
QUESTION NO-04

a). Define admissible search, give some properties of a heuristic function.

- In order for heuristic to be admissible function must be not over estimates the actual value
- h(n)always equal to actual function h(n) = SLD
- h(n) is always greater or equal to one



4.1 A* search: From Lugoj to Bucharest

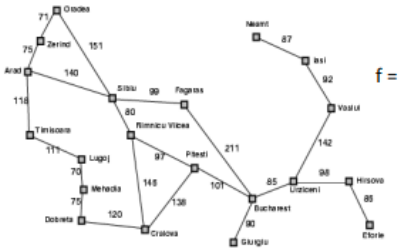


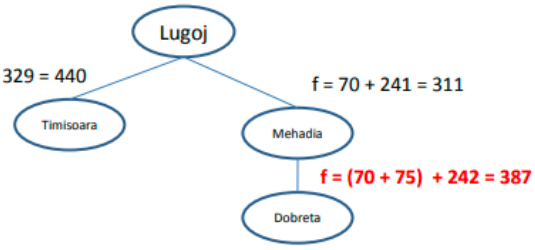
Straight–line distance to Bucharest	
Arad	366
Bucharest	0
Craiova	160
Dobreta	242
Eforie	161
Fagaras	176
Giurgiu	77
Hirsova	151
Iasi	226
Lugoj	244
Mehadia	241
Neamt	234
Oradea	380
Pitesti	100
Rimnicu Vilcea	193
Sibiu	253
Timisoara	329
Urziceni	80
Vaslui	199
Zerind	374

f(n) = g(n) + h(n)

A* search is guided by evaluation function f(n)

A* search: From Lugoj to Bucharest





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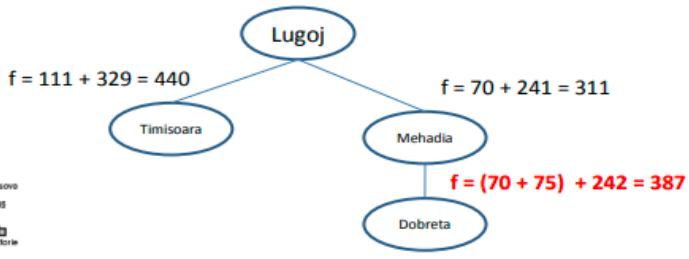
Activate Wi

A* search: From Lugoj to Bucharest



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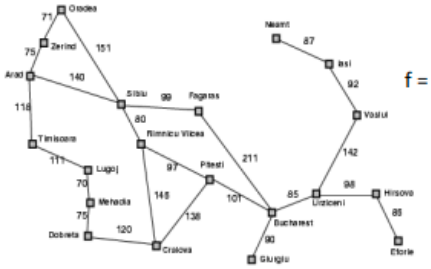

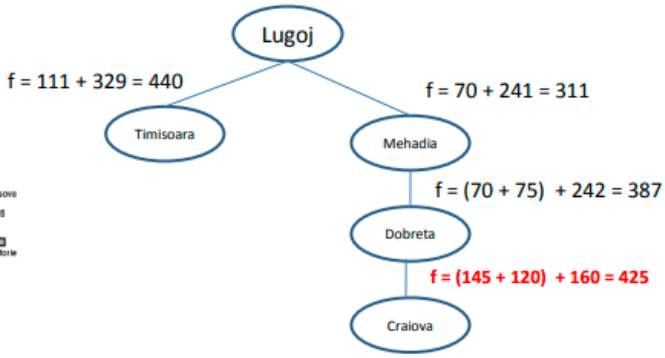

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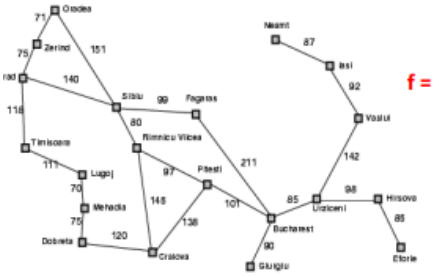

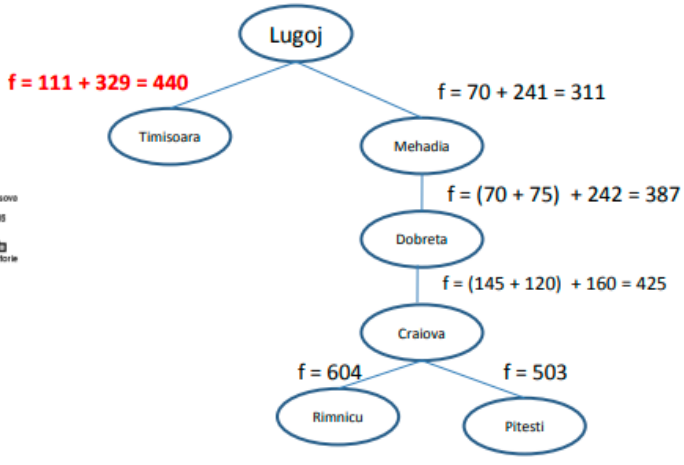

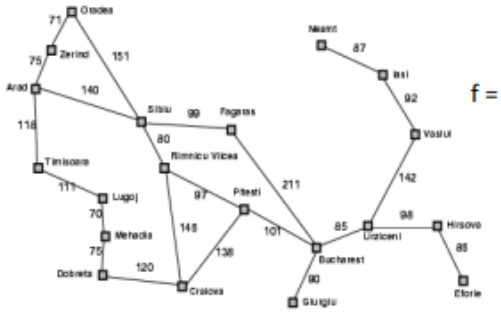

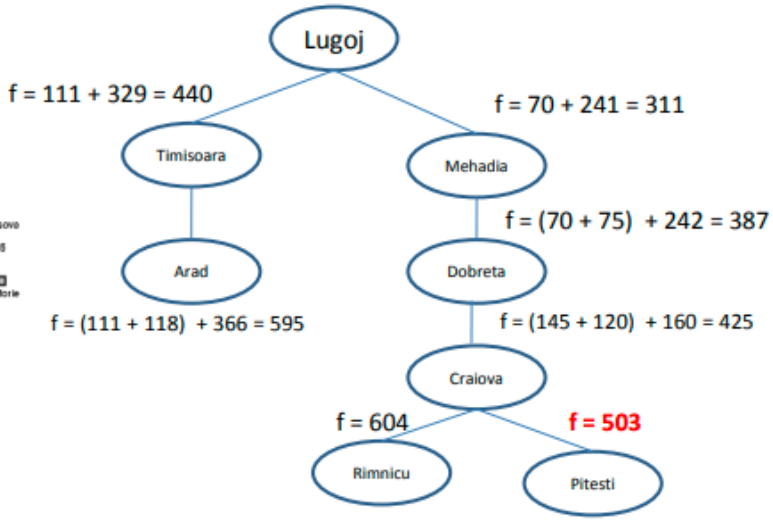

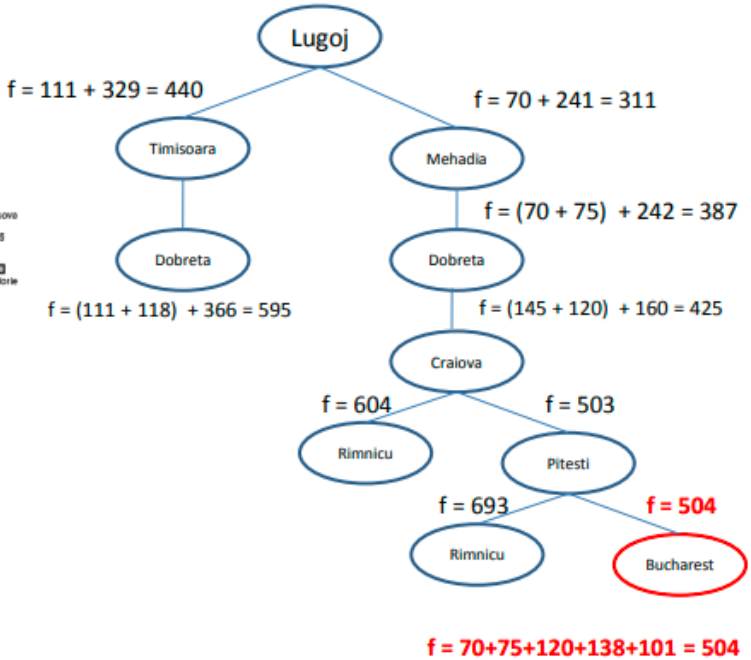

f = 70+75+120+138+101 = 504

4.2 Heuristic path algorithm

$f(n) = (2 – w)g(n) + wh(n)$

For what value of w is this algorithm guaranteed to be optimal?

g(n): a path cost to n from a start state

h(n): a heuristic estimate of cost from n to a goal state