**Q1. Examine the AI literature to discover whether the following tasks can currently be undertaken by computers: (20 marks, 1 mark for each correct judgment and 1 mark for each correct explanation.) a. Playing a decent game of table tennis (Ping-Pong). b. Driving in the center of Cairo, Egypt. c. Driving in Victorville, California. d. Buying a week’s worth of groceries at the market. e. Buying a week’s worth of groceries on the Web. f. Playing a decent game of bridge at a competitive level. g. Discovering and proving new mathematical theorems. h. Writing an intentionally funny story. i. Giving competent legal advice in a specialized area of law. j. Translating spoken English into spoken Swedish in real time. For the currently infeasible tasks, try to find out what the difficulties are and predict when, if ever, they will be overcome.**

A1:

a: Yes, because table tennis have standard rule, which can easily judge win or lose of player. And using system of visual sense as well as low level control algorithm reply to dynamic environment. Finally, I find existing robot: Andersson’s robot(1988), although it achieved a reasonable level of proficiency.

b: No, according to PAGE of car in the center of Cairo, which have a lot of people, other cars and its road have many hinder. Their behavior is unpredictable and massive. The information about the environment of this agent can be seen as infinite.

It’s multiagent, partically observable, and stochastic and dynamic and so on. Driving in downtown Cario is too unpredictable for any of these to work.

c: Yes, although the question c similarly to question b. Some of the cars manged to streets, intrersections, well-behaved traffic, and well-behaved pedestrains in good visual conditions. Agent is able to identify his surroundings through his visual receptors because the place is orderly and predictable.

d: No. Because to go shopping requires visual recognition, not only in a crowded shopping environment, but also for the recognition of different objects. Both are extremely difficult. In addition, this kind of strength is very difficult without damaging the items it have taken, and it have to do a lot of repetition, which is impossible under the current technology.

e: Yes (or may be). This should be regarded as a common software, if we set up a program in TaoBao or other online trading software to let him buy enough goods for us on a regular basis. Unless there is a rapid change in the goods we set, the program may fail. But this kind of situation is rare.

f: Yes. It’s just a simple board game. Now many games on the Internet are popular all over the country, such as fighting landlords, and players often hang up through the hosting function. Is to let the computer program help you play this game. Therefore. Bridge can also be used. This is because the rules of the bridge game are fixed and there are no other interfering factors.

g: Yes. The proof of mathematical theorems depends on logic. Therefore, as long as enough knowledge is transferred to artificial intelligence, the problem can be deduced formally. In fact, computer reasoning has solved many problems so far. In 2005, artificial intelligence experts also used French mainframe computers to prove the "four-color conjecture".

h: No. Even though AI already exists to generate some poems or stories. But stories and poems they generate usually have no logic between them and are not interesting enough.

i: No. Artificial intelligence can do this in some areas. Because the most fundamental thing of the law is logic. It is possible to let artificial intelligence learn all the legal provisions and give him the logic. But it is limited to social law, in some of the more complex commercial contract laws. Artificial intelligence is difficult to deal with.

J: Yes. Grammar rules and words are limited. And I was using similar functionality when I finished this coursework.

**Q2. This exercise explores the differences between agent functions and agent programs. (20 marks, 2 marks for each correct judgment and 2 marks for each correct explanation.) a. Can there be more than one agent program that implements a given agent function? Give an example, or show why one is not possible. b. Are there agent functions that cannot be implemented by any agent program? c. Given a fixed machine architecture, does each agent program implement exactly one agent function? d. Given an architecture with n bits of storage, how many different possible agent pro- grams are there? e. Suppose we keep the agent program fixed but speed up the machine by a factor of two. Does that change the agent function?**

**A2:**

**a.** Yes or maybe (in the dynamic environment).

Agent function is defined that maps any given percept sequence to an action. Agent percept to a certain extent equivalent to independent variable, agent action equivalent to dependent variable, percept sequence equivalent to domain. The agent program is the concrete code, that implements this abstract behavior, which is equivalent to a function expression.

Just add another null statements program that does not affect the output of the function to the agent program that can achieve the output of the agent function. But this is limited to the static environment, that is, the constant state of the percept.

When the environment is dynamic, the percept is dynamic, output is not fixed.

**b.** Yes.

If the agent function is when percept is a turing machine program that halts, the agent function output “true”, otherwise output “false”, the agent function might specify.

However, when the environment is dynamic, and the speed of machines less than infinite, the rational agent function may not be implementable by any agent program.

**c.** Yes;

Agent structure = architecture + program, and if the architecture of machine is fixed. The architecture as well as program is fixed, the agent’s behavior is fixed. So each agent program implement exactly one agent function.

**d**.2^n agent program;

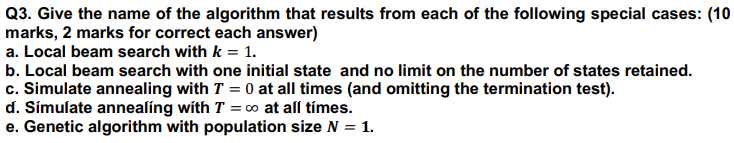
Most programs will not execute because each program takes up n-bits, and is obviously out of memory. Any given program takes up a maximum of n-bits memory, so the agent state history is less than 2^n. The action of the agent function is based on the history of the percept sequence. There will be a lot of agent function that cannot be run because the machine is lack of memory.

**e.** Yes (when environment is static and agent program can’t focus speed)

No (when environment is static and agent program need speed.)

Maybe (when environment is dynamic)

Because agent function depends agent program and agent environment. If agent is static, that is agent percept is not changed, and agent program ignore elapsed time, the agent function don’t be changed; But when the agent environment is dynamic, speeding up the machine may choose different actions, the agent function is changed.



A3:

1. hill-climbing search;

because there is 1 recorded state of the current state. It looks at all the neighbor states of the “1” state and pick the 1 number of best successor states among all the neighors. This search is hill-climbing search.

1. breadth-first search.

Because continue to look at their neighbors and so on. It searches each layer of the node before continuing the search of the next layer. This is the breadth-first search.

1. Hill-climbing search (or first choice hill climbing)

Simulate annealing algorithm is similar to the mountain climbing method, except that it does not choose to move in the best direction. This algorithm moves in the direction of stat difference with a certain probability to jump out of the local max. And this probability is related to T. when T is 0, every downward would be rejected with probability 1. That is, this algorithm is hill-climbing search (first choice hill climbing).

1. Random walk through the search space (or approximately equivalent to depth-first search)

Every successor would be accepted with probability. The algorithm will ignore the good or bad of the next node, so the search will continue, because when the optimal solution is found, it will still jump to the next node.

1. Random walk algorithm

The population is 1, the parents will be same and be individua. There is a small chance of mutation. The algorithm executes a random walk in the space of indivaduals.

