

**BACS 2003**

**BACS 3074**

**BMCS 2003**

**Artificial Intelligence**

# **Tutorial Book Sample Answer**

## **Tutorial 1**

1. Who is the father of A.I.? Describe the reason why he was recognized so. ()

**Answer:** John McCarthy

1. Due to his astounding contributions in the field of computer science and AI. By the mid-1950s,
2. John McCarthy created the term “artificial intelligence” (1956), which he defined as “the science and engineering of making intelligent machines. Dartmouth conference in 1956
3. The objective of the conference was to explore ways to invent a machine that could reason like a human, has problem solving skills and self-improvement.

*Student to find the answer from any reference. Reference source must be indicated*

2. Identify one key event or major achievement of A.I. development in the year of

- a) 1960-1969 ()
- b) 1970-1979 ()
- c) 1980-1989 ()
- d) 1990-1999 ()
- e) 2000-2009 ()
- f) 2010-2019 ()

**Answer:**

1960-1969

1. Industrial robot (Unimate)
2. Eliza chatbot developed by Joseph at MIT AI lab from 1964-1966. Early simple NLP computer program chatterbot later clipped to chatbot. Early test case for Alan Turing, look at key word in statement and reflect back in simple phrase and Question. Eliza could carry out conversations that sometimes trick users into believing that they are actually interacting with another human but most of the time it is only able to provide standard responses which were meaningless.
3. In 1965 the first expert system DENDRAL was developed by Edward Feigenbaum.
4. MacHack. Computer chess program written by Richard

1970-1979

1. Knowledge based medical diagnosis program (expert system): decision making ability of a human expert. To solve complex problem by reasoning through bodies of knowledge, using if then rules rather than conventional procedural code. Expert system divided into inference engine and knowledge base. Knowledge base represents facts and rules. Inference engine applies the rules to the known facts to deduce new facts
2. Wabot-1 in Japan big clumsy robot, able to see and converse

1980-1989

1. Commercial expert system : financial advice, diagnose car engine problems

1990-1999

2. Polly behavior based robotics (vision based robot-AIBO robot for entertainment)
3. ERS 110 robot pet dog (AIBO developed by SONY)
4. In 1997, Deep Blue, a chess-playing computer developed by IBM became the first system to win a chess game and match against a reigning world champion.
5. Alice (+NLP sample data collection)

2000-2009

1. Recommendation technology –item based/user based
2. Autonomous robot vacuum cleans while avoiding obstacles (Roomba)

2010-2019

1. Mobile recommendation apps
2. Machine Learning, Deep learning
3. 2010 - Kinect the first gaming device tracking human body movement through a 3D camera and infrared detection released by Microsoft for Xbox 360
4. 2011 - Apple released Siri, which is a built-in voice-controlled personal assistant.

5. 2012 - Google researchers have trained a massive neural network equipped with 16,000 processors to detect cat images without any background information, and found 10 million million unlabeled images in YouTube videos.
6. 2013 - A computer program called Never Ending Image Learner (NEIL) released. It works 24/7 learning information about image on internet
7. 2014 - Cortana, a virtual assistant similar to Apple's Siri released by Microsoft. And in the same year Alexa, which is a home assistant, developed into speakers, functioning as a personal assistant released by Amazon.
8. 2015-2017 - AlphaGo, a bot for playing Go was developed by Google DeepMind and successfully beat many human world Go champions.

*Each event of a decade to be answered by different students. They are to find the answers from any references. Reference source must be indicated.*

3. Name an artificial intelligence application that is created by a Malaysian company. Briefly describe its A.I. functions. ()

**Answer:**

1. AskAILA is an artificial intelligence (AI) legal assistant developed by the Malaysian law firm Shang & Co. It is designed to provide accessible legal advice at a lower cost than traditional law firms, particularly in the area of labor law. The AI is trained and equipped with knowledge of Malaysian labor laws and regulations, and it can provide assistance 24/7
2. Aerodyne is a global enterprise solutions provider specializing in drone technology, data technology, and digital transformation (DT3). It is ranked the world's #1 drone service provider in 2021 and 2022 by Drone Industry Insights (DII). The company helps integrate digital technology into various areas of businesses, changing how they operate and deliver value to their customers. Aerodyne's services are designed to be faster, better, cheaper, and safer. The company has been providing global DT3 solutions since 2014. It helps organizations leverage drone data and AI to resolve industrial challenges, enabling digital transformation, optimal operations, productivity gains. Its solutions cover infrastructure asset management, precision agriculture, oil & gas, telecoms, construction, utilities, and more.
3. Billion Prima Sdn Bhd is a Malaysian company established in 2007. Its office is located at No. 2C-3, Jalan Jubli Perak 22/1 Section 22, 40400 Shah Alam, Selangor. The company specializes in the assembly, supply, and maintenance of scanning machines. With over 15 years of experience, Billion Prima has developed and deployed cargo scanners and has transformed from a service maintenance-oriented firm to a world-class cargo x-ray scanner R&D and manufacturing company. The company's cargo inspection system is designed for manifest verification, homeland security, and contraband interdiction. Billion Prima won the Security Technology - Cargo Handling category award at the Malaysia Technology Excellence Awards in 2023
4. MeLAB Global Sdn Bhd is a tech company established in 2016 in Malaysia (registration number 1233436H/201701019271) by Bong Kum Tim, Bong Mei Lai, and Alexander Henderson. Their business includes mobile apps, web application programming, website development, blockchain, machine learning, AI, and the education industry. MeLAB has developed facial recognition and license plate recognition (LPR) technologies using AI for security in residential buildings. Their system offers automatic license plate detection and recognition. Their facial recognition system allows door access control, offering convenience and security without need for passcards. It facilitates hands-free operation. MeLAB claims their system can work offline and online, providing a complete hardware and software solution. This allows operation even during server downtimes. They offer rental, leasing or purchase options for their systems. Their customers range from low cost flats to luxury high rise buildings. MeLAB Global office is located at: B1-1-W9, Pusat Perniagaan Sri Ehsan, Jalan Sri Ehsan 15, Taman Sri Ehsan, Kepong 52100 Kuala Lumpur, Malaysia. In summary, MeLAB Global is a Malaysian tech startup focused on AI, facial

recognition and license plate recognition systems for security in residential buildings. Their systems offer convenience, security and savings.

*Student to find the answer from any reference. Reference source must be indicated*

4. Differentiate between the following, then provide an example for each type of system.
- Systems that think like humans. ()
  - Systems that act like humans. ()
  - Systems that think rationally. ()
  - Systems that act rationally. ()

**Answer:**

System that thinks like humans - The cognitive modelling approach

System that thinks like humans is that system that has the capability of self-learning, pattern recognition and logical thinking. This requires "getting inside" of the human mind to see how it works and then comparing our computer programs to this. This is what cognitive science attempts to do. The system is designed to solve problems by thinking, reasoning, and remembering, to mimic the way the human brain works Machine Learning and vision system (pattern recognition, object detection)

System that acts like humans - The Turing Test approach

Systems that act like humans are systems that have human characteristics and reflect the human condition/ has the capability and characteristics of acting like a person or doing human work. It can perform human's level action or interaction with minimal human assistance like communicating with humans in human language without understanding the meaning of the action. These programs must behave according to certain normal conventions of human interaction in order to make themselves understood. The underlying representation and reasoning in such a system may or may not be based on a human model. Example a conversational chatbot is able to chat with any human but it may not truly understand the language like how humans process it./Automation

A system that emulates human behavior may not always exhibit rational thinking. For example, when a human drives from Tarumt to KLCC, they might simply follow the familiar route they've always taken based on their past experiences, rather than considering specific conditions like the shortest path. In this case, their "thinking" relies on past experiences.

System that acts rationally – Agent-based system

A system that can act autonomously and independently in accordance with goals that are either created or predefined. The system is sensitive to its environment and can react to changes. Acting rationally means acting so as to achieve one's goals, given one's beliefs. An agent is just something that perceives and acts. Example: a map that detects GPS location of a driver and produce the shortest path according to his destination./Adaptive system/

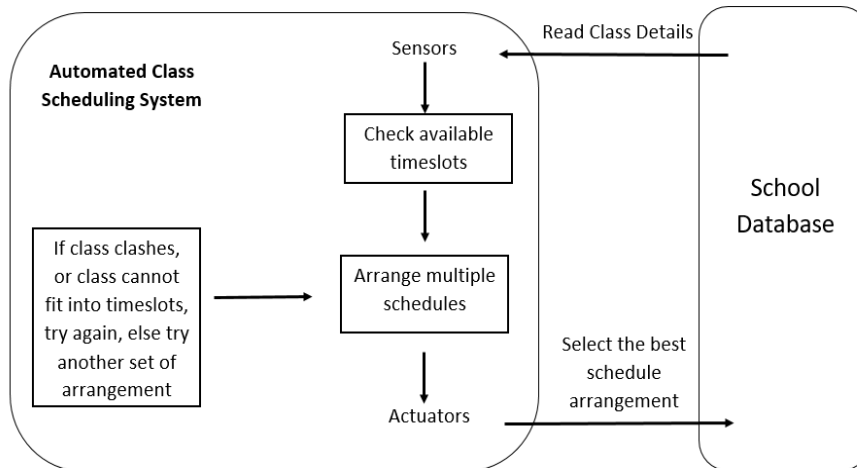
System that thinks rationally - Logic-based system

Thinks rationally means makes inference based on rules. Systems that think rationally approach using symbolic logic to capture the laws of rational thought as symbols that can be manipulated. Reasoning involves manipulating the symbols according to well-defined rules, kind of like algebra. The result is an idealized model of human reasoning. Thinking rationally means the use of logic. Logic uses reasoning processes to extract new representations of the world and how to deal with them. Example: A medical diagnosis system makes diagnosis based on symptoms of the patient.

5. Design a simple architecture of the following agents. You must clearly illustrate how the agent should react to the necessary input and produce output.
- Agent of an automated class scheduling system. ()
  - Agent of an intelligent air-conditioning system. ()
  - Agent of autonomous driving car. ()

**Answer:**

Agent of an automated class scheduling system

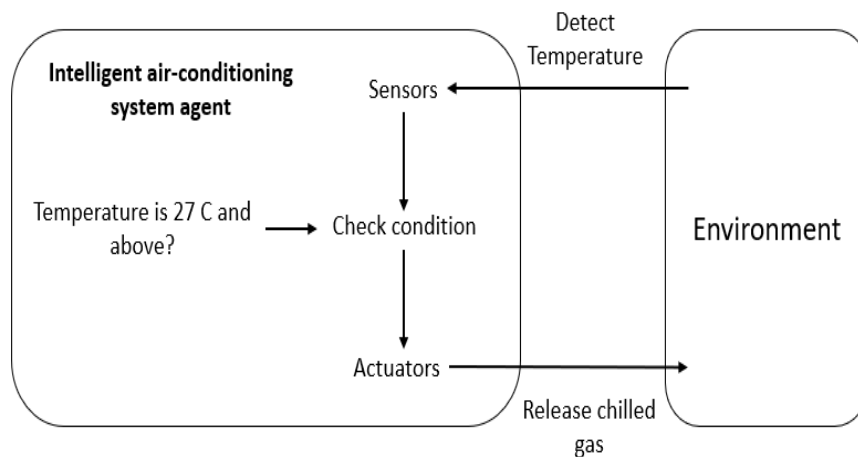


The agent of an automated class scheduling system will have access to students' required subjects to take based on their respective courses. Each subject also consists of multiple class types (lecture, tutorial, practical etc) that differ in duration for each subject and class type. The agent also has access (sense) to lecturer information including the subjects that they are assigned to teach. With this information, the agent assigns (actuate and adapt to change) the classes for all students' timetables with the required subjects so that no 2 classes overlap each other in period, while also assigning lecturers to their subjects to teach.

**Input:**

1. Course Information
2. Faculty availability
3. Classroom availability
4. Number of student
5. Number of lecturer

Agent of an intelligent air-conditioning system



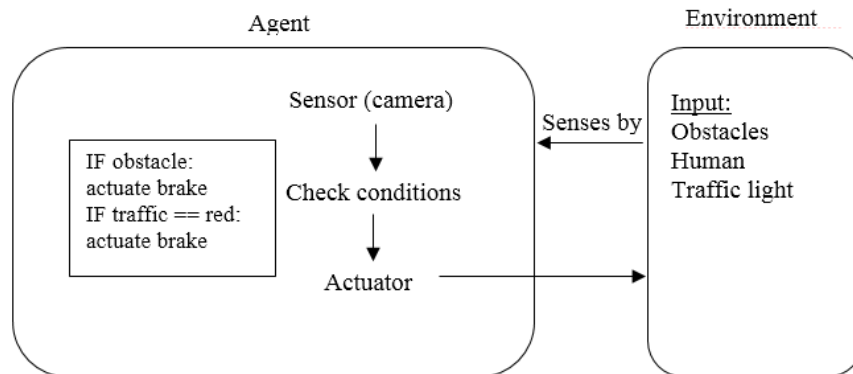
This agent of an intelligent air-conditioning system is responsible for making decisions based on the information it receives from the system's sensors. The system incorporates "Sensors" that continuously monitor the environmental temperature. Specifically, these sensors are designed to detect whether the temperature has reached or exceeded 27°C. This data is crucial for the system's decision-making process. The "Condition Check" step represents a pivotal moment in the system's operation. It involves evaluating the information gathered by the sensors. If the sensors report a temperature of 27°C or higher, the system proceeds to the next stage. "Actuators" are the components

responsible for carrying out physical actions in response to the system's decisions. In this context, the actuators come into play by releasing chilled gas to cool the environment. The "Environment" depicted in the diagram signifies the physical space where the temperature is continuously monitored and regulated by the air-conditioning system.

Input:

1. Room temperature
2. Desired temperature
3. humidity

Agent of autonomous driving car



This agent of an intelligent autonomous driving car system is responsible for making decisions based on the information. It consists of sensor (camera and others): This icon represents the camera sensors equipped on the autonomous vehicle, responsible for capturing images of the surroundings, including obstacles, pedestrians, and traffic lights. This information will be sent into condition evaluation stage (IF-else rule). This stage involves the decision-making process in which the system assesses the data received from the sensors. It encompasses two conditional statements:

1. If an obstacle is detected, the system triggers the braking mechanism.
2. In the event of a red traffic light signal, the system also initiates the braking action. (not limit to only 2 rules)

Finally, it will trigger the actuator to activate of the braking system if needed, effectively avoiding potential collisions or complying with traffic signals.

Input:

1. Sensor data from cameras, lidar, radar, and other perception systems.
2. GPS and mapping data for navigation.
3. Real-time traffic and obstacle information.

*Students can provide any other relevant answers*

## **Tutorial 2**