IT2023 Lecture Diary (Sept 22, 2023)

Lecture Outline

- Introducing the change of the lecture note for *Introduction to Intelligent Technology*.

    - Section 5.8 on *Workflow Management* has been added.
    - Workflow management system is basically a reporting system.
    - The system for me to claim on my expense on a computing device is a workflow management system.
    - It has not applied any intelligent technology.

- Introducing the change on the course homepage.

    - A link to *Piaget cognitive development theory* has been added.
    - A link to an article describing an algorithm bias of the Amazon recruitment system has been added.
    - A link to an article appeared in *IEEE Spectrum* describing an algorithm bias of a medical school admission system has been added.

- Piaget cognitive development theory has been introduced.

    - Four development stages in Piaget cognitive development theory is introduced.
    - Up to the middle of the twentieth century, Piaget's theory had been criticized by many American scholars in regard to its non-scientific research method.
    - In the second half of the twentieth century, Piaget's cognitive development theory had eventually been adopted and explored in the American academic.
    - The current AI technology has not yet reached the *formal operational stage* – generate an hypothesis and then validate if it is true.

- AI system from the west versus the AI system from the east. A truly intelligent system should be a system with wise. An AI system should not be designed simply to win. An AI system should be able to find a way to tie-break. Tie-Break machine is what John Sum is expecting. Follow the line of though, the ultimate *intelligent system* should be a *wise system* probably called *Laozi*.

- The stories about the Amazon recruitment system and the medical school admission system are introduced. While people commented that those systems have algorithmic biases, John Sum commented that these systems have no bias. The systems simply mimic (or replicate) from the dataset how human workers made decisions on the recruitment and admission processes. Thus, the roots of the biases are the dataset. In other words, the roots of the biases are from the human workers.

- Highlight that Carnegie Mellon University is famous in its computer science department, and its contributions in machine learning and AI research. Besides, the story of John Nash has been introduced. John Nash is a Noble Prize recipient in 1994 for his contribution in game theory.

- On the issue of AI safety.

  - If an object recognition system has 99.99 percent accuracy, application of such system in auto driving is safe?
  - The answer is definitely no. The auto driving system is not safe.
  - Normally, the objet recognition rate indicates how good the system in recognizing an object in one picture or one photo. Another interpretation of the accuracy rate is that the system will make mistake one out of ten thousand. If the system is used for recognizing objects from 10,000 photos, the system will have a wrong answer.
  - In a Tesla car, the camera takes 30 photos in one second. If a driver has driven a Tesla car for one hours, the total number of photos being captured is 108,000. If there are 10,000 Tesla cars running on the road in Taiwan, the total number of photos to be analyzed is 1,080,000,000. In such scale, the average number of miss recognitions is 108,000.
  - If one miss recognition will lead to one death, the total number of death in a day is 108,000. If one miss recognition will have 10^{-4} probability leading to a death, the number of death in a day is 10.8.
  - From these points, will you still believe that an auto driving system using the object recognition system with 99.99 percent accuracy is safe?
  - Here, I have assumed that there are 10,000 Tesla cars running on the road in Taiwan. If I consider the total number of Tesla cars running in the world, the number of death is no more 10.8. The total number of death would be thousands.

- Telecom network versus Internet.

  - Differences between a telecom network and the Internet are highlighted.
  - 3G/4G/5G is the terminology for the telecom network but not for the Internet.
  - WiFi is a technology developed particularly for Internet.
  - Telecom network and the Internet are two different networks.
  - Happen to be, both networks share many communication technologies in common.
  - Telecom network is able to support voice service and data service. That is to say, a telecom network is able to support users making phone calls by using their telephone devices. Besides, a telecom network is able to support users transferring data by using special devices like FAX machines. Furthermore, telecom firm is able to help its clients to build virtual private network – A data communication network connecting multiple data processing devices via the telecom network.
  - Since the first smartphone, the iPhone, has been introduced to the market, smartphone is able to make phone call (resp. access Internet) via its connection to the telecom network. It is able to connect to the Internet via its WiFi connection.
  - Each telecom network is now able to connect to the Internet. Note that the format of the data transferring within a telecom network is different from the format of the data transferring within the Internet. Data transferring back and forth a telecom network and the Internet must reply on exchange machines.

About Assignment 1

- If the due date of an assignment is September 29, 2023, submission of your answer file to the Gmail account has be on and before September 28, 2023.

- Two challenges have been designed for you in the Assignment 1. The first challenge is to let you design solutions to solve the problems. The second challenge is on the presentation.