

# ETBA2023 ASSIGNMENT 02

## (Due Date: October 23, 2023)

---

**Instructions:** The following points should be noted.

- If you use a word processing software to edit your answer, please make sure that the file to be submitted is either in WORD or PDF format.
- You need to submit the answer file before the due date to the Gmail account `johnsum.nchu@gmail.com`.
- Email heading must be conformed to `ETBA2023_Assignment02_studentID`.
- File name must be conformed to `ETBA2023_Assignment02_studentID`.
- It is a bonus assignment. If you are too busy to complete the assignment, you can just skip it.

The assessment of this course is solely depended on your work in the course project including your written report and your oral presentation. The score obtained from this assignment is bounce which is added up on top of your project score.

---

## Large Language Models

ChatGPT and Google Bard are two text generation systems. Base upon a user question, the systems are able to generate a bunch of text in response to the question. From the application point of view, ChatGPT or Google Bard could be treated as a *chatbot* or an *conversation assistant* giving information to the user in regard to a query. The model governing the text generation, no matter ChatGPT or Google Bard, is called *large language model* (LLM). It is developed based on learning from a huge database consisting of numerous sources of texts, like news, journal articles and wikipedia pages.

For the large language models supporting ChatGPT and Google Bard, they are clearly developed based on the dataset consisting of huge number of English documents. To be precise, these LLMs are better called *large English language models*. As a matter of fact, presentation of the same fact (resp. story) could be different from one language to another. For instance, the presentation style of English is quite different from the presentation style of Chinese. It is due to the cultural different between the west and the east. Thus, the LLM developed for English language should be different from the LLM developed for Chinese language.

Very recently, OpenAI and Google have released their conversation assistants ChatGPT and Google Bard which support languages other than English language. Their core technologies for making them work are based on the translators developed. Their core presentation styles are still based on English presentation. Clearly, their presentation styles might not fitting the presentation styles of other languages.

## Question 1

In this regard, the work for the students in this assignment is to figure out those LLMs which have been developed for your mother language and for Chinese. For your information, Baidu, Tecent and Beijing Academy of Artificial Intelligence (BAAI) have also developed LLMs for Chinese language text generation, namely Baidu Ernie, Tencent Hunyuan and BAAI WuDao. For your mother languages, there should have such LLMs being developed.

- (a) Find out those LLMs which have been developed for your mother language, like Vietnamese and Indonesian.
- (b) Find out those LLMs which have been developed for Chinese language, Vietnamese, Indonesian and Japanese.

- (c) In terms of their functionalities, what are their differences as compared with OpenAI ChatGPT and Google Bard.

[Assume that each parameter is encoded as a 32-bit floating point format, i.e. single-precision format.]

## Question 2

- (a) How possible the LLM is applied with commercial value? In the lecture, Kelby has mentioned the use of OpenAI ChatPDF and Tim has suspected the use of an LLM for *sales & marketing* and *customer support*.
- (b) Find out which firms have paid for OpenAI for the use of OpenAI ChatPDF and OpenAI ChatGPT.
- (c) Except that, would there be other possible applications leasing for profit?
- (d) How possible an LLM is able to make money for its developer? Note that advertising might not be the major income for an LLM.

## Question 3

- (a) Hugging Face is a key player in the LLM development. Find out what has(have) been done by Hugging Face in LLM development in the last decade.
- (b) Baidu, Google, Huawei, Hugging Face, OpenAI and Tencent are tech firms. All of them should have used their own cloud platforms to support LLM developments. Find out if any LLM has currently been developing by academic institute, like National Taiwan University or National Chung Hsing University.

## Question 4

- (a) With reference to the latest iPhone 15 and iPhone 15 Pro, how many processing units are embedded in the processor?
- (b) State the reason(s) why those LLMs are not able to be downloaded, installed and running in a cell phone or personal computer as a stand alone software.
- (c) What is the memory space (in term of Gigabyte GB) required for installing the latest iOS (respectively Android) in a cell phone? What is the minimum memory space (in term of Gigabyte GB) required for storing the model parameters of the ChatGPT4?