

Navigating the Uncharted Waters: AI and East Asian Studies

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Self-Introduction

- Kwok Leong Tang 鄧國亮
- By train, I am a historian. (Ph.D. in History and Asian Studies, Penn State)
- Digital China Fellow (Fairbank Center) from 2019 to 2023.
- Lecturer (EALC) from 2021 to present, teaching courses on digital tools and methods in East Asian Studies.
- Managing director for Digital China Initiative from December 2023 to present.
- Self-taught practitioner in digital humanities and digital scholarship.

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THE BIG DATA TURN IN THE HUMANITIES: SAILING INTO UNCHARTED WATERS

Javier Cha

Assistant Professor of East Asian Studies,
College of Liberal Studies, Seoul National University;
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Department of History, Lingnan University

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East Asian Digital Scholarship Series (co-organized with Kathrine Matsuura)

Digital China Initiative Summer Workshop (2022)

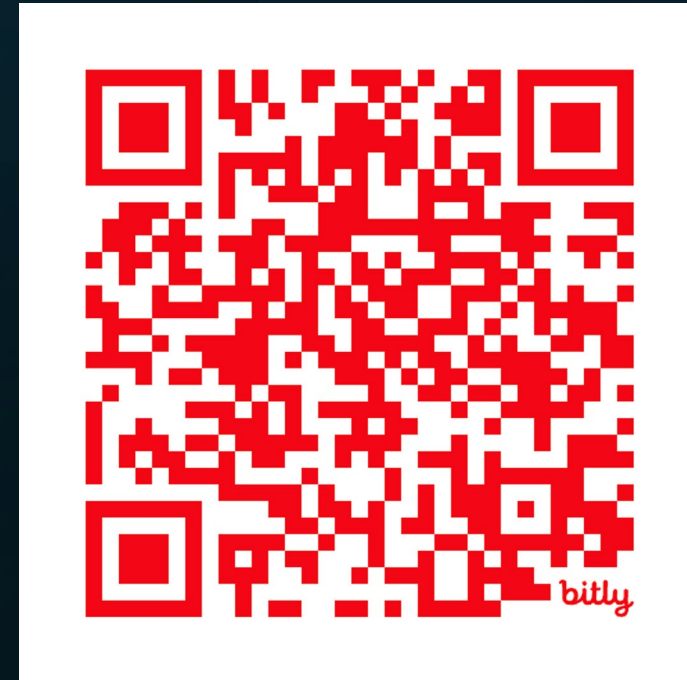




Tools of the Trade Conference (2023)

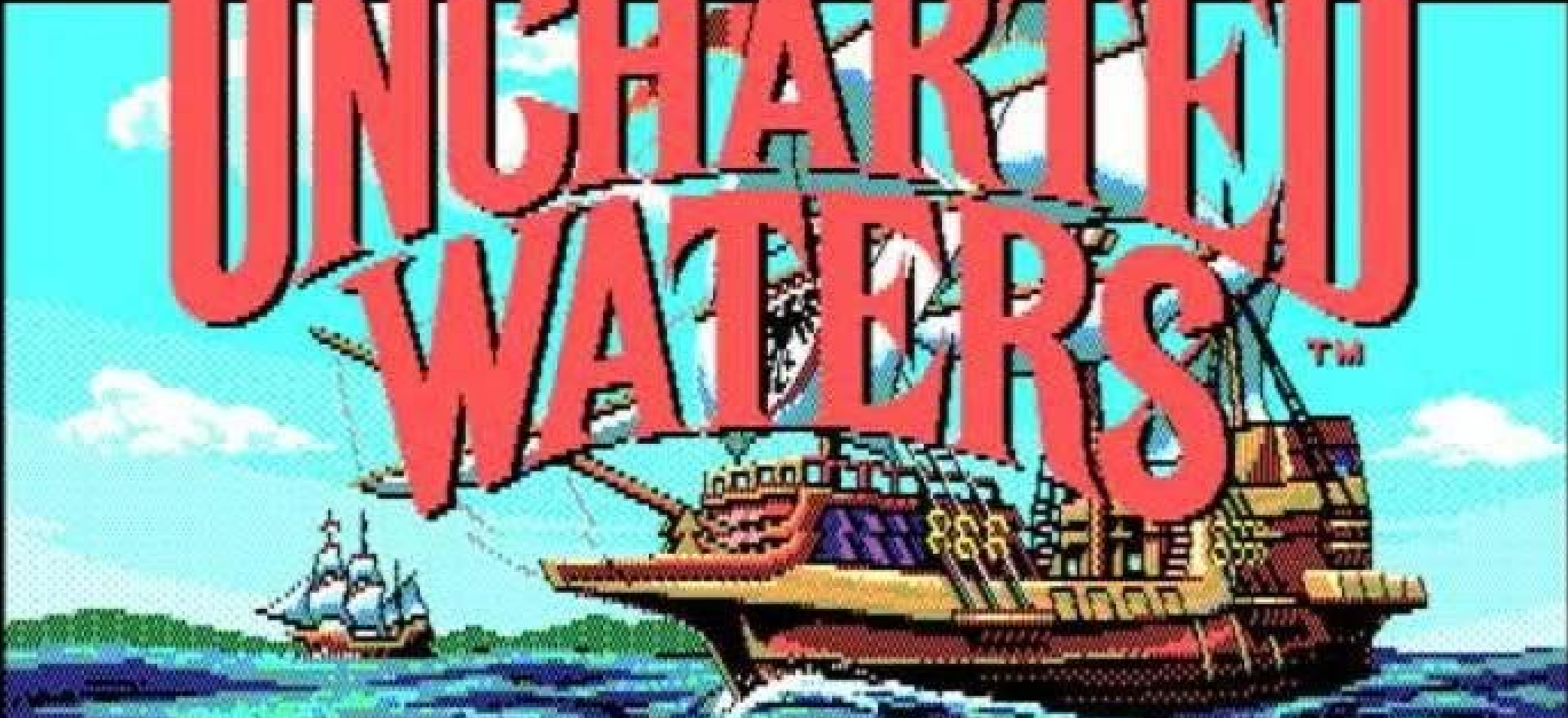


A series of generative AI workshops



My daily job is to advocate for adopting digital tools and methods in Chinese Studies. Therefore, my perspectives about generative AI are heavily opinionated (or biased).

UNCHARTED WATERS™



All my life I've worked on the docks of Lisbon, Portugal. My forefathers made their fortunes exploring the seas, yet side by side with my own father,

Age of Discovery

New resources, new markets, Columbian exchanges, cultural exchanges, slavery and slave trade, diseases, destruction of civilization, globalization, the birth of the United States of America, the birth of Canada, and the creation of the modern world.....

What's new after November 2022

- We had machine learning, deep learning, neural networks, transformers, and large language models before November 2022.
- The most significant change that the ChatGPT brought to the public was the revolution in human interaction with machines.
- We used to communicate with machines in two major ways: command-like interfaces and graphical user interfaces (GUI). For advanced computing tasks, we needed coding (or programming).
- After November 2022, we started to communicate with machines in natural languages.

The use cases here aim to demonstrate the following two points:

- 1.Simplifying Technological Adoption:** Generative AI significantly reduces the complexity and lowers the technological barriers to integrating digital tools and methodologies.
- 2.Introducing Novel Methodologies:** By leveraging the power of Generative AI, researchers can explore innovative methods and approaches, opening new avenues for analysis and interpretation in Chinese Studies.

Repeated tasks in research

- Formatting citations and references to comply with publishers' style guidelines often requires a significant investment of time.
- Imagine completing the manuscript of an article, having carefully revised the footnotes and bibliography to conform to the style of Journal A, only to have the submission rejected. Subsequently, it becomes necessary to revise the citation style once again before submitting it to Journal B.

Multilingual citations

Journal of Asian Studies Style Sheet

Non-English References

For references to works published in Chinese, Japanese, Korean, or any other Asian script, please provide titles in the following format: *Transcription* <original characters> [English translation]. Translations of journal or periodical names are not required.

- Huang Shang 黃裳. 1947. *Guanyu Meiguo bing* 關於美國兵 [About American soldiers]. Shanghai: Shanghai chuban gongsi.
- Peng Su 彭蘇. 2006. “Beida ‘fanMei’ nüsheng Ma Nan de zhenshi jinkuang 北大“反美”女生馬楠的真實近況 [Updates on Ma Nan, “anti-American” female student from Peking University]. *Nanfang renwu zhoukan* 南方人物週刊 9:38–39.

We have the following books:

石崎又造：《近世における支那俗語文学史》（東京：清水弘文堂書房，1967年）

林俊宏：《朱舜水在日本的活動及其貢獻研究》（臺北：秀威資訊科技股份有限公司，2004年）

湯沢質幸：《近世儒学韻学と唐音 — 訓読の中の唐音直読の軌跡》（東京：勉誠出版，2014年）

劉元卿：《劉聘君全集》，《四庫全書存目叢書》（濟南：齊魯書社，1997年）影印清咸豐二年（1852）重刻本

余英時：《朱熹的歷史世界》（北京：生活・讀書・新知三聯書店，2011年）

Ishizaki Mutsumi 石崎又造. 1967. *Kinsei ni okeru Shina zokugo bungakushi* 近世における支那俗語文学史 [A History of Vernacular Chinese Literature in the Early Modern Period]. Tokyo: Shimizu Kōbundō Shoten.

Lin Junhong 林俊宏. 2004. *Zhu Shunshui zai Riben de huodong ji qi gongxian yanjiu* 朱舜水在日本的活動及其貢獻研究 [A Study of Zhu Shunshui's Activities and Contributions in Japan]. Taipei: Showwe Information Co., Ltd.

Tōzawa Shigeyuki 湯沢質幸. 2014. *Kinsei jugaku in'gaku to Tōon – Kun'yomi no naka no Tōon chokudoku no kiseki* 近世儒学韻学と唐音 – 訓読の中の唐音直読の軌跡 [Phonology of Confucian Studies and the Tang Pronunciation in Early Modern Times – The Trajectory of Direct Reading of Tang Pronunciation within Japanese Readings]. Tokyo: Bensei Publishing.

Liu Yuanqing 劉元卿. 1997. *Liu Pinjun quanji* 劉聘君全集 [The Complete Works of Liu Pinjun], *Siku quanshu cunmu congshu* 四庫全書存目叢書. Facsimile of the 1852 heavy engraved edition. Jinan: Qilu Press.

Yu Yingshi 余英時. 2011. *Zhu Xi de lishi shijie* 朱熹的歷史世界 [The Historical World of Zhu Xi]. Beijing: SDX Joint Publishing Company.

Comparison

- Before the advent of generative AI, bibliographic management software such as Zotero and Endnote was essential for managing bibliographies. Additionally, custom citation styles could be created using Citation Style Language, or documents could be composed with LaTeX for precise formatting control.
- Now, We can utilize chatbots to format citations and references by supplying them with style guides and examples, all through the convenience of natural language commands.

A more complicated and innovative use case

We will use a very short example (the first two lines of a poem by the Tang writer Li He) to compare the well-established procedures of data extraction and text analysis and the methods now possible with generative AI.

漆灰骨末丹水沙
淒淒古血生銅花

Amidst lacquer ash and bone dust in cinnabar sands
Chilling, ancient blood gives birth to copper flowers

We want to study the use of color in this kind of poetry using a corpus of 10,000 poems over 200 years. We cannot do a close reading of so many poems.

If we want to use digital methods to conduct the same research before the advent of Generative AI, the following steps would be involved:

- 1. Building a Color Lexicon:** We first compile a dictionary of all words for colors in the target language.
- 2. Pattern Matching with Regex:** We write a computer program that uses “regular expressions” to match the items in the dictionary with the poetry. This allows us to begin a statistical analysis of color usage in classical poetry.
- 3. Addressing Implicit Color Meanings:** Some words may not explicitly mention colors but imply them. For example, ‘blood’ suggests a dark red hue, while ‘cloudless sky’ implies blue. In these instances, we might need to apply machine learning or deep learning techniques to discern these implicit color references.

Machine learning and deep learning

- 1.Preparing a Labelled Training Dataset:** This involves identifying sentences with color implications and labeling them accordingly. It's a meticulous and time-consuming process but essential for training accurate models.
- 2.Creating a Testing Dataset:** A dataset similar to the training set is required for evaluating the model's performance. This ensures that the model can generalize well to new, unseen data.
- 3.Training the Model:** With the datasets prepared, we can train a model to recognize implicit colors in the poetry.
- 4.Model Deployment:** Once the model's performance meets our expectations, we can deploy it to identify colors in classical Chinese poetry.

Visualization

- 1. Visualizing Poetry's Palette:** Scholars are naturally inclined to see a visual representation of the colors described in poetry.
- 2. Digital Color Mapping:** Assigning digital color values to the color words is necessary for this visualization. While labor-intensive and time-consuming, this task is vital for bringing the poetry's colors to life. For example, in the second line of Li He's poetry which contains "blood" which implicates red. We can assign hex color code #710C04 to it.

Red #D0312D	Cherry #990F02	Rose #E3242B	Jam #60100B
Merlot #541E1B	Garnet #610C04	Crimson #B90E0A	Ruby #900603
Scarlet #900D09	Wine #4E0707	Brick #7E2811	Apple #A91B0D
Mahogany #420C09	Blood #710C04	Sangria #5E1916	Berry #7A1712
Currant #680C07	Blush #BC544B	Candy #D21404	Lipstick #9B1003

Technical skills required

- **Text Processing and Analysis:**
 - Proficiency in working with text data, including parsing and manipulation.
 - Understanding of natural language processing (NLP) techniques.
- **Regular Expressions (Regex):**
 - Ability to construct and use regex for pattern matching and text extraction.
- **Programming:**
 - Knowledge of programming languages such as Python, which is commonly used for data analysis and machine learning tasks.
- **Machine Learning and Deep Learning:**
 - Familiarity with machine learning frameworks (e.g., TensorFlow, PyTorch).
 - Experience in preparing datasets, training models, and evaluating their performance.
- **Data Visualization:**
 - Skills in using visualization tools or libraries (e.g., Matplotlib, Seaborn, D3.js) to represent data graphically.

Now, how can we do it with Generative AI?
We can do it with natural language prompts.
In this case, we are using GPT-4 Turbo provided
by the Harvard AI “sandbox.”

漆灰骨末丹水沙，淒淒古血生銅花。

"Amidst lacquer ash and bone dust in cinnabar sands,
Chilling, ancient blood gives birth to copper flowers."

User

11:15:41 AM

Please analyze the colors mentioned in the given poetry sentence and explain your reasoning:

漆灰骨末丹水沙，淒淒古血生銅花。

GPT-4 Turbo (preview):

The poetry sentence you've provided is in Chinese, and it paints a vivid picture through the use of color-related words.

Let's break down the colors and the imagery they evoke:

1. 漆 (Qi) - This character can refer to lacquer, which is often black or very dark in color. In the context of the poem, it might be used to evoke a sense of darkness or depth, possibly relating to the color of ashes or something charred.
2. 灰 (Hui) - This character means "gray." Gray can be associated with ashes, dust, or something that has lost its vitality or color. It can also symbolize something that is between black and white, perhaps a transition or ambiguity.
3. 骨末 (Gu Mo) - These characters mean "bone" and "end" or "powder," respectively. When combined, they might refer to bone dust or bone powder, which could be white or pale in color. This could evoke a sense of death, the passage of time, or the remnants of something that once had life.
4. 丹 (Dan) - This character often refers to cinnabar or vermilion, which are both bright red pigments. Red in Chinese culture is associated with luck, joy, and happiness, but in the context of this poem, it might contrast with the other colors to highlight themes of life and death or beauty and decay.
5. 水沙 (Shui Sha) - "水" means water, which doesn't have a color itself but could be associated with blue or clear imagery. "沙" means sand, which could be golden, beige, or yellowish in color. Together, they might evoke a riverside or a desert scene, possibly suggesting the passage of time or the natural elements at work.
6. 淒淒 (Qi Qi) - This doesn't directly refer to a color, but it suggests an intense or profound emotion. It could be translated as "intensely cold" or "mournful," which might be associated with a cold color palette, such as pale blues or greens.
7. 古血 (Gu Xue) - "古" means ancient, and "血" means blood. Blood is typically red, but "ancient blood" might suggest a brownish-red, indicating dried blood or the passage of time.
8. 銅花 (Tong Hua) - "銅" means copper, and "花" can mean flower or pattern. Copper has a reddish-brown color, and when it oxidizes, it can form a green patina. The imagery of copper flowers could suggest a beautiful yet unnatural or enduring creation, possibly hinting at the interplay between man-made and natural beauty.

In summary, the colors in this poetry sentence suggest a scene that is rich with the interplay of life and death, natural beauty and decay, and the passage of time. The colors range from dark and somber tones like black and gray, to vibrant reds, to the more muted tones of bone white and oxidized copper. The use of color in this context is likely symbolic, with each hue contributing to the overall mood and themes of the poem.

User

11:37:33 AM

Based on your analysis, can you return the colors you identify in a tabular format such as the following:

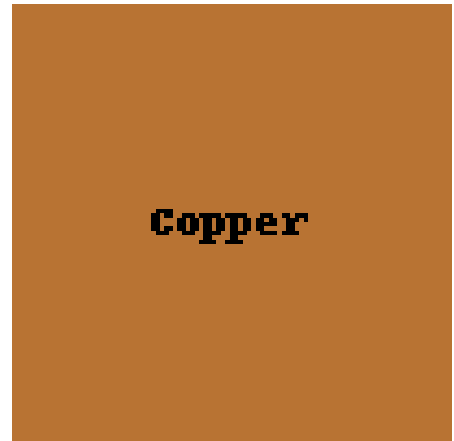
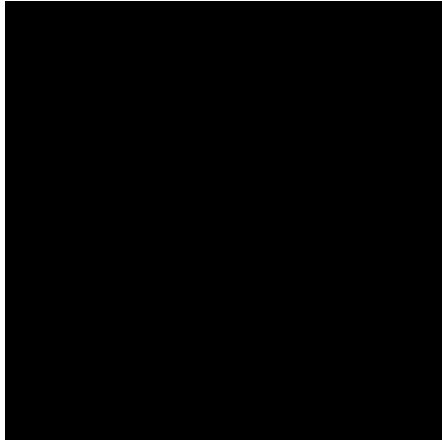
Chinese color-related word | color | hex color code |

GPT-4 Turbo (preview):

Certainly! Here's a table with the color-related words from the poetry sentence, their corresponding colors, and approximate hex color codes:

Chinese color-related word	Color	Hex Color Code
漆 (Qi)	Black	#000000
灰 (Hui)	Gray	#808080
骨末 (Gu Mo)	Bone White	#E3DAC9
丹 (Dan)	Vermilion	#E34234
水沙 (Shui Sha) - 水	Clear/Blue	#00FFFF
水沙 (Shui Sha) - 沙	Sand	#C2B280
古血 (Gu Xue)	Dried Blood	#8B0000
銅花 (Tong Hua)	Copper	#B87333

Please note that the hex color codes provided are approximate representations of the colors mentioned. The actual perception of color can vary depending on the context and cultural interpretations. Additionally, the color for "水沙" is split into two interpretations: "水" as clear or blue (like water), and "沙" as sand. The hex code for water is a common representation of clear blue water, while the hex code for sand represents a typical sandy color.



Please look at the following couplets by Li He. Close your eyes and imagine the scenes depicted.

劍如霜兮膽如鐵

出燕城兮望秦月。

"The sword is as frost, the courage as iron,
leaving the city of Yan, gazing at the moon over Qin."

Could you please specify the ambient color of the scene you have imagined? Are the ambient color mentioned in the couplet?

劍如霜兮膽如鐵

出燕城兮望秦月。

"The sword is as frost, the courage as iron,
leaving the city of Yan, gazing at the moon over Qin."

GPT-4 Turbo (preview):

Of course! Here's the table with explanations added for each color:

Chinese color-related word	Color	Hex color code	Covered percentage of the canvas	Explanation
霜白	Frost white	#F0F8FF	20%	Represents the frost-like sword, gleaming in the moonlight, symbolizing sharpness and clarity.
鐵灰	Iron grey	#43464B	15%	Symbolizes the iron-like courage of the protagonist, indicating a steely determination.
燕藍	Yan blue	#5CACEE	25%	Could represent the city of Yan, with a historical context that might be associated with blue.
秦月白	Qin moon white	#FDF5E6	30%	Reflects the moon as seen from the perspective of the protagonist, soft and contemplative.
夜黑	Night black	#000000	10%	Fills the rest of the canvas, representing the night sky that envelops the scene.

This table includes the colors, their hex codes, the estimated percentage of the canvas they would cover, and explanations based on the poetic imagery.

Language Learning

- Language training is an essential part of East Asian Studies.
- Generative AI may help in learning the language.
- Use case: AI language partners.



The Dark Side

Hallucination, Inconsistence, Inaccuracy

- Hallucination has been a famous critic of generative AI since November 2022.
- Given generative AI's inherent characteristics, its outcomes may only sometimes be consistent.
- Many scholars stopped using generative AI tools as they did not get correct answers in the first trial.
- Fun fact: the PRC laws state that "A book with an error rate of no more than 1/10000 is considered to have passed the editing and proofreading quality check. A book with an error rate exceeding 1/10000 is considered to have failed the editing and proofreading quality check."

Possible solutions are prompt engineering, retrieval-augmented generation (RAG), and function calling.

Privacy and Security

- All the state-of-art models are proprietary.
- This exclusivity raises significant concerns regarding the privacy and security of personal data and user behavior patterns.
- Scholars doubt the reliability of the proprietary models in the long run.
 - Mutiny at OpenAI in November 2023
 - Almost none of the proprietary models are available to the PRC.

Possible solutions are the development of open-source models and the adaptation of large language models locally.

Bias and censorship

- Because of the amount of training data, LLMs' performance in English outperforms other languages.
- There are intrinsic biases in the training data.
- Two cases for your reference:
 - Academia Sinica LLM controversy in 2023.
 - Qwen model's responses to Chinese and English questions with “sensitive words”.

Evaluation

- Domain knowledge is unprecedently essential!
- Participation of experts in different disciplinary is crucial.

Inevitable?



I am inevitable.

Thank you very much!