

國立清華大學 學習科學與科技所

新素養和內容分析與生成

(暫擬課綱)

Spring 2024, 3 credits (中文授課)

Time: Tuesday, 2, 3, 4 Location: Room 409, General Building

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數位學習: eLearn 平台

課程說明

日新月異的科技正在重新定義 21 世紀的讀寫素養(literacy)、資訊理解與表達能力(information understanding and expression)、以及內容分析詮釋(content analysis and interpretation)與內容生成創用(content generation, appropriation and creation)。新素養(New Literacies)研究從偏重傳統課堂文本理解到數位資訊和網路參與文化,從文字為主體的讀寫素養到多模態素養(本課程專注在文字與圖像兩種模態的討論),從基本技能到個人/公民/生涯發展的多重素養,再銜接到 Generative AI 時代下 ChatGPT, Midjourney, and Stable Diffusion 等模型的 text2text 和 text2image 的應用作為最前沿新素養的想像。

在課程內容上,本課程有四個單元,(1)新素養的理念以及和內容分析與生成的關連;(2)內容分析:方法演進和未來發展的文獻耙梳、文字探勘和輿情分析的實徵研究、及實作演示;(3)內容生成:方法演進和未來發展的文獻耙梳、大型語言模型 ChatGPT & GPT4、大型生圖模型 Midjourney & Stable Diffusion;(4)內容分析與生成在四個領域的應用:學習、教育、敘說故事和健康照護。本課程希望以理念和實徵研究為基石,實作為方法,建構對於學習產業、教育產業、出版社產業以及健康照護產業的想像與能力,在過程中並兼顧科技應用歷程所需之批判思考素養。

本課程兩個層次的教學目標為:(1)通過文獻討論,構立對新素養、內容分析與生成等學術論文的基本理解。(2)安排實作範例,邀請有實務經驗的研究者與學生專家來進行交流。在課程規劃上,約有 3/4 的週次是簡報分享與討論(paper presentation and leading discussion),1/4 的週次是實做交流(invited talk, workshops, final project presentation)。在學習期待上,每位同學需進行三篇論文簡報與討論帶領,在論文的挑選上,此版本課綱所羅列的論文選單只是提供修課同學參考,非常歡迎同學在選單外提供自選論文。Final project 則形式多元,可以從事文本分析或圖像分析,或者進行文字生成與圖像生成的嚐試。

本課程鼓勵學生利用 AI 進行協作或互學,以提升本門課產出品質。根據清華大學公布之「大學教育場域 AI 協作、共學與素養培養指引」,本門課程採取有條件開放,以下說明如何使用生成式 AI 於課程產出:學生須於課堂作業或報告中的「標題頁註腳」或「引用文獻後」簡要說明如何使用生成式 AI 進行議題發想、文句潤飾或結構參考等使用方式。相對地,本門課授課教材或學習資料若有引用自生成式 AI,教師也將在投影片或口頭標注。

課程主題

		Topic
1	2/20	Course introduction
2	2/27	Overview on new literacies, content analysis and generation
3	3/5	Emergent technologies and new literacies
4	3/12	Content analysis (I): Review on technique and prospect
5	3/19	Content analysis (II): Text mining and sentiment analysis
6	3/26	Content analysis (III): 實作範例
7	4/2	Content generation (I): Review on technique and prospect
8	4/9	Content generation (II): ChatGPT (LLM)
9	4/16	Content generation (III): Midjourney and Stable Diffusion (text2image)
10	4/23	Content analysis and generation (I): Application in learning and education
11	4/30	Content analysis and generation (II): 實作範例
12	5/7	Content analysis and generation (III): 實作範例
13	5/14	Content analysis and generation (IV): Application in learning and education
14	5/21	Content analysis and generation (V): Application in storytelling
15	5/28	Content analysis and generation (VI): Application in healthcare
16	6/4	Final project presentation

週次進度及論文選單

Week 2 (2/27)

Overview on new literacies, content analysis and generation

Week 3 (3/5)

Emergent technologies and new literacies

1. Stordy, P. (2015). Taxonomy of literacies. *Journal of Documentation*, 71(3), 456-476. doi: <https://doi.org/10.1108/JD-10-2013-0128>
2. Lammers, J. C., Magnifico, A. M., & Wang, A. (2022). Playful Multiliteracies: Fan-Based Literacies' Role in English Language Arts Pedagogy. *Journal of Adolescent & Adult Literacy*, 66(2), 80-90.
3. Chen, S.Y. (2023). Generative AI, learning and new literacies. *Journal of Educational Technology Development and Exchange*, 16(2), 1-19.

Week 4 (3/12)

Content analysis (I): Review on technique and prospect

4. Thakur, K., & Kumar, V. (2022). Application of text mining techniques on scholarly research articles: Methods and tools. *New Review of Academic Librarianship*, 28(3), 279-302.
5. Wankhade, M., Rao, A. C. S., & Kulkarni, C. (2022). A survey on sentiment analysis methods, applications, and challenges. *Artificial Intelligence Review*, 55(7), 5731-5780.
6. Cetinic, E., & She, J. (2022). Understanding and creating art with AI: review and outlook. *ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM)*, 18(2), 1-22.
7. Cetinic, E., Lipic, T., & Grgic, S. (2019). A Deep Learning Perspective on Beauty, Sentiment, and Remembrance of Art. *IEEE Access*, 7, 73694-73710

Week 5 (3/19)

Content analysis (II): Text mining and sentiment analysis

8. Haque, M. U., Dharmadasa, I., Sworna, Z. T., Rajapakse, R. N., & Ahmad, H. (2022). "I think this is the most disruptive technology": Exploring Sentiments of ChatGPT Early Adopters using Twitter Data. arXiv preprint arXiv:2212.05856.
9. Taecharungroj, V. (2023). "What Can ChatGPT Do?" Analyzing Early Reactions to the Innovative AI Chatbot on Twitter. *Big Data and Cognitive Computing*, 7(1), 35.
10. Figueira, Á. (2018). A Three-Step Data-Mining Analysis of Top-Ranked Higher Education Institutions' Communication on Facebook. In Proceedings of the Sixth International Conference on Technological Ecosystems for Enhancing Multiculturality (pp. 923-929).
11. Hung M, Lauren E, Hon ES, Birmingham WC, Xu J, Su S, Hon SD, Park J, Dang P, Lipsky MS. (2020). Social Network Analysis of COVID-19 Sentiments: Application of Artificial Intelligence *J Med Internet Res*, 22(8):e22590
12. de Melo T, & Figueiredo, C. M. S. (2021). Comparing News Articles and Tweets About COVID-19 in Brazil: Sentiment Analysis and Topic Modeling Approach. *JMIR Public Health Surveill*, 7(2): e24585. doi: 10.2196/24585
13. Zhao, Y., Zhang, J., & Wu, M. (2019). Finding Users' Voice on Social Media: An Investigation of Online Support Groups for Autism-Affected Users on Facebook. *International Journal of Environmental Research and Public Health*, 16(23), 4804.
14. Wrycza, S., & Maślankowski, J. (2020). Social Media Users' Opinions on Remote Work during the COVID-19 Pandemic. *Thematic and Sentiment Analysis. Information Systems Management*, 1-10.
15. Iglesias-Sanchez, P. P., Vaccaro Witt, G. F., Cabrera, F. E., & Jambrino-Maldonado, C. (2020). The Contagion of Sentiments during the COVID-19 Pandemic Crisis: The Case of Isolation in Spain. *Int J Environ Res Public Health*, 17(16). doi:10.3390/ijerph17165918

Week 6 (3/26)

Content analysis (III): 實作範例 (Invited talk)

Week 7 (4/2)

Content generation (I): Review on technique and prospect

16. Gozalo-Brizuela, R., & Garrido-Merchan, E. C. (2023). ChatGPT is not all you need. A State of the Art Review of large Generative AI models. arXiv preprint arXiv:2301.04655.
17. Zhang, C., Zhang, C., Zheng, S., Qiao, Y., Li, C., Zhang, M., ... & Hong, C. S. (2023). A Complete Survey on Generative AI (AIGC): Is ChatGPT from GPT-4 to GPT-5 All You Need? arXiv preprint arXiv:2303.11717
18. Shi, J., Jain, R., Doh, H., Suzuki, R., & Ramani, K. (2023). An HCI-Centric Survey and Taxonomy of Human-Generative-AI Interactions. arXiv preprint arXiv:2310.07127.
19. Hadi, M. U., Qureshi, R., Shah, A., Irfan, M., Zafar, A., Shaikh, M. B., ... & Mirjalili, S. (2023). A survey on large language models: Applications, challenges, limitations, and practical usage. TechRxiv.
20. Zhao, W. X., Zhou, K., Li, J., Tang, T., Wang, X., Hou, Y., ... & Wen, J. R. (2023). A survey of large language models. arXiv preprint arXiv:2303.18223.
21. Yu, H., & Guo, Y. (2023). Generative artificial intelligence empowers educational reform: current status, issues, and prospects. *Frontiers in Education*, 8
22. Zhou, C., Li, Q., Li, C., Yu, J., Liu, Y., Wang, G., ... & Sun, L. (2023). A Comprehensive Survey on Pretrained Foundation Models: A History from BERT to ChatGPT. arXiv preprint arXiv:2302.09419.
23. Wu, T., He, S., Liu, J., Sun, S., Liu, K., Han, Q. L., & Tang, Y. (2023). A brief

overview of ChatGPT: The history, status quo and potential future development. *IEEE/CAA Journal of Automatica Sinica*, 10(5), 1122-1136.

24. Zhang, C., Zhang, C., Li, C., Qiao, Y., Zheng, S., Dam, S. K., ... & Hong, C. S. (2023). One small step for generative ai, one giant leap for agi: A complete survey on chatgpt in aigc era. arXiv preprint arXiv:2304.06488.

Week 8 (4/9)

Content generation (II): ChatGPT (LLM)

25. Ray, P. P. (2023). ChatGPT: A comprehensive review on background, applications, key challenges, bias, ethics, limitations and future scope. *Internet of Things and Cyber-Physical Systems*.
26. Hariri, W. (2023). Unlocking the Potential of ChatGPT: A Comprehensive Exploration of its Applications, Advantages, Limitations, and Future Directions in Natural Language Processing. arXiv preprint arXiv:2304.02017.
27. White, J., Fu, Q., Hays, S., Sandborn, M., Olea, C., Gilbert, H., ... & Schmidt, D. C. (2023). A Prompt Pattern Catalog to Enhance Prompt Engineering with ChatGPT. arXiv preprint arXiv:2302.11382.
28. Veselovsky, V., Ribeiro, M. H., Arora, A., Josifoski, M., Anderson, A., & West, R. (2023). Generating Faithful Synthetic Data with Large Language Models: A Case Study in Computational Social Science. arXiv preprint arXiv:2305.15041.
29. Bubeck, S., Chandrasekaran, V., Eldan, R., Gehrke, J., Horvitz, E., Kamar, E., ... & Zhang, Y. (2023). Sparks of artificial general intelligence: Early experiments with gpt-4. arXiv preprint arXiv:2303.12712.
30. Wu, C., Yin, S., Qi, W., Wang, X., Tang, Z., & Duan, N. (2023). Visual chatgpt: Talking, drawing and editing with visual foundation models. arXiv preprint arXiv:2303.04671.
31. Hu, E. J., Shen, Y., Wallis, P., Allen-Zhu, Z., Li, Y., Wang, S., ... & Chen, W. (2021). Lora: Low-rank adaptation of large language models. arXiv preprint arXiv:2106.09685.
32. Ferrara, E. (2023). Should ChatGPT be Biased? Challenges and Risks of Bias in Large Language Models. arXiv preprint arXiv:2304.03738.
33. Lai, V. D., Ngo, N. T., Veyseh, A. P. B., Man, H., Derroncourt, F., Bui, T., & Nguyen, T. H. (2023). ChatGPT Beyond English: Towards a Comprehensive Evaluation of Large Language Models in Multilingual Learning. arXiv preprint arXiv:2304.05613.
34. Cao, Y., Zhou, L., Lee, S., Cabello, L., Chen, M., & Hershcovich, D. (2023). Assessing cross-cultural alignment between chatgpt and human societies: An empirical study. arXiv preprint arXiv:2303.17466.

Week 9 (4/16)

Content generation (III): Midjourney, DALL-E3 and Stable Diffusion (text2image)

35. Oppenlaender, J. (2022, November). The creativity of text-to-image generation. In *Proceedings of the 25th International Academic Mindtrek Conference* (pp. 192-202).
36. Oppenlaender, J., Linder, R., & Silvennoinen, J. (2023). Prompting ai art: An investigation into the creative skill of prompt engineering. arXiv preprint arXiv:2303.13534.
37. Hutson, J., & Cotroneo, P. (2023). Generative AI tools in art education: Exploring prompt engineering and iterative processes for enhanced creativity. *Metaverse*, 4(1).
38. Dehouche, N., & Dehouche, K. (2023). What's in a text-to-image prompt? The potential of stable diffusion in visual arts education. *Heliyon*

39. Sanchez, T. (2023, June). Examining the Text-to-Image Community of Practice: Why and How do People Prompt Generative AIs?. In Proceedings of the 15th Conference on Creativity and Cognition (pp. 43-61).
40. Giannini, T., & Bowen, J. P. (2023, July). Generative Art and Computational Imagination: Integrating poetry and art. In Proceedings of EVA London 2023 (pp. 211-219). BCS Learning & Development.
41. Thomas, R. J., & Thomson, T. J. (2023). What Does a Journalist Look like? Visualizing Journalistic Roles through AI. *Digital Journalism*, 1-23

Week 10 (4/23)

Content analysis and generation (I): Application in learning and education

42. Baidoo-Anu, D., & Ansah, L. O. (2023). Education in the era of generative artificial intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning. *Journal of AI*, 7(1), 52-62.
43. Chiu, T. K. (2023). The impact of Generative AI (GenAI) on practices, policies and research direction in education: a case of ChatGPT and Midjourney. *Interactive Learning Environments*, 1-17.
44. Farrokhnia, M., Banihashem, S. K., Noroozi, O., & Wals, A. (2023). A SWOT analysis of ChatGPT: Implications for educational practice and research. *Innovations in Education and Teaching International*, 1-15.
45. Susnjak, T. (2022). ChatGPT: The End of Online Exam Integrity? arXiv preprint arXiv:2212.09292.
46. Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. *Smart Learning Environments*, 10(1), 1-24.
47. Zhai, X. (2022). ChatGPT user experience: Implications for education. Available at SSRN 4312418

Week 11 (4/30)

Content analysis and generation (II): 實作範例 (Invited demonstration)

Week 12 (5/7)

Content analysis and generation (III): 實作範例 (Invited demonstration)

Week 13 (5/14)

Content analysis and generation (IV): Application in learning and education

48. Kohnke, L., Moorhouse, B. L., & Zou, D. (2023). ChatGPT for Language Teaching and Learning. *RELC Journal*, 00336882231162868.
49. Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., ... & Wright, R. (2023). "So what if ChatGPT wrote it?" Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, 71, 102642.
50. Johri, A., Katz, A. S., Qadir, J., & Hingle, A. (2023). Generative artificial intelligence and engineering education. *Journal of Engineering Education*, 112(3), 572-577.
51. Bozkurt, A., Xiao, J., Lambert, S., Pazurek, A., Crompton, H., Koseoglu, S., ... & Jandrić, P. (2023). Speculative futures on ChatGPT and generative artificial intelligence (AI): A collective reflection from the educational landscape. *Asian Journal of Distance Education*, 18(1).

Week 14 (5/21)

Content analysis and generation (V): Application in storytelling

52. Gursesli, M. C., Taveekitworachai, P., Abdullah, F., Dewantoro, M. F., Lanata, A., Guazzini, A., ... & Thawonmas, R. (2023, October). The Chronicles of ChatGPT: Generating and Evaluating Visual Novel Narratives on Climate Change Through ChatGPT. In International Conference on Interactive Digital Storytelling (pp. 181-194). Cham: Springer Nature Switzerland.
53. Vinchon, F., Gironnay, V., & Lubart, T. (2023). The Creative AI-Land: Exploring new forms of creativity.
54. Chu, H., & Liu, S. (2023). Can AI tell good stories? Narrative Transportation and Persuasion with ChatGPT.
55. Chiou, L. Y., Hung, P. K., Liang, R. H., & Wang, C. T. (2023, July). Designing with AI An Exploration of Co-Ideation with Image Generators. In Proceedings of the 2023 ACM Designing Interactive Systems Conference (pp. 1941-1954).
56. Chakrabarty, T., Laban, P., Agarwal, D., Muresan, S., & Wu, C. S. (2023). Art or Artifice? Large Language Models and the False Promise of Creativity. arXiv preprint arXiv:2309.14556.
57. Zhang, Z., Xu, Y., Wang, Y., Yao, B., Ritchie, D., Wu, T., ... & Li, T. J. J. (2022, April). Storybuddy: A human-ai collaborative chatbot for parent-child interactive storytelling with flexible parental involvement. In Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems (pp. 1-21).
58. Uehara, K., Mori, Y., Mukuta, Y., & Harada, T. (2022, April). ViNTER: Image Narrative Generation with Emotion-Arc-Aware Transformer. In Companion Proceedings of the Web Conference 2022 (pp. 716-725).

Week 15 (5/28)

Content analysis and generation (VI): Application in healthcare

59. Kung, T. H., Cheatham, M., Medenilla, A., Sillos, C., De Leon, L., Elepaño, C., ... & Tseng, V. (2023). Performance of ChatGPT on USMLE: Potential for AI-assisted medical education using large language models. *PLoS digital health*, 2(2), e0000198.
60. Wang, D. Q., Feng, L. Y., Ye, J. G., Zou, J. G., & Zheng, Y. F. (2023). Accelerating the integration of ChatGPT and other large-scale AI models into biomedical research and healthcare. *MedComm—Future Medicine*, 2(2), e43
61. Rao, A. S., Pang, M., Kim, J., Kamineni, M., Lie, W., Prasad, A. K., ... & Succi, M. D. (2023). Assessing the utility of ChatGPT throughout the entire clinical workflow. medRxiv.
62. Johnson, D., Goodman, R., Patrinely, J., Stone, C., Zimmerman, E., Donald, R., ... & Wheless, L. (2023). Assessing the accuracy and reliability of AI-generated medical responses: An evaluation of the Chat-GPT model. Research Square.
63. Branley-Bell, D., Brown, R., Coventry, L., & Sillence, E. (2023). Chatbots for embarrassing and stigmatizing conditions: Could chatbots encourage users to seek medical advice? *Frontiers in Communication*, 8, 1275127.
64. Cheng, S. W., Chang, C. W., Chang, W. J., Wang, H. W., Liang, C. S., Kishimoto, T., ... & Su, K. P. (2023). The Now and Future of ChatGPT and GPT in Psychiatry. *Psychiatry and Clinical Neurosciences*.
65. Seo, W., Yang, C., & Kim, Y. H. (2023). ChaCha: Leveraging Large Language Models to Prompt Children to Share Their Emotions about Personal Events. arXiv preprint arXiv:2309.12244.

Week 16 (6/4)

Final Project Presentation

評量配置

1. Attendance and participation 20%
2. Select 3 articles from the above class reading (self-selected articles are also welcome!) and conduct Paper Presentations 45 %
 - * Will discuss article selections on the second week
 - * Please turn in your PPT by Sunday midnight before your presentations
 - * Each presentation is 40 minutes, including PPT presentation and activities/leading discussion)
3. Final team or individual project 35%