1. Course Code

2282

2. Course Title

S31e: Generative AI: Application and Perspective

3. Teacher

TAKAHARA, Toshiro

4. Term

Spring 1

5. Course Requirements (Courses / Knowledge for this course) and Important Information

None

6. Course Overview and Objectives

Generative AI has been a hot topic in recent years, but we don't know the reality around it. In this course, we will explore the conceptual framework of Generative AI, the application examples in various fields, and its perspective in the coming years. The objective is to deepen the understanding of Generative AI and include its use in ICT-related projects.

7. Course Outline

1 Lesson 1: Course introduction/ Kick off/ Method introduction (Lecture)
2 Lesson 2: What is "Intelligence"? (Lecture/Discussion)
3 Lesson 3: Linguistic approach to human intelligence (Lecture/Discussion)
4 Lesson 4: Difference between Clssical (Analytical)AI and Generative AI
5 Lesson 5: Text Generation (NLP & LLM)
6 Lesson 6: Music/Sound Generation
7 Lesson 7: Image generation
8 Lesson 8: Video contents generation
9 Lesson 9: Future of Generative AI (Immersive VR)
10 Lesson 10: Issues of Generative AI, Ethical and Legal framework
11 Lesson 11: How to use effectively & efficiently Generative AIs
12 Lesson 12: Human Computer Interaction
13 Lesson 13: Role of human body and human intelligence
14 Lesson 14: Towards the AGI
15 Lesson 15: Presentation/ Sum up and evaluation
16

8. Textbooks (Required Books for this course)

None

9. Reference Books (optional books for further study)

10. Course Goals (Attainment Targets)

(1) Understand the concept and mechanism of Generative AI
(2) Ability to use various Generative AIs in different purposes
(3) Ability to explain the usefulness of various Generative AIs
(4)
(5)
(6)
(7)
(8)

11. Correspondence relationship between Educational goals and Course goals

Educational goals of the school			Course Goals
High level ICT skills	Basic academic skills		
	Specialized knowledge and literacy		(1), (2), (3)
Human skill (Tankyu skill)	Ability to continually improve own strengths		(2), (3)
	Ability to discover and resolve the problem in society	Problem setting	(1)
		Hypothesis planning	(2)(3)
		Hypothesis testing	(2)(3)
		Practice	
	Fundamental Competencies for Working Persons	Ability to step forward	(1), (2), (3)
		Ability to think through	(1), (2), (3)
		Ability to work in a team	
Professional ethics			

12. Evaluation

	Evaluation method & point allocation					
	examination	Quiz	Reports	Presentation	Deliverables	Other
(1)			○	○	○	
(2)			○	○		
(3)			○			
(4)						
(5)						
(6)						
(7)						
(8)						
Allocation			40	40	20	

13. Evaluation Criteria

Examination	
Quiz	
Reports	Project which includes the application of generative AI, how it will be useful for the target users, what value and meaning it creates.
Presentation	Group presentation of a research on specific type of generative AI, the mechanism, issues and perspectives.
Deliverables	Thought experiment about intelligence.
Other	

14. Active Learning

Hourly percentage of active learning within the whole class time	70%

1	Active learning such as problem solving assignment using the knowledge and skills acquired in class.	Sometimes
2	Active learning such as group works and discussions.	All the time
3	Outcome presentations and feedbacks.	Sometimes
4	Students actively make decisions on how the class should be conducted.	Sometimes

15. Notes

Active participation to the discussion will be appreciated and counted to the evaluation

16. Course plan

(Notice) This plan is tentative and might be changed at the time of delivery

Lesson 1: Course introduction/ Kick off/ Method introduction (Lecture) (Lecture, 90 min.)

1. Course introduction and kick off
2. Skills to be obtained at the end of the course
3. Introduction of various lecturers.

Lesson 2: What is "Intelligence"? (Lecture/Discussion) (Lecture, 45 min. / Discussion, 45 min.)

1. Conceptual framework of human intelligence
2. Different approaches to understanding human intelligence
3. Discussion

Lesson 3: Linguistic approach to human intelligence (Lecture/Discussion) (Lecture, 60 min. / Discussion, 30 min.)

1. How the human language works
2. Semantics and Semiotics: What AI can handle and what it can't
3. Dependency of actual Generative AI on human language system

Lesson 4: Difference between Clssical (Analytical)AI and Generative AI (Lecture, 60 min. / Discussion, 30 min.)

1. Difference between Classical AI and Generative AI
2. Principals of machine learning
3. How GAN works

Lesson 5: Text Generation (NLP & LLM) (Lecture, 60 min. / Discussion, 30 min.)

1. How the NLP works
2. Explore LLMs
3. Prompt engineering

Lesson 6: Music Generation (Lecture, 60 min. / Discussion, 30 min.)

1. How the sound works (Acoustics)
2. How the music works (Elements of music, frameworks)
3. Actual music generation by AI

Lesson 7: Image generation (Lecture, 60 min. / Discussion, 30 min.)

1. What is image? (How human recognize image?)
2. How the computer graphics works (Elements of image, frameworks, system of colors)
3. Actual image generation by AI

Lesson 8: Video contents generation (Lecture, 60 min. / Discussion, 30 min.)

1. Elements of video
2. Importance of timeframe in video
3. Meaning of movements and spacial information
4. Actual video generation by AI

Lesson 9: Future of Generative AI (Immersive VR) (Lecture, 60 min. / Discussion, 30 min.)

1. How an experience is constructed?
2. Value generation
3. Meaning generation
4. Time and space/ Speed and distance

Lesson 10: Issues of Generative AI, Ethical and Legal framework (Lecture, 60 min. / Discussion, 30 min.)

1. Ethical issues of generative AI
2. Legal framework

Lesson 11: How to use effectively & efficiently Generative AIs (Lecture, 60 min. / Discussion, 30 min.)

1. Application examples of Generative AI for social issues

Lesson 12: Human Computer Interaction (Lecture, 60 min. / Discussion, 30 min.)

1. How humans interact with computers
2. How computers interact with humans
3. Diversity of human sensory systems
4. Data from sensory systems
5. Use of these data in HCI

Lesson 13: Role of human body and human intelligence (Lecture, 60 min. / Discussion, 30 min.)

1. Necessity of robotics
2. Principals of robotics
3. Relationship between AI system and robotics

Lesson 14: Towards the AGI (Lecture, 30 min/Discussion 60min)

1. What is AGI?
2. Difference between AGI and AI of today
3. Issues and difficulties in developing an AGI
4. Is AGI achievable or not?

Lesson 15: Presentation/ Sum up and evaluation (Discussion 90min)

1. Revision of the course, important points to remember, and class feedback