

CS470 – 인공지능개론

Introduction to Artificial Intelligence

(Lectures in English)

Spring 2022

v2.0

| | |
|--------------------------|---|
| Instructor: | Prof. Ho-Jin Choi Mobile: 010-8765-7445, Email: hojinc@kaist.ac.kr Office hours: Anytime (by appointment) |
| Class hours: | Tue/Thu 10:30~12:00 |
| Classroom: | Online: Zoom Meeting ID: 813 3547 8754 (Password: 874315) https://kaist.zoom.us/j/81335478754?pwd=Yk5HRU9HcHdmaEc3aVFtQVdjMmlOUT09 |
| Course web: | KLMS in the KAIST Portal (with CLASSUM) |
| Head TA: | Mr. Young-Jun Lee , Cellphone: 010-5039-2961, Email: passing2961@gmail.com |
| TA: | Mr. Jong-Hwa Lee , Email: jongwhoa.lee@kaist.ac.kr |
| TA: | Mr. Jinsu Lim , Email: j1n2u@kaist.ac.kr |
| TA: | Mr. Dongkun Lee , Email: babba82200@naver.com |
| TA: | Mr. Ye-Chan Hwang , Email: yemintmint@kaist.ac.kr |
| TA: | Mr. Min-Ho Shim , Email: smh3946@kaist.ac.kr |
| TA office hours: | Anytime (by appointment) |
| Prerequisites: | Statistics, data structures, and substantial programming skills |
| Textbooks: | [RN21] Stuart Russell and Peter Norvig, <i>Artificial Intelligence: A Modern Approach (4th ed.)</i> , Pearson Education, 2021. |
| Grading scale: | Each student chooses either letter grading (usual A-F scale) or S/U grading. |
| Grading criteria: | Homework (30%) - assessed individually Practice (15%) - assessed individually Group project (50%) - assessed by group Attendance & participation (5%) - assessed individually |

Course description:

This course aims to be a general introductory AI course, covering trends and techniques of AI, namely, intelligent agents, searching, constraint satisfaction, logical reasoning, planning, knowledge representation, uncertain reasoning, machine learning, natural language processing, computer vision, and intelligent robots, to provide a comprehensive spectrum of AI.

The course also aims to meet different levels of demands from diverse groups of audience by providing (1) recent trends of AI for beginners, (2) fundamental theories of AI for those wish to learn something, and (3) substantial practice for problem solving and applications. For this purpose, homework and self-laboratory practices are included, and a group project will be imposed. Due to the unfortunate persistence of COVID-19, the course will be offered online and there will be no written exams.

Group project:

Four students form a group and perform a project in collaboration. The group will choose one of the following two options.

Project option 1: Perform a mini-research project of problem-solving using AI techniques. A list of topics will be given in due course. (Or the team may suggest their own topic.)

Project option 2: Perform a project of replicating a recent AI paper (taken from the top conferences listed below), and making meaningful improvements.

- AI/ML – IJCAI, AAAI, NeurIPS, ICML, ICLR, etc.
- NLP – ACL, EMNLP, NAACL, etc.
- Data Mining – KDD, ICDM, CIKM, WSDM, etc.
- Computer Vision – CVPR, ICCV, ECCV, ICIP, etc.

Discussion forum:

For more effective communication and interactions with the instructor and the TA's, we will use the CLASSUM facilities embedded within the KLMS. The CLASSUM will also be used as an open discussion forum among the students themselves.

Course schedule:

| Wk | Date | Topic | Textbook Chapters | Homework | Lab. / Project |
|----|------|---|--------------------|----------|-----------------|
| 1 | 3/1 | No class (National Holiday) | | | |
| | 3/3 | Course introduction (via Zoom online meeting) -Course objectives, plans and logistics | | | |
| 2 | 3/8 | Introduction to AI (L01) | [RN21] Ch. 1 | | |
| | 3/10 | Intelligent agents (L02) | [RN21] Ch. 2 | | |
| 3 | 3/15 | Searching (I) (L03) -Solving problems by searching -Search in complex environments | [RN21] Ch. 3, 4 | HW1 | Project teaming |
| | 3/17 | | | | |
| 4 | 3/22 | Searching (II) (L04) -Adversarial search and games | [RN21] Ch. 5 | | |
| | 3/24 | Constraint satisfaction problems (L05) -Features and constraints | [RN21] Ch. 6 | HW2 | |

| | | | | | |
|----|---------|--|---------------------------------|---------------|--------------------------------------|
| 5 | 3/29 | Term project – Proposal (27 teams * 3 min) | | | Proposal |
| | 3/31 | Term project – Proposal (27 teams * 3 min) | | | Proposal |
| 6 | 4/5 | Knowledge and reasoning (I) (L06a) -Propositional logic | [RN21] Ch. 7 | HW3 | |
| | 4/7 | Knowledge and reasoning (I) (L06b) -First-order logic | [RN21] Ch. 8 | | |
| 7 | 4/12 | Knowledge and reasoning (I) (L06c) -Inference in first-order logic Knowledge and reasoning (II) (L07a) -Knowledge representation | [RN21] Ch. 9, 10 | HW4 | |
| | 4/14 | Knowledge and reasoning (II) (L07b) -Automated planning | [RN21] Ch. 11 | | |
| 8 | 4/18-22 | Term project – Progress reporting (To be arranged separately team by team) | | | Progress report |
| 9 | 4/26 | Deep learning practice (I) (L08a) | [RN21] Ch. 21 | | |
| | 4/28 | -Introduction to neural networks | | | |
| 10 | 5/3 | Deep learning practice (II) (L08b) | | PT1 (Lab1) | Lab1 |
| | 5/5 | -Convolutional neural networks | | | |
| 11 | 5/10 | Deep learning practice (III) (L08c) | | PT2 (Lab2) | Lab2 |
| | 5/12 | -Recurrent neural networks | | | |
| 12 | 5/17 | Uncertain knowledge and reasoning (L09) | [RN21] Ch. 12, 13, 16, 17 | | |
| | 5/19 | -Quantifying uncertainty -Probabilistic reasoning -Making simple/complex decisions | | | |
| 13 | 5/24 | Machine learning (I) (L10) -Learning from examples | [RN21] Ch. 19 | HW5 | |
| | 5/26 | Machine learning (II) (L11) -Learning probabilistic models -Reinforcement learning | [RN21] Ch. 20, 22 | | |
| 14 | 5/31 | Language and communication (L12) | [RN21] Ch. 23, 24 | | |
| | 6/2 | -Natural language processing -Neural NLP | | | |
| 15 | 6/7 | Computer vision and robotics (L13) -Computer vision -Robotics | [RN21] Ch. 25, 26 | | |
| | 6/9 | Explainability of AI (L14) | Ch. 27 | | |
| 16 | 6/13-17 | Final exam period (no class meeting) Term project – Final presentation (video recording) (due: Friday June 17, 23:59) Term project – Final paper (due: Friday June 17, 23:59) | | | Final present'n / Final paper |

* This schedule is subject to change.

(Syllabus version 2.0 – 2022/03/02)