Introduction to Prolog (Programming in Logic) for Artificial Intelligence (E2COD001C)

Introduction	Prolog is a widely used programming language in artificial intelligence (AI). As opposed to imperative languages (C or Python), it is a declarative language. When implementing the solution to a problem in Prolog, we simply specify what the situation (rules and facts) and the goal (query) are. Then, we let the Prolog interpreter automatically derive the solution. In this course, you will learn how to use Prolog to solve some practical problems in computer science. Its use in some AI problems will be illustrated. Besides, the logical foundations of Prolog will be briefly introduced.
Programme Type / Level	Coding Course (Level II) ([Token-required](#))
Instructor(s)	Dr Eric FUNG (Head of Research Division, The Hong Kong Academy for Gifted Education)
Pre-requisite	• Basic computer skills in Windows. • Some minimal experiences in computer programming (e.g., C or Python) is preferred, but certainly not a must. • Students are recommended to bring their own laptops for the largest benefits from the course. (If a student does not have a laptop, HKAGE will provide one for him/her.)
Target Participants	➤ S1-S3 HKAGE student members ➤ Class size: 15
Medium of Instruction	Cantonese with English Handouts
Certificate	**E-Certificate** will be awarded to participants who have: ❖ Attended **at least 5 sessions**; AND ❖ Completed all the assessments with **satisfactory performance**.
Intended Learning Outcomes	Upon completion of the programme, participants should be able to: • Describe the basics of Prolog, including list processing, arithmetic expressions, and operators. • Explain backtracking, cuts, and negation in Prolog. • Outline logic foundations of Prolog. • Recognise the use of Prolog in database and (simple) planning problems. • Discuss whether AI could be a threat to human dignity.
Screening	Please answer the screening questions in the online application form. *The screening question is designed to help the applicant understands the course level and the course content. The question must be answered by the student applicant, and it can only be attempted once. The answer cannot be changed once the application is submitted. Selection is based on students' performance in answering the questions. Only students who can demonstrate motivation and knowledge of logic and coding in the screening questions can be enrolled in the programme.

Application Deadline	25 Oct 2021, 12:00 n.n	Application Result Release Date	5 Nov 2021

If student members withdraw from the programme after the Application Deadline, the token will be deducted.

Schedule

Session	Date	Time	Venue (HKAGE)
1	11 Dec 2021	10:00 a.m. – 12:00 noon	Room 204
2	18 Dec 2021		
3	24 Dec 2021		
4	29 Dec 2021		
5	31 Dec 2021		
6	8 Jan 2022		

Sample Notes

```
edge(a, b).
edge(b, c).
edge(b, d).
edge(d, e).
edge(d, f).

path(X, Y) :- edge(X, Y).
path(X, Y) :-edge(X, Z), path(Z, Y).
```

path(b, X).

X = c
X = d
X = e
X = f
false

Prolog Program:
```
bigger(elephant, horse).
bigger(horse, donkey).
is_bigger(X, Y) :- bigger (X, Y).
is_bigger(X, Y) :- bigger(X, Z), is_bigger(Z, Y).
```

Translating this program into a set of first-order logic formulas yields:

$$\{ \quad bigger(elephant, horse),$$
$$bigger(horse, donkey),$$
$$\forall x. \forall y. (bigger(x, y) \rightarrow is\_bigger(x, y)),$$
$$\forall x. \forall y. \forall z. (bigger(x, z) \land is\_bigger(z, y) \rightarrow is\_bigger(x, y)) \quad \}$$

Enquiries

For enquiries, please contact us on 3940 0101 or email at programme@hkage.org.hk.