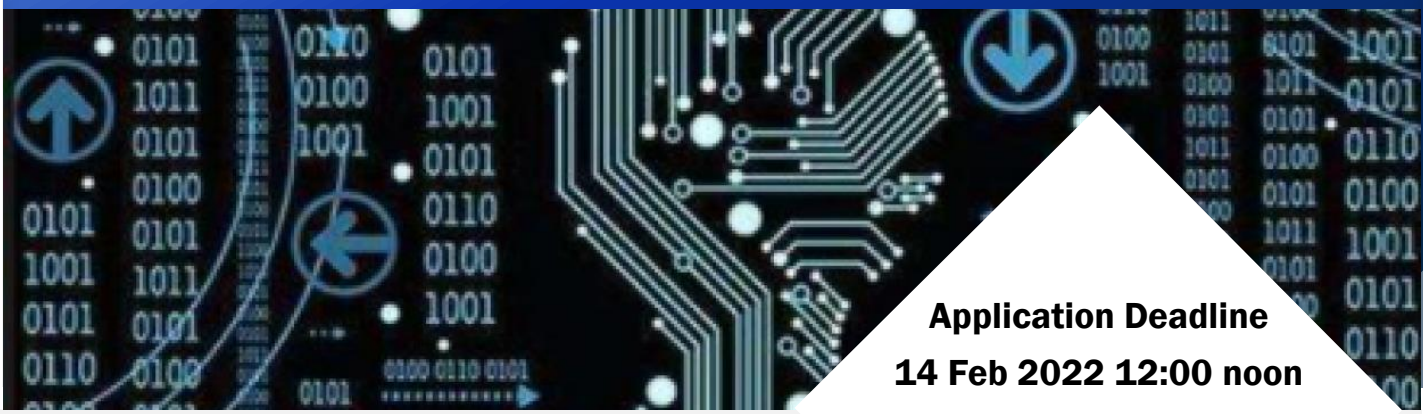
香 港 資 優 教 育 學 苑
The Hong Kong Academy for Gifted Education

E2COD001C-2
(Token- required)

Coding Course (Level II):

Introduction to Prolog (Programming in Logic) for Artificial Intelligence – Thinking as Computation

Dr Eric FUNG
Head of Research Division, The Hong Kong Academy for Gifted Education



Application Deadline
14 Feb 2022 12:00 noon

Result Release
25 Feb 2022

Intended Learning Outcomes

Upon completion of the programme, participants should be able to:

1. Describe the basics of Prolog, including list processing, arithmetic expressions, and operators.
2. Explain backtracking, cuts, and negation in Prolog.
3. Outline logic foundations of Prolog.
4. Recognise the use of Prolog in database and (simple) planning problems.
5. Discuss whether AI could be a threat to human dignity.

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

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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.

Schedule

Session	Date	Time	Venue (HKAGE)
1	21 May	~~2:00 p.m. – 4:00 p.m.~~	Room ~~206~~ 204
2	28 May	~~10:00 a.m. – 12:00 noon~~	Room ~~203~~ 204
3	4 Jun	~~10:00 a.m. – 12:00 noon~~	Room ~~203~~ 204
4	11 Jun	~~10:00 a.m. – 12:00 noon~~	Room ~~203~~ 204
5	18 Jun	~~2:00 p.m. – 4:00 p.m.~~	Room 204
6	25 Jun	~~10:00 a.m. – 12:00 noon~~	Room ~~206~~ 204

6:00 p.m. – 8:00 p.m.

Target Participants

- S3 – S6 HKAGE student members only in 2021/22 school year
- Class size: 15

Pre-requisite

- Students should be good at analytical thinking.
- Some minimal experiences in computer programming (e.g., C or Python) are required.
- Basic computer skills in Windows.
- 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.)

Medium of Instruction

~~Cantonese~~ English with English Handouts

Screening

Please answer the screening questions in the online application form.

*The screening questions are designed to help the applicant understands the course level and the course content. The questions must be answered by the student applicant and it can only be attempted once. The answers 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 the knowledge of analytical thinking and coding in the screening questions can be enrolled in the programme.

Certificate

E-Certificate will be awarded to participants who have:

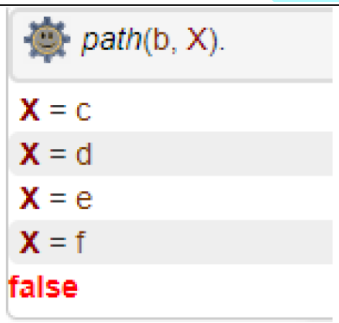
- attended at least 5 sessions; and
- completed all the assignments with satisfactory performance

Enquiries 3940 0101 programme@hkage.org.hk

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).
```



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:

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