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

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Applications from High School Students are Welcome!

Intended Learning Outcomes

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

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

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<tr>
<th>Session</th>
<th>Date</th>
<th>Time (Hong Kong)</th>
<th>Broadcasting via ZOOM</th>
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<tr>
<td>1</td>
<td>21 May</td>
<td>6:00 p.m. – 8:00 p.m.</td>
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<td>28 May</td>
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<td>3</td>
<td>4 Jun</td>
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<td>5</td>
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<td>6</td>
<td>25 Jun</td>
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Target Participants

High school students

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.

Medium of Instruction

English with Handouts

Sample Notes

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:

```
{ 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)) }
```