Inductive Programming: Tutorial 1
End-User Programming by Induction

Stephen Muggleton

The aim of this tutorial is to enable you to understand concepts introduced in Lecture 1, involving End-User Programming by Induction.

Question 1

Explain the motivation for supporting end-user programming using inductive programming.

Solution

- Much of world uses computers.

- Most users cannot program.

- Often perform time-consuming tasks manually.

- Inductive Programming generates small complex programs from few examples.

Question 2

Describe an existing mass-market inductive programming system.

Solution

Microsoft's Excel's FlashFill add-on was developed by Summit Gulwani. Given a spreadsheet containing text data in column A it will complete column B on the basis of a small number of examples provided by the user. The examples in column B are used to induce a string transformation program, consistent with the examples, which transforms all strings in column A into corresponding strings in column B.

Question 3

- What are the two main approaches in Inductive Programming?

- Describe the key similarities between these approaches.

- Describe the key differences.

Solution

- The two main approaches are 1) Inductive Functional Programming (IFP) 2) Inductive Logic Programming (ILP).

- Both approaches involve examples E and background knowledge B which is used to identify a hypothetical program H consistent with the examples.

- IFP and ILP use functional and logic programming frameworks respectively to represent E, B and H. IFP induces deterministic programs and ILP induces non-deterministic programs.

Question 4

Use a table to describe four key differences between Inductive Programing and Machine Learning.

Solution

	Inductive Programming	Machine Learning
Examples	Small data	Big data
Hypotheses	Programs	Network, kernel
Comprehend	High	Low
Bias	Background knowledge	Bayes' Prior

Question 5

Describe three challenges for making IP more like human learning.

Solution

- **Few examples.** Cognitive Science shows humans learn complex ideas from small numbers of positive examples.

- **Background knowledge.** Humans learn using large amounts of background knowledge.

- **Life-Long Learning.** Humans learn continuously and incrementally.