Artificial Intelligence

Exercise sheet 5
Inductive Logic Programming & Semantic Web and Services

1 Inductive Logic Programming

Note: This is a group task, you may solve it in groups up to the size of two people, everybody must however be able to explain all parts of the implementation

Exercise 1.1 - Michalski's Train Problem (14 points)

This exercise is based on the lecture slides on the topic "Inductive Logic Programming", so a review of them is highly recommended.

1. Use an ILP system implementation: **A** **L**earning **E**ngine for **P**roposing **H**ypotheses (Aleph), `http://www.cs.ox.ac.uk/activities/machlearn/Aleph/`.
   Aleph has been ported into SWI-Prolog:
   - SWI-Prolog, `http://www.swi-prolog.org/`
   - Package "aleph", `http://www.swi-prolog.org/pack/list?p=aleph`
   - Source on GitHub, `https://github.com/friguzzi/aleph`
2. Download SWI-Prolog and package "aleph"
3. Select "Michalski-style" train examples based on the last digit of your and your team-mate Matrikelnummers

(i) Even $\wedge$ Even $\rightarrow$ Example #1

(ii) (Odd $\wedge$ Even) $\vee$ (Even $\wedge$ Odd) $\rightarrow$ Example #2

(iii) Odd $\wedge$ Odd $\rightarrow$ Example #3

4. Based on the assigned train examples, construct the 3 data files for Aleph:
   (i) Background knowledge file
   (ii) Positive examples file
   (iii) Negative examples file

   Note: file examples are available in the package "aleph".
5. Generate the hypotheses and describe in your own words the problem at hand and the key aspects of the strategy followed to solve it.

Train Examples

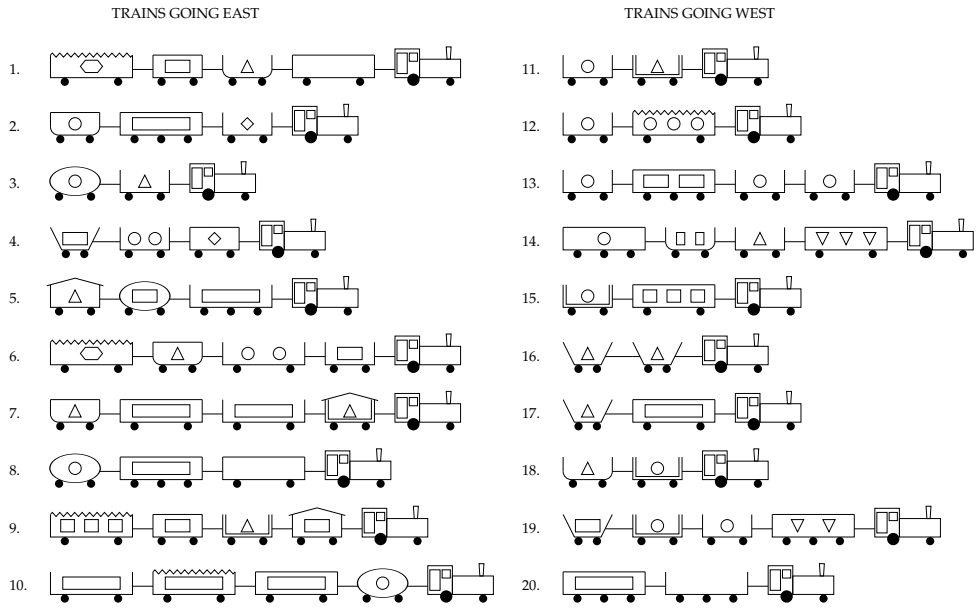

Figure 1.1: Train Examples #1

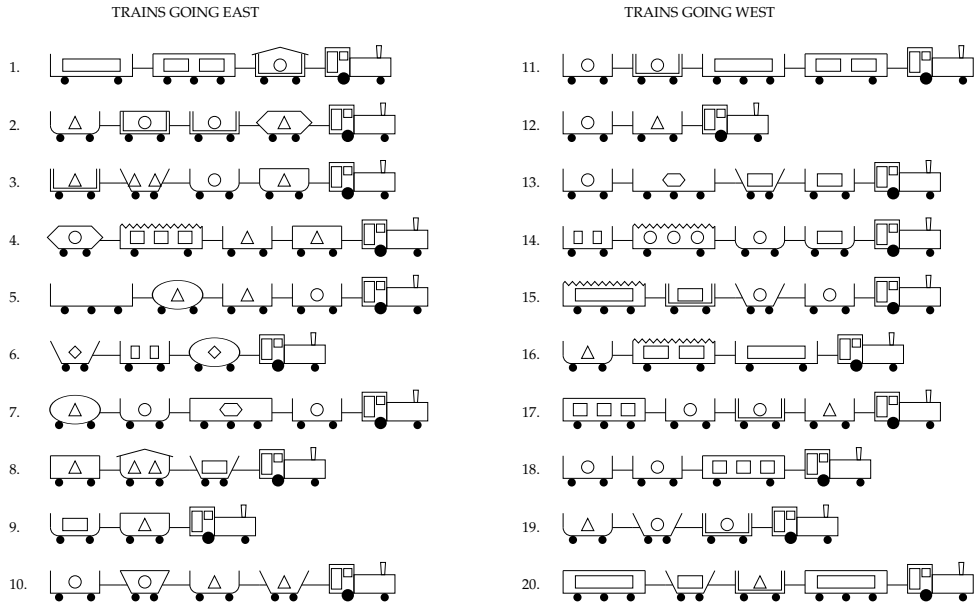

Figure 1.2: Train Examples #2

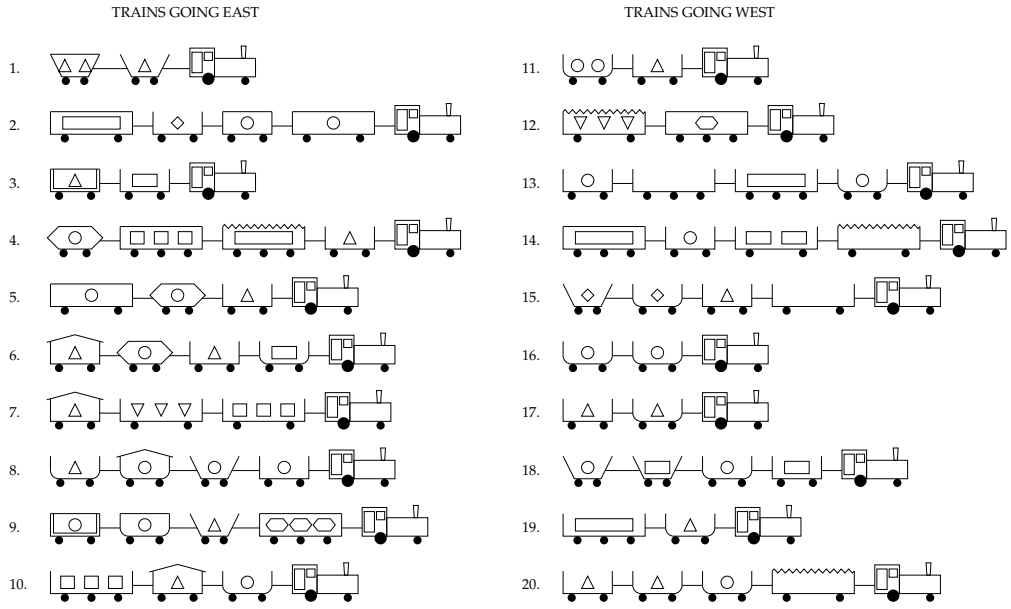

Figure 1.3: Train Examples #3

2 Semantic Web and Services

Note: This is an individual task, you should answer it with your own words.

Exercise 2.1 (8 points)

Take the following natural language sentences:

1. The STI Innsbruck is located at the Technikerstrasse 21a, 6020, Innsbruck, Austria
2. The web site `http://sti-innsbruck.at/teaching` hosts the homepage for the STI Innsbruck's teaching activity
3. John claims that Mary is married to Bill

Questions:

(a). Write down sentences 1 & 2 in RDF triple notation without blank nodes, using at least 3 triples for each sentence.

(b). Take your solutions from (a) and write them down as a directed labeled graph where resources are ellipses, literals are boxes and properties are arrows.

(c). Write down sentence 3 as RDF (either as triples or as a graph). Use reification.

Exercise 2.2 (8 points)

Create a small RDFS ontology (in triple or graph notation) about Persons and Universities. Create at least 3 classes and at least 2 properties; use at least 2 `subClassOf` statements.