Tutorial 07   Decision Tree Learning

Introduction

In this tutorial, you will gain better understanding about how to construct a decision tree from some examples. Refer to Lecture 05 handout for completing this tutorial.

Task 1.   ID3

Assume that in a game the AI needs to steer a car in a 2-lane road. It tries to learn from some examples observed from a player. The attributes are whether there is a car in front (F), whether there is a car behind (B), and whether there is a car in next lane (N). The examples given these attribute values and the corresponding actions are shown in the following table:

Example	Attribute F: Car in front?	Attribute B: Car behind?	Attribute N: Car next lane?	Action
1	No	No	No	Turbo
2	Yes	Yes	Yes	Maintain speed
3	No	Yes	Yes	Maintain speed
4	Yes	No	No	Change lane
5	Yes	Yes	No	Change lane
6	No	Yes	No	Turbo

Construct the decision tree based on the above examples using the ID3 algorithm.

Task 2.   Simple Updating

Assume that one more example is observed by the player. The following table shows a newly example 7 added to the last row where examples 1-6 are the same as in Task 1. Modify the decision tree you obtained from Task 1 by considering this new example using the simple updating procedure (refer to slides 22-27 in Lecture 5).

Example	Attribute F: Car in front?	Attribute B: Car behind?	Attribute N: Car next lane?	Action
1	No	No	No	Turbo
2	Yes	Yes	Yes	Maintain speed
3	No	Yes	Yes	Maintain speed
4	Yes	No	No	Change lane
5	Yes	Yes	No	Change lane
6	No	Yes	No	Turbo
7	No	No	Yes	Turbo

Task 3.   Complete the Canvas Quiz

Complete the quiz "Tutorial 07" on the <u>Canvas</u> course page (Assignments > Tutorial 07) before the posted deadline.