Assignment 6: Hidden Markov Models

CS 6601

Due Friday December 4 by 11:55PM

Abstract

A simple introduction to Hidden Markov Models.

1 The Challenge

HMMs are a useful class of statistical model for dealing with time series data and indirect evidence. Your challenge is to use hidden markov models to analyze the states of systems you cannot directly observe.

2 Your Assignment

The structure of this assignment is as follows:

- In Part 1 of the assignment, you'll be presented with a toy system (the Swiss Horn problem presented in lecture), and be asked to use the Viterbi algorithm to compute state probabilities by hand, then implement the Viterbi algorithm and verify your results programmatically.
- In Part 2 of the assignment, you'll be presented with a different toy system (the Umbrella World system presented in Russel and Norvig), and be asked to implement the forward-backward algorithm to inspect the most likely states at an instant in an observation sequence.

As always, more details are provided in the assignment notebook.

3 Grading

Each section of the assignment is associated with a number of points, as follows (out of 100 points total):

Part 1: The Viterbi algorithm (60 pts)

Part 2: The forward-backward algorithm (40 pts)

4 Submission

This assignment is due on T-Square Friday December 4th by 11:55pm. The deliverables for the assignment are:

- A filled out version of the iPython notebook provided. (hmm_notebook.ipynb)

Please submit this in iPython notebook format - it makes grading much easier.

5 Resources

Most of the problems are drawn directly from Chapter 15 and 20 of Russel & Norvig

As always, TAs will hold office hours Monday, Tuesday, Thursday and Friday from 2:00 to 4:00 PM outside TSRB 241.