Adam Gincel

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Homework 3 Conclusions and Operation

After finally getting the EM algorithm working over our given sequence, I was interested to see wildly different results for my matrices over consecutive runs. Only after seeding the random numbers and getting the same results per run did I understand local minima. Because we were given the proper state matrix, runs can be performed consecutively until the algorithm happens to start with the right weights that will converge properly, but to do so exactly correctly for all values happens less often than one might hope. While I was happy I was able to predict a given state transition using the EM algorithm, and using Maximum Likelihood Estimation, I was left wondering how we would know for sure we had happened upon the right values when each run produces different local minima. Perhaps a large number of trials, averaged out, may yield us a better estimate to the true matrices? Going by the true transition matrix, we see that transitions from state 0 into state 0, and from state 2 into state 2 are the most common – ie, the program is more likely to stay in the same state than it is to change. While we know nothing about the program itself, this seems like a reasonable conclusion.

Operation

Submitted are two files: HW3.py and seq.txt. HW3.py is written in Python 3, so either the console command “python3 HW3.py” or “python.HW3” will run it properly. During execution the program will ask you how many iterations you would like to perform estimation over. To skip this simply press enter, and the program will default to 50 iterations. It will inform you as to its status, show you its initial A, B, and pi matrices, and will then display the final A and B values. Finally, one final update is done using a constant matrix that is the given matrix from the assignment page, and B is then displayed after having run through the algorithm. This is labeled as “B using Given Matrix Solution.”

Please feel free to email agincel@stevens.edu with any questions. Thank you very much.