King Fahd University of Petroleum & Minerals
Department of Electrical Engineering
EE430 Information Theory and Coding

Computer Assignment I: Arimoto-Blahut Algorithm for Channel Capacity

Due: Sunday, March 16, 2008

As an introduction to the assignment make sure that you understand the material presented in section 2.2.1 (Maximization of Mutual Information and Channel Capacity).

You are required to build a Matlab **function** to implement the Arimoto-Blahut algorithm . The Matlab function should accept two inputs; namely: the transition matrix and the termination error. The function should produce four different outputs; namely: the channel capacity, input distribution, the output distribution, and the mutual information given a uniform distribution at the input. Like example 2.2.1

You may test your program for the channels in Example 2.2.1.

Use your own examples to draw different conclusions about how sensitive the channel capacity to changes on the input probabilities and transition matrix.

Function [Cc,Pc,Py,I]=**capacity**(Pygc,epsilon)
…….
…….

safe your program as *capacity.m*

You need to submit a total of **no more than four pages** including the code. A hard copy should be submitted in the class on the due date and a soft copy (report+m-file) should be submitted through WebCT earlier.

Try to explain the principle of the algorithm.

Instructions:
1. Writing style and organization are very important (Quality not Quantity!)
2. **Your names and serial numbers should be clearly presented on the first page as well as on the code.**
3. A group of two students work together and submit one report. You will have to change your partner every computer assignment.
4. You should make your output clear and nice. If you have plots, use commands like (axis, xlabel, ylabel, title, legend, text)
5. Remember to use (**help**, **lookfor**) commands.
6. This assignment accounts for **3%** of your total grade.
7. Allow yourself enough time. Do not work close to the due date.
8. Projects are to be submitted during class time. Any late submission will result in zero or low grade.
9. You can use the discussion group in the Course WebCT to discuss general ideas and questions.
10. **Copying is the easiest way to loose points**.

Good luck,   Dr. Ali Muqaibel