

CSCI4155/CSCI6505: Assignment 2

This is an individual assignment. Assignments must be submitted on paper at the beginning of the **Thursday class, September 26, 2013**. Late assignments not accepted.

1. The probability of catching Lyme disease after on day of hiking in the Cuyamaca mountains are estimated at less than 1 in 10000. You feel bad after a day of hike in the Cuyamacas and decide to take a Lyme disease test. The test is positive. The test specifications say that in an experiment with 1000 patients with Lyme disease, 990 tested positive. Moreover. When the same test was performed with 1000 patients without Lyme disease, 200 tested positive. What are the chances that you got Lyme disease?
2. This problem uses Bayes theorem to combine probabilities as subjective beliefs with probabilities as relative frequencies. A friend of yours believes she has a 50% chance of being pregnant. She decides to take a pregnancy test and the test is positive. You read in the test instructions that out of 100 non-pregnant women, 20% give false positives. Moreover, out of 100 pregnant women 10% give false negatives. Help your friend upgrade her beliefs.
3. In a communication channel a zero or a one is transmitted. The probability that a zero is transmitted is 0.1. Due to noise in the channel, a zero can be received as one with probability 0.01, and a one can be received as a zero with probability 0.05. If you receive a zero, what is the probability that a zero was transmitted? If you receive a one what is the probability that a one was transmitted?
4. The course manuscript includes an example program that was used to produce the filtered image shown on the right in Fig. 2.1. This program uses the build in Matlab function `conv2()` to calculate the 2-dimensional convolution. Write a Matlab function that replaces this function and implements the convolution from scratch. Include a printed listing in your paper submission, and in addition also send the corresponding file to `prof4155@cs.dal.ca` with subject line A2. Explain the black border in the filtered image.
5. Take an image of your choosing and use Gabor filters to filter the image. Show the original and resulting images with two different angular parameter.