

Exercises of lecture  
**Wireless Sensor Networks**  
 Winter 2006/2007  
 Sheet 9

**SECTION 1:**

## Interpretation

1. Consider a mobile beacon that moves around a sensor node. The node uses data available to it for calculating its probable location using Bayes theorem. The node could be located among four equal size squares namely A1, A2, A3 and A4. Following data is available to the node using local measurements.

Probability that node is in a square  $x$  is ( $P(A_x)$ ) :

$$P(A_1) = 0.2$$

$$P(A_2) = 0.3$$

$$P(A_3) = 0.35$$

$$P(A_4) = 0.15$$

Probability that RSSI is equal to "k" if node is in square  $x$ :  $P(B|A_x)$  :

$$P(B|A_1) = 0.1$$

$$P(B|A_2) = 0.3$$

$$P(B|A_3) = 0.25$$

$$P(B|A_4) = 0.35$$

Probability that RSSI is equal to "k",  $P(B)$ , is not known.

In what square the node could be located with highest probability? What is the probability of node being located in square A1?

**Solution:**

$$P(A_1|B) + P(A_2|B) + P(A_3|B) + P(A_4|B) = 1$$

$$P(B|A_1) \cdot P(A_1) + P(B|A_2) \cdot P(A_2) + P(B|A_3) \cdot P(A_3) + P(B|A_4) \cdot P(A_4) = P(B)$$

$$0.02 + 0.09 + 0.0875 + 0.0525 = 0.25$$

*The node will be located in square  $A_2$  with highest probability i.e.  $0.09/0.25 = 0,36$*

*The probability that node will be located in square  $A_1$  is equal to  $0.02/0.25 = 0,08$*