OULUN YLIOPISTO
Tietotekniikan osasto
Prof. Tapio Seppänen

1. *Bayes Decision Rule*

   Present the Bayes decision rule carefully defining and explaining the notation! (6 p)

2. *Evaluation of Classifiers*

   You are participating in a classifier design competition in which the task is to classify speech emotion as neutral or happy or sad, or angry. Volunteers have made several recordings with differing speech emotions, and each recording from each volunteer containing only a single emotion have been split into parts of constant duration. The samples used in classification are these recording parts from all the volunteers and all the records. How would you divide and handle the data set when testing your classifier in order to find out its expected performance with least bias? (6p)

3. *Maximum Likelihood Estimation*

   You have N samples x_i of a real-valued random variable X at your disposal. The random variable X attains values in the range $]0, \infty[$, and you know that it has the distribution $p(x|\lambda) = \lambda e^{-\lambda x}$ with the parameter λ. Use the Maximum Likelihood Estimation method to derive an estimate for the parameter λ using the samples x_i! (6p)

4. *Classifiers*

   Thoroughly describe the operating principle of three classifiers of your choice but introduced in this course (max. 2 pages)! (6p)