ECE 802-601 Review Paper 1

due February 14, 2008

Reading: Applications of time-frequency representations for signal detection and classification

For this first review paper, you are given three recent papers on the applications of time-frequency distributions for signal detection and classification. The first paper by Gillespie and Atlas talks about designing the optimal time-frequency kernel for signal classification. The second paper describes an application of time-frequency distributions in the area of radar waveform recognition using features in the time-frequency plane. The last paper by Boashas and Mesbah describes a biomedical application of time-frequency distributions.

For your reviews, you should write a 2-3 page report first summarizing the three papers in your own words and discussing the major points made in the papers (summarize each paper in 200 words or so). After you summarize the papers, try to answer the following questions in your report:

1. In the first paper, explain what a regular TFR is and why it is used as the base TFR for classification.

2. Compare the feature extraction methods proposed in the three papers in terms of their computational complexity, applicability to a large class of signals and robustness of the features.

3. Discuss the computational complexity and the difficulties of implementing equation 18 in Gillespie and Atlas's paper.

4. Discuss the problems with the instantaneous frequency estimation approach used in Lunden's paper.

5. What are some potential problems with treating time-frequency distributions as images for feature extraction as discussed in Lunden's paper?

6. Discuss some of the properties and drawbacks of the B-distribution introduced in Boashash's paper.