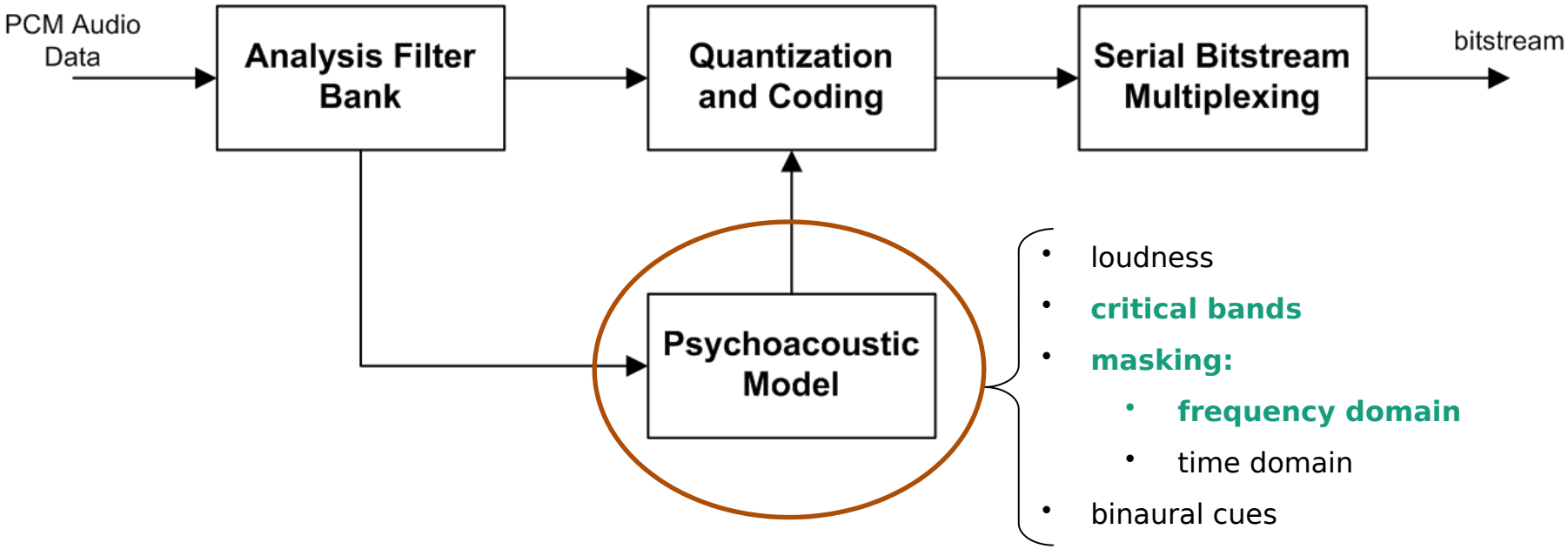
Audio Coding - Practice Lessons

Seminar 4 – Perceptual Model / Masking

Perceptual Audio Encoder



Homework Assignment 4

Goal: Using the Psychoacoustics model reduce the amount of audible quantization noise.

Step 1:

- Generate a signal consisting of two sinusoids:
  i. Sin_1 – 200 Hz
  ii. Sin_2 – 600 Hz
  iii. Signal duration – 3 min, Sampling rate - 44100
- Apply STFT to the signal (1024 subbands)

Homework Assignment 4

Goal: Using the Psychoacoustics model reduce the amount of audible quantization noise.

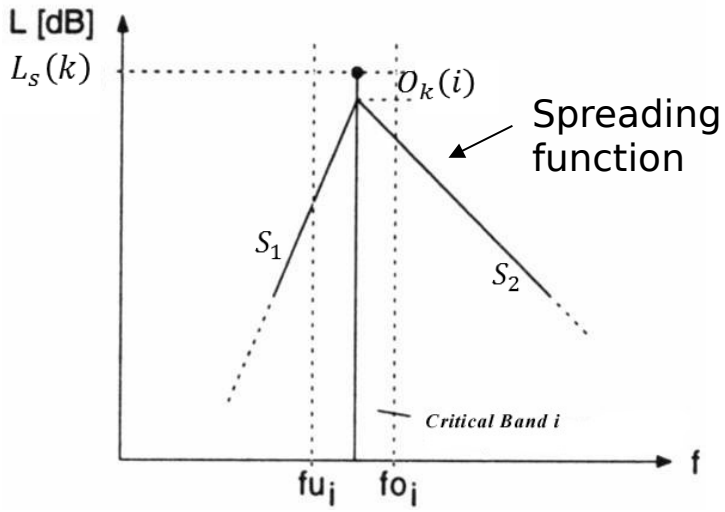
Step 2:

- Transformation from STFT to Bark scale
  - For the input to the psycho-acoustic model, group the STFT subbands into groups of **width of 1/2 Bark**
  - Use the function of frequency to Bark for it
  - Within each group, add the powers (squares of the values) of the subbands

Homework Assignment 4

Step 2:

- Spreading function
  - Compute the spreading function, centered on each group
  - Observe that each spreading function extends over all other bark groups.



Source: U. Zölzer, “Digital Audio Signal Processing”

Homework Assignment 4

Step 3:

- Masking threshold
  - Then add up the contributions of all spreading functions within each 1/2 Bark group.
  - This now is our masking threshold as a power, T^2.
  - This should be equal to our quantization error power, $T^2 = \frac{\Delta^2}{12}$, with quantization step size Δ.

- Include the plots of:
  - Spectrum of the signal
  - Magnitude Spectrum mapped to 1/2 Bark Bands
  - Masking Threshold in Bark Domain
  - Masking Threshold back in Linear Domain
  - Masking Threshold including Threshold in Quiet for our signal