Audio Coding - Practice Lessons

Seminar 3 – Perceptual Model / Masking
Perceptual Audio Encoder

- loudness
- critical bands
- masking:
  - frequency domain
  - time domain
  - binaural cues
Homework Assignment 3

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

Step 1:
- Transformation from MDCT to Bark scale
  - For the input to the psycho-acoustic model, group the MDCT 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 3

Step 2:

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

Homework Assignment 3

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 \( \Delta \).
Homework Assignment 3

Step 4:
- Quantization step size
  - Take this $\Delta$ as quantization step size, and apply it to the quantizers for the MDCT subbands in the corresponding 1/2 Bark group.
  - Do this calculation for each block such that the Masking Threshold can follow the signal.