Questions and Answers for Week 8

Question:

I found that the lecture slides and the notes by Prof. Gunduz emphasize differently. Should we understand both or only follow slides.

Answer:

It is better to understand both. But, the examination in April will be according to the lecture slides.

Question:

Will the exam paper this year follow the same style as that of previous years which where made by Dr.Gunduz? If not could you please release some sample papers to help us understand this.

Answer:

Yes. It is more or less similar but not same.

Question:

I was reviewing lecture 9 and I find this derivation on page 8 of the slides.

Matched Filter Derivation

Let $\varphi_1(f) = H(f)$ and $\varphi_2(f) = G^*(f)e^{-j2\pi f T_b}$

$$\left|\int_{-\infty}^{\infty} H(f)\, G(f)\, e^{j2\pi f T_b}\, df\right|^2 \le \int_{-\infty}^{\infty} |H(f)|^2\, df \int_{-\infty}^{\infty} |G(f)|^2\, df$$

Do we ignore the exponential term when performing the integral as it's just a time shift and we only focus on the magnitude?

Answer:

The amplitude of $e^{-j2\pi f T_b}$ is one. Therefore, $|G^*(f)e^{-j2\pi f T_b}| = \left||G^*(f)| \times |e^{-j2\pi f T_b}\right| = |G(f)|$ and $e^{-j2\pi f T_b}$ is not on the right side of the inequality.

Question:

I am confused with the difference between I(s) and the lk in average codeword length formula. For me, both of them represent number of bits per symbol. Could you show me the difference between them?

Answer:

I(s) is the amount of information in a symbol, s, while l_k is the codeword length for symbol k. They are obviously different. If we would like to design coding with minimum average length, the symbol with a less amount of information (larger probability) should assign a shorter codeword, as we do in Huffman code, to minimize the average length of codewords.