

資訊網路與多媒體研究所

資格考試科目：資訊理論與編碼技巧

Information Theory and Coding Techniques

Quality Exam 2012/3

- (1) What is Kraft Inequality?
- (2) For the following set of codeword lengths, please find the corresponding Binary Instantaneous decodable codes.
Codeword-length set = {2,2,3,3,4,4,4,4}
- (3) Find the Huffman code of the following source, in which the variance of the code length is minimum.
- $$\begin{matrix} \{x_1, & x_2, & x_3, & x_4, & x_5, \} \\ \{0.4 & 0.2 & 0.2 & 0.1 & 0.1\} \end{matrix}$$
- (4) What is Jensen's Inequality?
Please prove it by using Mathematical Induction.
- (5) What is Fano's Inequality?
Let $X \in \{1, 2, \dots, m\}$ and $P_1 \geq P_2 \geq \dots \geq P_m$
What Fano's Inequality would be for this particular source?
And, what kind of probability distribution will make the equality hold?
- (6) Please briefly explain why and under what conditions DPCM will provide compression gain?
- (7) Please briefly explain why and under what conditions Transform coding will provide compression gain?
- (8) What is 3-setp fast search algorithm?
Please describe the pros and cons of 3-step fast Search Algorithm?