Quantizer

* After Qu if L levels } Simple encoding is $R = \log_2 L$ / sample if L is a power of 2 (or) $R = \lfloor \log_2 L \rfloor + 1$.

* In Source coding quantizer can be optimized if we know the pdf of signal amp at i/p to Quantizer.
* for i/p $\{x_n\}$ at i/p to Quantizer has a pdf $p(x)$ is let $L = 2^R$ be the desired no of level.
* Designing optimum Scalar Quantizer that minimize some func of qun error $q = \tilde{x} - x$ where $\tilde{x}$ is the quantized value of x. if suppose $f(\tilde{x} - x)$ denotes denoid func of error.
* Then distortion resulting from quantization of i/p amp

$$D = \int_{-\infty}^{\infty} f(\tilde{x} - x)\, p(x)\, dx.$$

* In general, an optimum Quantizer is one that minimizes D by optimally selecting the o/p levels and the corresponding i/p range of each level. This optimization problem has been considered by Lloyd (1982) & Max (1960) & the resulting optimum Quantizer is usually called the Lloyd-Max Quantizer.