$$\xi[0]\ \xi[1]\ \xi[2] \quad \xi[n] \quad \xi[N-1]$$

$$\xi_1[n] \quad \xi_2[n] \quad \xi_\omega[n] \quad \xi_\Omega[n]$$

$$\xi[n] \in \mathcal{R} \qquad \xi[n] \in [h_1, h_2, \dots, h_H]$$

$$\xi[n] \in [h_1, h_2, \dots h_H] = [0, 1, 2, \dots, 36]$$

$$F(x,n) = \mathcal{P}\{\xi[n] < x\},$$

$$\text{probability} = \frac{\text{count}}{\text{total}}$$

$$\hat{F}(x,n) = \frac{\text{count}(\xi_\omega[n] < x)}{\Omega}$$

$$\mathcal{P}(X_i, n)$$

$$\sum_{\forall i} \mathcal{P}(X_i, n) = 1$$

$$\mathcal{P}(\hat{X_i}, n) = \frac{\text{count}(X_i, n)}{\text{total}[n]}$$

$$\mathcal{P}(x,n) = ???$$

$$p(x,n) = \frac{dF(x,n)}{dx}$$

$$v(t) = \frac{dl(t)}{dt} = \frac{l(t_2) - l(t_1)}{t_2 - t_1} = \frac{\Delta l}{\Delta t}$$

$$\rho(x,y,z) = \frac{dm}{dV} = \frac{m(x_1 \dots x_2, y_1 \dots y_2, z_1 \dots z_2)}{(x_2 - x_1)(y_2 - y_1)(z_2 - z_1)} = \frac{\Delta m}{\Delta V}$$

$$p(x,n) = \frac{\text{probability}}{\text{normalization}}$$

$$\text{histogram}(x \in interval, n) = \text{count}(x \in interval, n)$$

$$\mathcal{P}(x \in interval, n) = \frac{\text{count}(x \in interval, n)}{\Omega}$$

$$p(x \in interval, n) = \frac{\text{count}(x \in interval, n)}{\Omega |interval|}$$

$$\int_t v(t) = ??$$

$$\iiint_V \rho(x,y,z) = ??$$

$$\int_{x=-\infty}^{+\infty} p(x,n) = 1$$

$$\mathcal{P}(X_i, X_j, n_1, n_2)$$

$$p(x_i, x_j, n_1, n_2)$$

$$\text{joint probability} = \frac{\text{count that something happened } \textbf{simultaneously} \text{ in } \ n_1 \ \ \textbf{AND} \ \ n_2}{\text{total}}$$

$$\hat{\mathcal{P}}(X_i, X_j, n_1, n_2) = \frac{\text{count}(\xi[n_1] = X_i \ \ \textbf{AND} \ \ \xi[n_2] = X_2)}{\Omega}$$

$$\text{histogram}(x_1 \in interval_1, x_2 \in interval_2, n_1, n_2) = \text{count}(x_1 \in interval_1, n_1 \ \ \textbf{AND} \ \ x_2 \in interval_2, n_2)$$

$$\mathcal{P}(x_1 \in interval_1, x_2 \in interval_2, n_1, n_2) = \frac{\text{count}(x_1 \in interval_1, n_1 \ \ \textbf{AND} \ \ x_2 \in interval_2, n_2)}{\Omega}$$

$$p(x_1 \in interval_1, x_2 \in interval_2, n_1, n_2) = \frac{\text{count}(x_1 \in interval_1, n_1 \ \ \textbf{AND} \ \ x_2 \in interval_2, n_2)}{\Omega |interval_1||interval_2|}$$

$$a[n] = E\{\xi[n]\}$$

$$\text{expectation} = \text{sum}_{over\ all\ possible\ values}\text{what we're expecting}$$

$$a[n] = \sum_{\forall X_i} \mathcal{P}(X_i, n) X_i$$

$$a[n] = \int_x p(x,n) x dx$$

$$D[n] = E\{(\xi[n] - a[n])^2\}$$

$$D[n] = \sum_{\forall X_i} \mathcal{P}(X_i, n)(X_i - a[n])^2$$

$$D[n] = \int_x p(x,n)(x - a[n])^2 dx$$

$$\hat{a}[n] = \frac{1}{\Omega} \sum_{\omega=1}^{\Omega} \xi_\omega[n]$$

$$\hat{D}[n] = \frac{1}{\Omega} \sum_{\omega=1}^{\Omega} (\xi_\omega[n] - \hat{a}[n])^2$$

$$R[n_1, n_2] = E\{\xi[n_1]\xi[n_2]\}$$

$$R[n_1, n_2] = \sum_{\forall X_1} \sum_{\forall X_2} \mathcal{P}(X_1, X_2, n_1, n_2) X_1 X_2$$

$$R[n_1, n_2] = \int_{x_1} \int_{x_2} p(x_1, x_2, n_1, n_2) x_1 x_2 dx_1 dx_2$$

$$\hat{R}[n_1, n_2] = \frac{1}{\Omega} \sum_{\omega=1}^{\Omega} \xi_\omega[n_1] \xi_\omega[n_2]$$

$$F(x,n) \to F(x) \quad p(x,n) \to p(x)$$
$$a[n] \to a \quad D[n] \to D \quad \sigma[n] \to \sigma$$
$$p(x_1, x_2, n_1, n_2) \to p(x_1, x_2, k)$$
$$R[n_1, n_2] \to R(k)$$

tady pak skrtnout to s omegou ...

$$\xi_\omega[n] \quad \Rightarrow \quad \xi[n]$$

$$\hat{a} = \frac{1}{N} \sum_{n=0}^{N-1} \xi[n] \quad \hat{D} = \frac{1}{N} \sum_{n=0}^{N-1} [\xi[n] - \hat{a}]^2 \quad \hat{\sigma} = \sqrt{\hat{D}}$$

$$\hat{R}[k] = \frac{1}{N} \sum_{n=0}^{N-1} \xi[n]\xi[n+k]$$

$$\hat{\mathcal{P}}(X_i, X_j, k) = \frac{\text{count}(\xi[n] = X_1 \ \ \textbf{AND} \ \ \xi[n+k] = X_2)}{N}$$

$$G(\frac{k}{N}) = DFT\{R[n]\}$$

$$G(\frac{kF_s}{N}) = DFT\{R[n]\}$$

$$G(\frac{k}{N}) = \frac{|DFT\{\xi[n]\}|^2}{N}$$

$$G(\frac{kF_s}{N}) = \frac{|DFT\{\xi[n]\}|^2}{N}$$