Statistical Communication Theory (CT-314)

Tutorial 8

25/03/2018

1. Show that when X and Y are jointly Gaussian with zero mean and pdf

$$f_{X,Y}(x,y)=\frac{1}{2\pi\sqrt{1-\rho^2}}e^{-(x^2-2\rho xy+y^2)/2(1-\rho^2)},-\infty<x,y<\infty$$

then, $f_Y\left(\frac{y}{x}\right)$ is also Gaussian.

2. Show that the linear transformation of jointly Gaussian random variable is also Gaussian.

$$f_{X_1,X_2,.....,X_n}(x_1,x_2,...,x_n)=\frac{1}{(2\pi)^{\frac{n}{2}}|C_X|^{\frac{1}{2}}}e^{-\frac{1}{2}\left[(x-m_x)^T C_X^{-1}(x-m_x)\right]}$$

3. Show that the E(X/Y) (best MMSE of X given y) corresponds to the linear estimate of X given y is possible only if X and Y are jointly Gaussian.