

Random processes

A collection of RVs indexed by time.

Eg: Consider temp. in a room

↳ Can be modelled as RV. (Conti: RV).

• DISCRETE TIME RANDOM PROCESS:

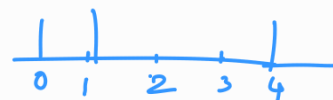
X_1, X_2, \dots

$t_1 \quad t_2$

Binomial

Bernoulli.

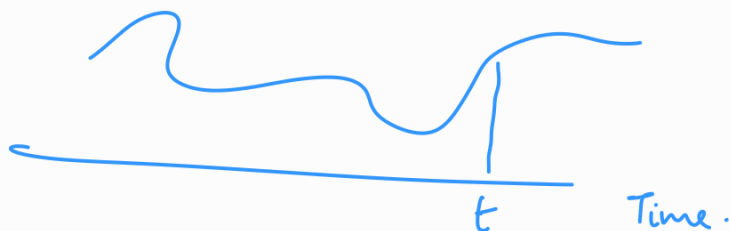
(X_n is RV).



St. line \Rightarrow Heads.

Nbg \Rightarrow Tails.

$\rightarrow X_t \rightarrow$ Temperature.



$X_t(w)$

At a given t , the value of temp. can't be predicted
It's a RV.
 $X_t \rightarrow$ RV.

$\rightarrow X_t = A + Bt, t \in [0, \infty)$

$A, B \sim N(1, 1).$

$A \perp B.$

Is this a random process?

(i.e., is X_t a RV for each t).

Let $\mu_x(t) = E[X_t]$

$$R_x(t_1, t_2) = E[X_{t_1} \cdot X_{t_2}]$$

\uparrow
CORRELATION:

Autocorrelation of X, Y where
 $X = X_{t_1}$ & $Y = X_{t_2}$

$$C_x(t_1, t_2) = R_x(t_1, t_2) - \mu_x(t_1)\mu_x(t_2).$$

\downarrow
Covariance ($\text{cov}(X, Y)$)

