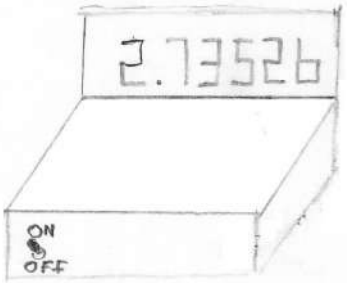
Random variable is an abstract mathematical object that resembles a device that shows numbers on a display. Each device presents a characterist preference for numbers of specific ranges.



Random variable $\underline{X}$

Specification chart of $\underline{X}$

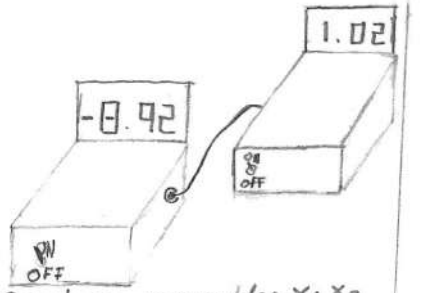
Distribution function
$F(x) : R \to R$

— or* —

The moments of the random variable

(mean, variance, skewness, kurtosis...)

A couple of random variables can be visualized as a couple of devices. If the variables are not independed then the devices are connected, which results in: the operation of one device influencing the opperation of the other.



Random variables $\underline{X_1}$ $\underline{X_2}$

Specification chart of $\underline{X_1}$ $\underline{X_2}$ and connection

Joint distribution function
$F_{\underline{X_1}\underline{X_2}}(x_1, x_2) : R^2 \to R$

Marginal distribution function
$F_{\underline{X_1}}(x_1) : R \to R$, $F_{\underline{X_2}}(x) : R \to R$

— or* —

The moments

(mean $\underline{X_1}$, mean $\underline{X_2}$, var $\underline{X_1}$, var $\underline{X_2}$ covar $\underline{X_1}$ and $\underline{X_2}$ ...)

Time series is like a simple database.

Time		Measurement
index: Integer	1 — 1	index: Integer
Time: string		value: real

Time series can also be considered as a $2 \times n$ table of which the first column is the time and the second the values of the n measurements.

The whole game in statistics

For a given time series, identify the best stochastic process.

The means to accomplish this is to analyse the time series with the sample moments (mean, variance, autocovariance...) and they build a numerical model (eg. ARC1)) that hopefully describes well the ideal stochastic process.

User's guide of $\underline{X}$

Switch on the device to display a number

Switch off and back on the device to display another number

User's guide of $\underline{X_1}$, $\underline{X_2}$ connection

Switch on first $\underline{X_1}$ then $\underline{X_2}$ to display the two numbers

Switch $\underline{X_1}$ off and then back on to display a new set of two numbers

* The Distribution functions fully describe random variables. Alternatively, I need moments (the more the better).

Evangelos Rozos