

Beta random variables

The density of a Beta random variable is proportional to $x^{\alpha-1} (1-x)^{\beta-1}$ for $0 < x < 1$ and α, β some fixed parameters.

$$f_X(x) = \frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1} \text{ for } 0 < x < 1$$
$$= 0 \text{ otherwise}$$

Idea: The beta random variable models the behavior of some proportion (X is the proportion; notice $0 < X < 1$), based on the prior observations related to the random variable. Based on these, we set (and fix) α and β to model future of the random variable X .