

A primer in statistics – Random variables

Sensor fusion & nonlinear filtering

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DISCRETE-VALUED RANDOM VARIABLES

Probability mass function, pmf

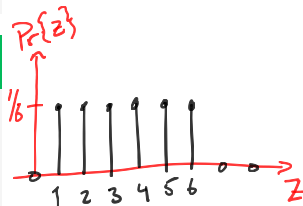
- The *probability mass function* (pmf) of a discrete-valued random variable is denoted, $\Pr\{z\}$ or $P\{z\}$, where

$$\Pr\{z = i\} \geq 0 \quad \text{for all } i$$

$$\sum_z \Pr\{z\} = 1.$$

Example: A fair dice

$$\Pr\{z = i\} = \begin{cases} \frac{1}{6} & \text{if } i = 1, 2, \dots, 6 \\ 0 & \text{otherwise.} \end{cases}$$



CONTINUOUS-VALUED RANDOM VARIABLES

Probability density function (pdf)

- The *probability density function* (pdf) of a continuous-valued random variable is denoted $p(z)$, where

$$p(z) \geq 0 \text{ for all } z, \quad \text{and} \quad \int p(z) dz = 1$$

Example: Uniform distribution

- Suppose z is uniformly distributed between 0 and 2π , its pdf is then

$$p(z) = \begin{cases} \frac{1}{2\pi} & \text{if } 0 \leq z < 2\pi \\ 0 & \text{otherwise.} \end{cases}$$

