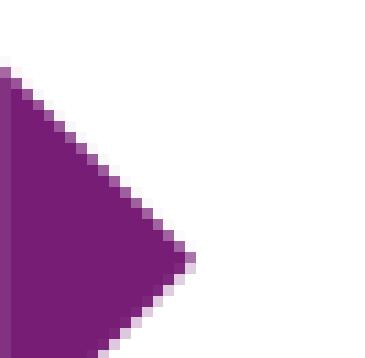


PROBABILISTIC
STRUCTURE





Suppose (X, \mathcal{F}) is a measurable space.

\Rightarrow $\mathcal{P}(X)$ to be the space of probability distributions over X

► Given a probability distribution $\mu \in \mathcal{P}(\mathbb{X})$, we will assume there is a density over dx

$$\mu(dx) = \mu(x)dx$$

► Define the product measure $\mu_1 \otimes \mu_2 \in \mathcal{P}(\mathbb{X} \times \mathbb{X})$

$$\mu \otimes \mu'(dx, dx') = \mu(dx)\mu'(dx') = \mu(x)\mu'(x')dxdx'$$

► E.g. when $\mathbb{X} = \{x_1, \dots, x_n\}$ is discrete we can represent μ as a n -dimensional row vector with i -th entry $\mu(x_i)$

Given $\mu, \mu' \in \mathcal{P}(X)$ with $\mu(dx) = \mu'(x)dx$:

PROBABILITY DISTRIBUTIONS

- ▶ Suppose $(\mathbb{X}, \mathcal{F})$ is a measurable space
- ▶ $\mathcal{P}(\mathbb{X})$ be the space of probability distributions over \mathbb{X}
- ▶ Given a probability distribution $\mu \in \mathcal{P}(\mathbb{X})$, we will assume there is a density over dx

$$\mu(dx) = \mu(x)dx$$

- ▶ Given $\mu, \mu' \in \mathcal{P}(\mathbb{X})$ with $\mu(dx) = \mu(x)dx$ and $\mu'(dx) = \mu'(x)dx$:

- ▶ Define the product measure $\mu_1 \otimes \mu_2 \in \mathcal{P}(\mathbb{X} \times \mathbb{X})$

$$\mu \otimes \mu'(dx, dx') = \mu(dx)\mu'(dx') = \mu(x)\mu'(x')dxdx'$$

- ▶ E.g. when $\mathbb{X} = \{x_1, \dots, x_n\}$ is discrete we can represent μ as a n -dimensional row vectors with i -th entry $\mu(x_i)$

FUNCTIONS