

$$a_i(\mathbf{x}) = \langle \mathbf{x}, \mathbf{e}_i \rangle = \sum_{j=1}^m x_j e_{ij} \quad 1 \leq i \leq p$$

$$\begin{aligned} \langle \text{cat image}, \text{bottle image} \rangle &= a_1 \langle \text{bottle image}_1, \text{bottle image}_1 \rangle + a_2 \langle \text{bottle image}_2, \text{bottle image}_1 \rangle + \dots = a_1 \\ \langle \text{cat image}, \text{bottle image} \rangle &= a_1 \langle \text{bottle image}_1, \text{bottle image}_1 \rangle + a_2 \langle \text{bottle image}_2, \text{bottle image}_1 \rangle + \dots = a_2 \end{aligned}$$