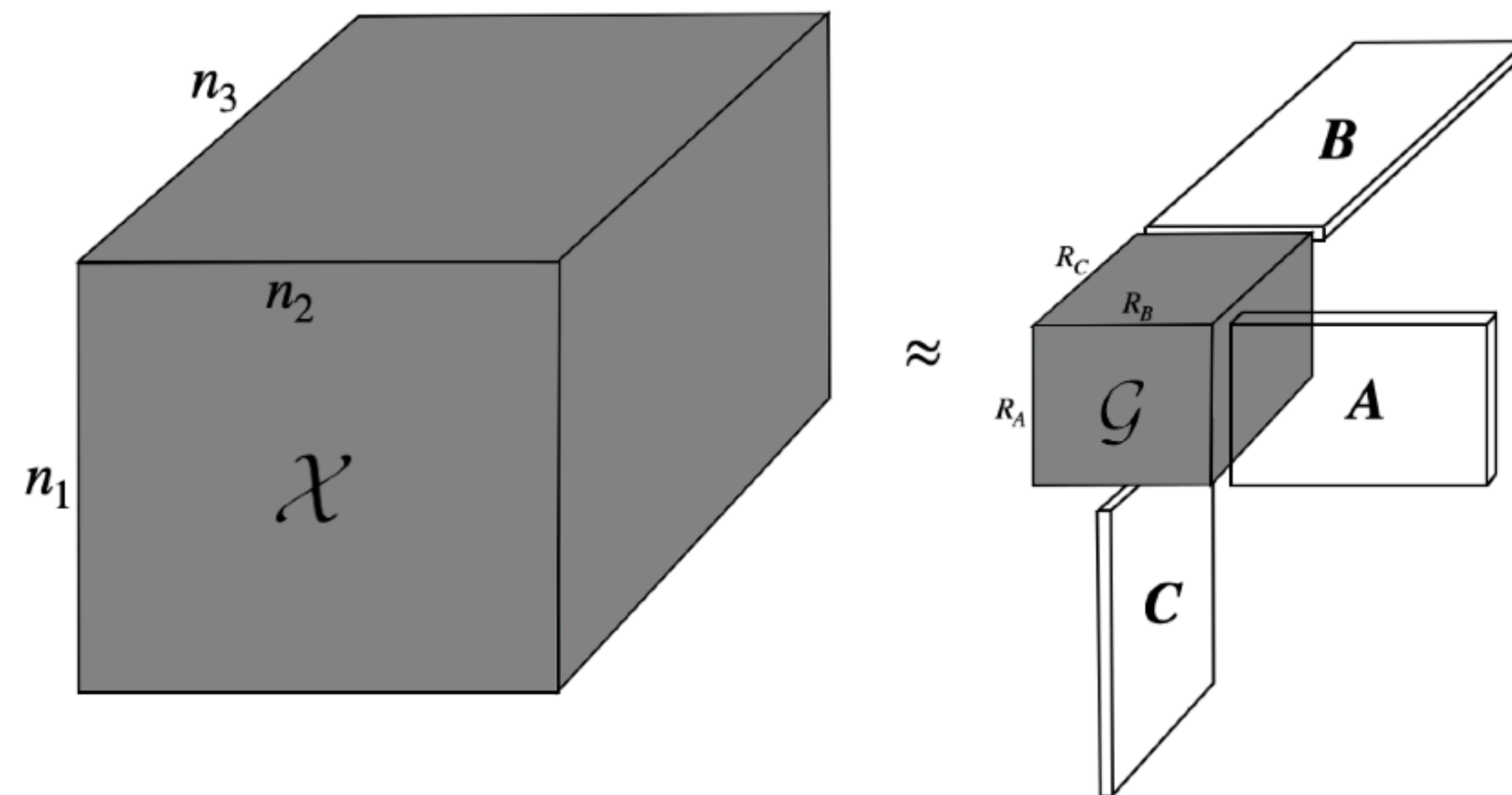


# Tucker Decomposition

$$\mathcal{X}^{n_1 \times n_2 \times n_3} \approx \mathcal{G}^{R_A \times R_B \times R_C} \times_1 \mathbf{A}^{n_1 \times R_A} \times_2 \mathbf{B}^{n_2 \times R_B} \times_3 \mathbf{C}^{n_3 \times R_C}$$

$$\mathcal{X}(x_1, x_2, x_3) \approx \sum_{r_A=1}^{R_A} \sum_{r_B=1}^{R_B} \sum_{r_C=1}^{R_C} \mathcal{G}(r_A, r_B, r_C) \cdot \mathbf{A}(x_1, r_A) \cdot \mathbf{B}(x_2, r_B) \cdot \mathbf{C}(x_3, r_C)$$



Estimated using Higher-order orthogonal iteration

# Proposing 2 Methods

## Method 1

- Compressing the **input** into an **ANN**
- Decomposition acts as part of the learning
- Hopefully aids the ANN

## Method 2

- Compressing a **pre-trained CNN**
- Using a model that is known to work
- Speeding up the evaluation of a forward pass