SONNX Meeting — FLATTEN Operator

Input tensor : coordinates $(k_i)_{i \leq n}$ with $(0 \leq k_i < d_i)_{i \leq n}$

Data is $A(\overline{k})$

Output tensor : matrix with coordinates (x, y)

Data is $M(x, y)$

Abstract Level:

Definition of the operator:

$$M = \mathsf{FLATTEN}(A)$$

Characterization of the output matrix dimension:

$$N, M = \mathsf{FLATTENDIMS}(\overline{d})$$

Characterization of the output matrix values:

$$\overline{k} = \mathsf{FLATTENPOS}(x, y)$$
$$\forall x, y.\, M(x, y) = A(\mathsf{FLATTENPOS}(x, y))$$

Concrete Level:

One C-Array for A:

$$C_A[\mathit{offset}(\overline{k}, \overline{d})] = A(\overline{k})$$

One C-Array for M:

$$C_M[\mathit{offset}([x, y], [N, M])] = M(x, y)$$

Proof Lemma

$$\mathit{offset}(\ [x, y],\ \mathsf{FLATTENDIMS}(\overline{d})\ ) = \mathit{offset}(\ \mathsf{FLATTENPOS}(x, y)\ , \overline{d}\ )$$