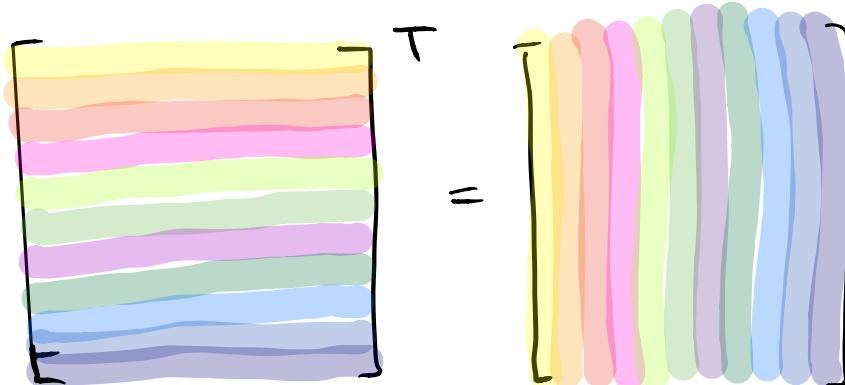


Whenever possible we want to use an orthonormal basis vector set when we transform our data.

- ↳ That is transformation matrix to be an orthogonal matrix.
- inverse is easy to compute.
- transformation is reversible; it doesn't collapse space.
- projection is just the dot product.

The transpose of a matrix is the interchange of columns for rows.

$$A_{ij}^T = A_{ji}$$



$$A^T A = \begin{matrix} & \text{[Diagonal 1s]} \\ \text{[Diagonal 1s]} & \end{matrix} = I.$$

When all vectors are perpendicular called orthonormal.
 $a_i \cdot a_j = 0, i \neq j$
 $a_i \cdot a_j = 1, i = j$

A diagram showing a vertical stack of colored bars (yellow, orange, pink, light green, purple, teal, blue) with a diagonal line drawn through them, representing the product $A^T A$. The result is a square matrix with 1s on the diagonal and 0s elsewhere, labeled I . A brace on the right indicates that all vectors are perpendicular (orthonormal).

$$|A^T A| = \pm 1. \text{ (if inversion).}$$