

## Scores

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- A (linear) “score” is an artificially created feature that is a linear combination of existing features.

$$S_j = \sum a_i x_{ji}$$

- A score is defined by  $k$  weights

$$\begin{bmatrix} a_1 \\ a_2 \\ \vdots \\ a_k \end{bmatrix}$$

and the values of a score on the samples is computed by

$$\begin{bmatrix} S_1 \\ S_2 \\ \vdots \\ S_n \end{bmatrix} = X_0 \begin{bmatrix} a_1 \\ a_2 \\ \vdots \\ a_k \end{bmatrix}$$

### **Mean of scores**

A linear combination of features with mean zero has mean zero.

## Variance and Covariance of scores

If  $S$  is a score corresponding to a weight vector  $a$ , then

$$\sigma_S^2 = a^\top D_0 a.$$

If  $S$  and  $T$  are two scores corresponding to weights  $a$  and  $b$ , then the covariance of  $S$  and  $T$  is given by

$$\sigma_{ST} = b^\top D_0 a.$$