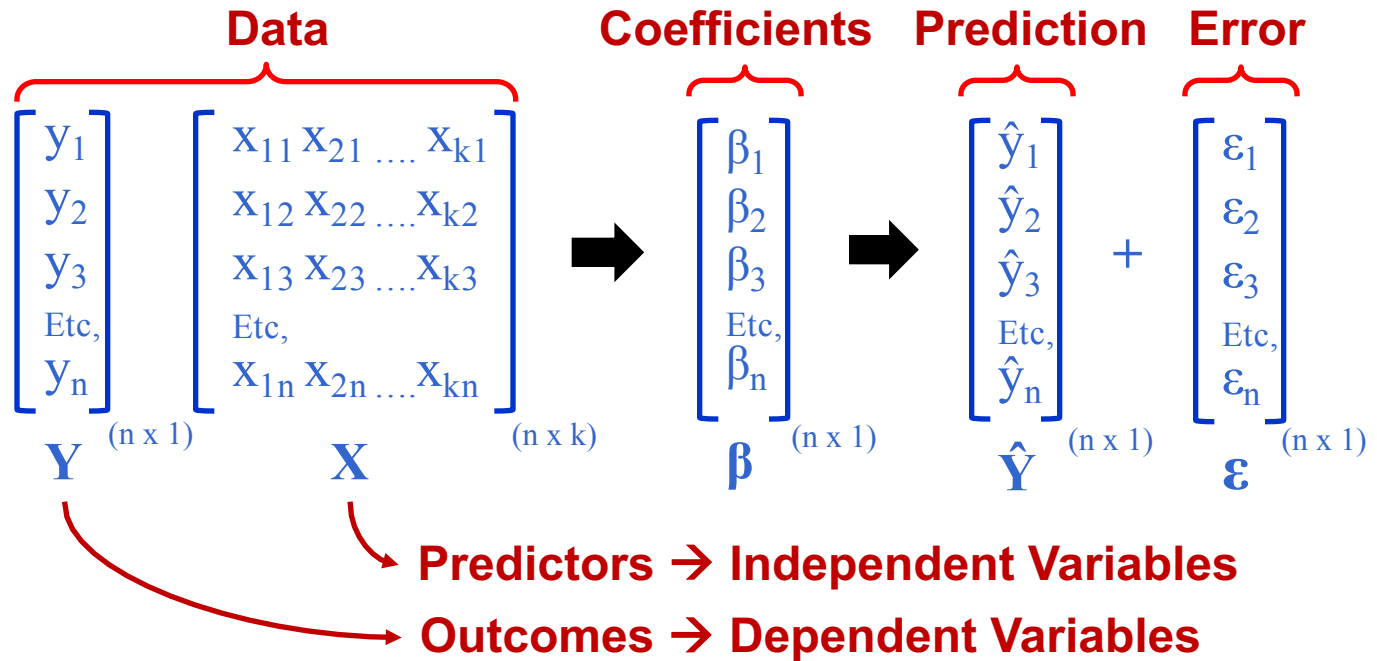


Matrix Notation

Some Matrix Notation



Matrix algebra facilitates computation, e.g.:

Predictive Model: $\mathbf{Y} = \hat{\mathbf{Y}} + \boldsymbol{\epsilon} = \boldsymbol{\beta}\mathbf{X} + \boldsymbol{\epsilon}$

Sum of Squared Errors: $\boldsymbol{\epsilon}'\boldsymbol{\epsilon}$

Regression Coefficients: $\boldsymbol{\beta} = (\mathbf{X}'\mathbf{X})^{-1} \mathbf{X}'\mathbf{Y}$

More Matrices: Covariance & Correlation

Covariance Matrix

$$\begin{bmatrix} \sigma_1^2 & \sigma_{12} & \sigma_{13} & \dots & \sigma_{1k} \\ \sigma_{21} & \sigma_2^2 & \sigma_{23} & \dots & \sigma_{2k} \\ \sigma_{31} & \sigma_{32} & \sigma_3^2 & \dots & \sigma_{3k} \\ \dots & \dots & \dots & \dots & \dots \\ \sigma_{n1} & \sigma_{n2} & \sigma_{n3} & \dots & \sigma_n^2 \end{bmatrix}$$

$$\Sigma = \text{Cov}(\mathbf{X})$$

$$\Rightarrow \rho_{ij} = \sigma_{ij} / \sigma_i \sigma_j \Rightarrow$$

Correlation Matrix

$$\begin{bmatrix} 1 & \rho_{12} & \rho_{13} & \dots & \rho_{1k} \\ \rho_{21} & 1 & \rho_{23} & \dots & \rho_{2k} \\ \rho_{31} & \rho_{32} & 1 & \dots & \rho_{3k} \\ \dots & \dots & \dots & \dots & \dots \\ \rho_{n1} & \rho_{n2} & \rho_{n3} & \dots & 1 \end{bmatrix}$$

$$\mathbf{R} = \text{Corr}(\mathbf{X})$$



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