

REAL MATRICES WITH ORTHONORMAL COLUMNS

Matrix notation

Let $u_1 \ldots, u_k \in \mathbf{R}^n$. Define $U \in \mathbf{R}^{n \times k}$ so that

$$U = \left[\begin{array}{cccc} u_1 & u_2 & \cdots & u_k \end{array} \right].$$

Then $\{u_1,\ldots,u_k\}$ is an orthonormal set mean

$$U^{\top}U = I_k$$

Notice that if $k < n, UU^{\top} \neq I$, since its rank is at most k.

