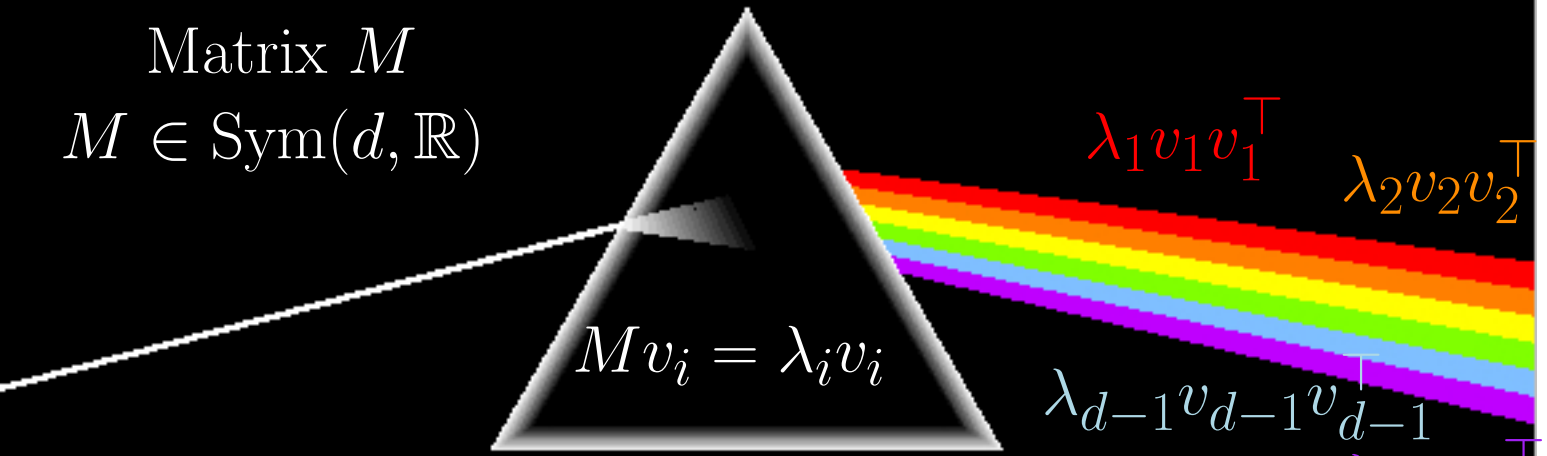
Spectral decomposition of a symmetric matrix

(assume all eigenvalues are distinct)

Matrix M

$M \in \mathrm{Sym}(d, \mathbb{R})$



$$M = \sum_{i=1}^{d} \lambda_i v_i v_i^\top$$

$$P_i = v_i v_i^\top, P_i P_j = 0 (i \neq j), \sum_{i=1}^{d} P_i = I$$