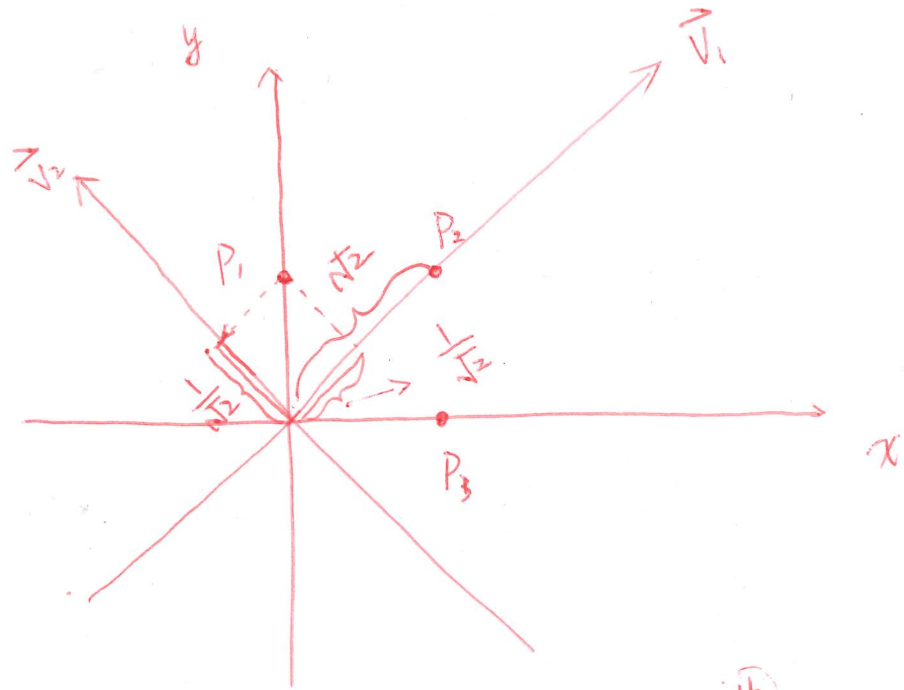
$$A = \begin{array}{cc} \begin{array}{cc} x & y \end{array} & \\ \begin{pmatrix} 0 & 1 \\ 1 & 1 \\ 1 & 0 \end{pmatrix} & \begin{array}{c} P_1 \\ P_2 \\ P_3 \end{array} \end{array} \qquad A = U\Sigma V^T = \underbrace{\begin{pmatrix} 1/\sqrt{6} & 1/\sqrt{2} & 1/\sqrt{3} \\ 2/\sqrt{6} & 0 & -1/\sqrt{3} \\ 1/\sqrt{6} & -1/\sqrt{2} & 1/\sqrt{3} \end{pmatrix}}_{U} \underbrace{\begin{pmatrix} \sqrt{3} & 0 \\ 0 & 1 \\ 0 & 0 \end{pmatrix}}_{\Sigma} \underbrace{\begin{pmatrix} 1/\sqrt{2} & 1/\sqrt{2} \\ -1/\sqrt{2} & 1/\sqrt{2} \end{pmatrix}}_{V^T} \begin{array}{c} v_1 \\ v_2 \end{array}$$



$$P_1' = \left(\underline{\underline{\tfrac{1}{\sqrt{2}}}}, \tfrac{1}{\sqrt{2}}\right) \cdot / (\sqrt{3}, 1)$$

$$= \left(\tfrac{1}{\sqrt{6}}, \tfrac{1}{\sqrt{2}}\right)$$

$$P_2' = \left(\tfrac{\sqrt{2}}{\sqrt{3}}, 0\right) = \left(\tfrac{2}{\sqrt{6}}, 0\right)$$

$$\frac{\sum_{i=1}^{k} \sigma_i}{\sum_{i=1}^{N} \sigma_i} > 95\%, 99\% \qquad \frac{\sqrt{3}}{1+\sqrt{3}}$$

$$A^T \cdot A = V\Sigma^2 \cdot V^T$$

$$\Sigma = \sqrt{\lambda}$$