$A = U S V^T$, let $D = SS$

$A^T A = (V S U^T)(U S V^T) = V S \underbrace{U^T U}_{=I \text{ (since orthonormal)}} S V^T$

$= V D V^T$

so the singular values S_{ii} are $\sqrt{D_{ii}}$ where

D_{ii} are the eigenvalues of $A^T A$

columns of V are the eigenvectors of $A^T A$