Key steps of PCA algorithm

1. Compute the mean μ of the data matrix $X = [x_1|...|x_N]^\top \in \mathbb{R}^{N \times D}$
2. Mean subtraction: Replace all data points x_i with $\tilde{x}_i = x_i - \mu$.
3. Divide the data by its standard deviation in each dimension: $\bar{X}^{(d)} = \tilde{X}/\sigma(X^{(d)})$ for $d = 1, \ldots, D$.
4. Compute the eigenvectors (orthonormal) and eigenvalues of the data covariance matrix $S = \frac{1}{N}\bar{X}^\top \bar{X}$
5. Choose the eigenvectors associated with the M largest eigenvalues to be the basis of the principal subspace.
6. Collect these eigenvectors in a matrix $B = [b_1, ..., b_M]$
7. Orthogonal projection of the data onto the principal axis using the projection matrix $BB^\top$