we have done the PCA in several steps.
we also cleaned up the data and we got to 13 countries and 20 types of foods, using same model we used in the class (slides)

$m = 13 \quad d = 20$

$x^1, \ldots, x^{13} \in R^{d=20} \Rightarrow$ matrix $X \in R^{13 \times 20}$

next step: calculate the mean an covariance of the matrix

$$\mu = \frac{1}{m} \sum_{i=1}^{m} x^i \quad \& \quad C = \frac{1}{m} \sum_{i=1}^{m} (x^i - \mu)(x^i - \mu)^T$$

next step: find the eigenvectors $w_1, w_2, \ldots$ of the covariance matrix and pick the largest eigen value (λ), then the next one, then the next, ... Depend on the dimension we want to reduce to.

next step: computed the principle component>

$$z_i = \begin{pmatrix} w_1^T (x^i - \mu)/\sqrt{\lambda_1} \\ w_2^T (x^i - \mu)/\sqrt{\lambda_2} \\ \vdots \end{pmatrix}$$