Exercise: Heuristic for assessing applicability of PCA

(Source: (**?**, Q9.8).). Let the empirical covariance matrix Σ have eigenvalues $\lambda_1 \geq \lambda_2 \geq \cdots \geq \lambda_d > 0$. Explain why the variance of the evalues, $\sigma^2 = \frac{1}{d}\sum_{i=1}^{d}(\lambda_i - \overline{\lambda})^2$ is a good measure of whether or not PCA would be useful for analysing the data (the higher the value of σ^2 the more useful PCA).