The Silhouette score and Mirai ratio are ways to measure how good clusters are in k-means, whether you use PCA or not. The Silhouette score tells you how well-separated and compact the clusters are, with values closer to 1 being better. PCA, which reduces the number of features by keeping the most important ones, can improve this score by removing noise and focusing on key patterns in the data, especially if there are too many features. However, it might make the score worse if important details are lost during this process. The Mirai ratio, which compares how far apart clusters are to how tight they are, can also get better with PCA if it simplifies the data without losing the natural grouping. Without PCA, k-means uses all the original features, which works well if the data is already clean and clear but can struggle with too much noise or too many features. PCA can make clusters harder to understand since the data gets transformed, while clustering without PCA keeps things more familiar. In the end, you can compare these scores, look at how the clusters turn out, and decide if PCA helps or not based on the specific data you’re working with.