***PCA***

Principal Component Analysis (PCA) is a statistical technique used for dimensionality reduction while preserving as much variability (information) as possible. It transforms the original variables into a new set of uncorrelated variables called principal components, ordered by the amount of variance they capture from the data.

Reducing the dimensionality of an image means transforming the high-dimensional data (where each pixel in the image is considered a dimension) into a lower-dimensional representation that captures the most significant information or variance from the original data. Here's what it involves and why it's done (for example, in a picture, background pixels are less important compared to actual face pixels)

***SVM***

Support Vector Machine (SVM) is a powerful supervised machine learning algorithm used for classification and regression tasks. SVM is used to classify the reduced-dimensional data (obtained from PCA) into different face classes.

Concept of SVM:

SVM aims to find the optimal hyperplane that separates the classes in the feature space. The optimal hyperplane is the one that maximizes the margin, which is the distance between the hyperplane and the nearest data points from each class (called support vectors).

For non-linearly separable data, SVM uses kernel functions to transform the data into a higher-dimensional space where a linear separator can be found.

Kernel Trick:

SVM can use different kernel functions to handle non-linear relationships. Common kernels include linear, polynomial, radial basis function (RBF), and sigmoid. In our model, we used radial basis function (RBF).

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Helpful link for SVM:

https://jakevdp.github.io/PythonDataScienceHandbook/05.07-support-vector-machines.html