C32 Principal Component Analysis: Mathematics and Voodoo

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After attending this presentation, attendees will understand the mathematical principles behind principal component analysis (PCA), where it is appropriate to use PCA and how to debunk misuses of PCA.

This presentation will impact the forensic community and/or humanity by demonstrating the proper application of PCA and by debunking abuse of PCA.

Principal Component Analysis (PCA) is one of a number of methods that can be used to reduce the dimensionality of data. The purpose for reducing the dimensionality by PCA is to determine vectors of maximum variation in the data, so as to better distinguish between data.

PCA has been used in the environmental field to distinguish compounds of different origins. However, as with many statistical techniques, the practitioner is often poorly familiar with the technique and relies on a computer program to perform the analysis. The purpose of this paper is to describe the mathematics behind the technique, what it is that the computer programs do, and how to interpret the results.

A case study will be used to illustrate the proper and improper use of PCA.

Principal, Component, Analysis

 ** Presenting Author*