Functional Principal component analysis similar to typical

Both have goal of creating a new set of variables which are orthogonal vectors with maximal variance

Both use inner products to achieve this.

Inner products give linear combinations of the variables in typical PCA

In fPCA it is the same however linear combination of time points (vaguely)

Inner product is integral however.

Bivariate covariance function analogous to covariance matrix

Interpretation

You will get scores, the new variables, and function called PCs. These give the loadings/weightings each time point has in explaining the variance within sample.

E.g. first PC explains 95% of variation. There is peak in function. This peak represents the most variation between the functions and it is at this time point where the variation between the curves is highest time point separates them the most is there behaviour at that time point.