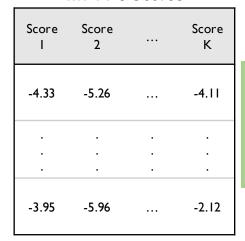
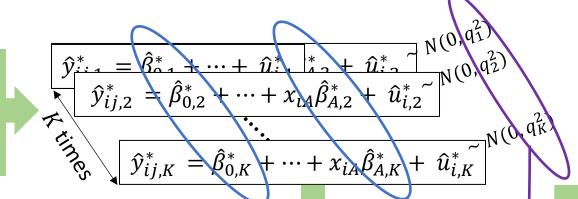
mv-FPC Scores



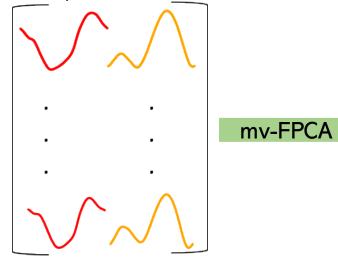
Fit a separate scalar linear mixed model to each score



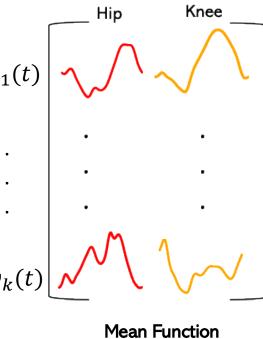


Multivariate Functional

Data



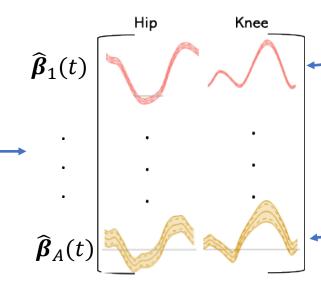
mv-FPCs



 $\mu(t)$

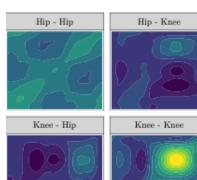
Knee

Functional Fixed Effects



Combine model fixed effects estimates with mv-FPCs for functional estimates

Functional Random Effects Covariances



Combine model random effects parameter estimates with mv-FPCs to reconstruct covariance functions