Algorithm 1: tGMM

Input:

$x[i, d]$: The timeseries for which we are estimating the mixture parameters for. Of dimensionality timesteps x features.

means: an initial guess at the means.

covs: an initial guess at the covariances.

$\pi[trials, conditions, t]$: some pi-vector indicating the contributions of each condition. Each timestep sums to 1. Use the pi-vec from a specific subject.

tol: the tolerance for defining convergence. Model is said to converge if there is an observed change in the likelihood by less than this amount.

Result:

tmeans: the tGMM estimated means.

tcovs: the tGMM estimated true covariance matrices.

π: passes through the pi vector.

1 $likelihood(x, means, covs) \leftarrow \left(\sum_{i=1}^{nt} \log \left[\sum_{c=1}^{nc} \pi_{ic} N(x_i | \mu_c, \Sigma_c) \right] \right)$

2 $nt = numtimesteps$

3 $nc = numconditions$

4 converged = FALSE

5 **while** *converged = FALSE* **do**

6   **for** *c in 1:nc* **do**

7 $sumcond = \sum_{c'=1}^{nc} N(x_i | \mu_c', \Sigma_c')$

8   **for** *i in 1:nt* **do**

9 $resp_{ic} = \frac{\pi_{ic} N(x_i, \mu_c \Sigma_c)}{sumcond}$

10   **end**

11   **end**

12 $meanresp = mean(resp, dim = 2)$

13   **for** *c in 1:nc* **do**

14 $tmeans_c = \frac{resp_c^T x}{meanresp_c}$

15 $tcovs_c = \frac{\sum_{i=1}^{nt} resp_{ic}(x_i - tmeans_c)^T (x_i - tmeans_c)}{meanresp_c}$

16   **end**

17 $newll = likelihood(x, tmeans_c, tcovs_c)$

18   **if** $newll - ll > tol$ **then**

19 $ll = newll$

20   **end**

21   **else**

22   converged = TRUE

23   **end**

24   return(tmeans, tcovs, π)

25 **end**