

# The RW2dX3-model

## Parametrization

This is a specialised model for a certain application, for which the linear predictor require three different contributions from the RW2D model. Similar to the `2diidwishartpart0/1` and `3diidwishartpart0/1/2` models, this is also defined similarly.

Let  $\mathbf{z}_0$  be a RW2D model with precision  $\kappa$ , then define  $\mathbf{z}_1$  and  $\mathbf{z}_2$  conditionally on  $\mathbf{z}_0$ , as

$$\mathbf{z}_1 \mid \mathbf{z}_0 \sim \mathcal{N}(\beta_1 \mathbf{z}_0, \kappa_1 \mathbf{I})$$

and

$$\mathbf{z}_2 \mid \mathbf{z}_0 \sim \mathcal{N}(\beta_2 \mathbf{z}_0, \kappa_2 \mathbf{I}).$$

The joint density  $\pi(\mathbf{z}_0, \mathbf{z}_1, \mathbf{z}_2 \mid \kappa, \kappa_1, \kappa_2, \beta_1, \beta_2)$  is then proportional to

$$\exp \left( -\frac{1}{2} \mathbf{z}_0^T \mathbf{Q}(\kappa) \mathbf{z}_0 - \frac{\kappa_1}{2} (\mathbf{z}_1 - \beta_1 \mathbf{z}_0)^T (\mathbf{z}_1 - \beta_1 \mathbf{z}_0) - \frac{\kappa_2}{2} (\mathbf{z}_2 - \beta_2 \mathbf{z}_0)^T (\mathbf{z}_2 - \beta_2 \mathbf{z}_0) \right)$$

where  $\mathbf{Q}(\kappa)$  is the precision matrix for the RW2D model.

The models components are named as `rw2dx3part0` for  $\mathbf{z}_0$ , `rw2dx3part1` for  $\mathbf{z}_1$  and `rw2dx3part2` for  $\mathbf{z}_2$ .

## Hyperparameters

The hyperparameters are

$$\theta = (\log \kappa, \log \kappa_1, \log \kappa_2, \beta_1, \beta_2).$$

## Specification

## Example

## Notes