Correlated random effects: iidkd

This model is available for dimensions k = 2, to 20. We describe in detail the case for k = 3 as other ones are similar. This model do the same as models iid2d, iid3d, iid4d, iid5d, but uses a different and more efficient parameterisation.

Parametrization

The (k = 3)-dimensional Normal-Wishard model is used if one want to define three vectors of "random effects", u and v and w, say, for which (u_i, v_i, w_i) are iid bivariate Normals

$$\begin{pmatrix} u_i \\ v_i \\ w_i \end{pmatrix} \sim \mathcal{N}\left(\mathbf{0}, \mathbf{W}^{-1}\right)$$

where the covariance matrix \mathbf{W}^{-1} is parameterised as $\mathbf{W} = \mathbf{L}\mathbf{L}^T$, where

$$\mathbf{L} = \begin{pmatrix} \exp(\theta_1) \\ \theta_4 & \exp(\theta_2) \\ \theta_5 & \theta_6 & \exp(\theta_3) \end{pmatrix}$$
 (1)

and $\theta_1, \theta_2, \theta_3, \theta_4, \theta_5, \theta_6$ can take any value. The number of hyperparameters are k(k+1)/2, which is 3, 6, 10, 15, 21, 28, 36, 45, 55,..., for $k = 2, 3, 4, 5, 6, 7, 8, 9, 10, \ldots$

For these models the precision matrix W is Wishart distributed

$$\mathbf{W} \sim \operatorname{Wishart}_k(r, \mathbf{R}^{-1}),$$

with density

$$\pi(\mathbf{W}) = c^{-1} |\mathbf{W}|^{(r-(k+1))/2} \exp\left\{-\frac{1}{2} \operatorname{Trace}(\mathbf{W}\mathbf{R})\right\}, \quad r > k+1$$

and

$$c = 2^{(rk)/2} |\mathbf{R}|^{-r/2} \pi^{(k(k-1))/4} \prod_{j=1}^{k} \Gamma((r+1-j)/2).$$

Then.

$$E(\mathbf{W}) = r\mathbf{R}^{-1}$$
, and $E(\mathbf{W}^{-1}) = \mathbf{R}/(r - (k+1))$.

Hyperparameters

The hyperparameters are $\theta_1, \theta_2, \theta_3, \theta_4, \theta_5, \theta_6$.

The prior-parameters are

$$(r, R_1, R_2, R_3, R_4, R_5, R_6)$$

where

$$\mathbf{R} = \left(\begin{array}{ccc} R_1 & R_4 & R_5 \\ R_4 & R_2 & R_6 \\ R_5 & R_6 & R_3 \end{array} \right)$$

The inla function reports posterior distribution for the hyperparameters $\{\theta_i\}$, and the conversion into interpretable quantities can be done using simulation as described below.

The prior for θ is **fixed** to be wishartkd, and number of prior parameters required are 1 + k(k + 1)/2. By default the prior-parameters are

$$(r = 100, \underbrace{1, \dots, 1}_{k \text{ times}}, 0, \dots, 0)$$

Specification

The model iidkd is specified as

where order = k = 3, and the iidkd model is represented internally as one vector of length n,

$$(u_1, u_2, \ldots, u_m, v_1, v_2, \ldots, v_m, w_1, w_2, \ldots, w_m)$$

where n = 3m, and n is the (required) argument in f().

For this model the argument constr=TRUE is interpreted as 3 sum-to-zero constraints

$$\sum u_i = 0$$
, $\sum v_i = 0$ and $\sum w_i = 0$.

Hyperparameter spesification and default values

(**Note:** The value "1048576" is just a code for "replace this by the default value". As the default value depends on order, the was the easy way out for the moment.)

doc Gaussian random effect in dim=k with Wishart prior

hyper

theta1

hyperid 29101 name theta1 short.name theta1 initial 1048576 fixed FALSE prior wishartkd

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to.theta function(x) x
    from.theta function(x) x
theta2
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    name theta2
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theta3
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theta32
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    short.name theta36
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theta37
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name theta50
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theta67
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theta68
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theta71
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    short.name theta71
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theta72
    hyperid 29172
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name theta72
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theta76
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    short.name theta76
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    short.name theta80
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    param
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theta81
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    short.name theta84
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    short.name theta85
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theta86
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theta87
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    short.name theta87
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    short.name theta88
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theta89
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    short.name theta89
    initial 1048576
    fixed FALSE
    prior none
    param
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```
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theta90
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theta92
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    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta93
    hyperid 29193
    name theta93
    short.name theta93
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta94
    hyperid 29194
```

```
name theta94
    short.name theta94
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta95
    hyperid 29195
    name theta95
    short.name theta95
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta96
    hyperid 29196
    name theta96
    short.name theta96
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta97
    hyperid 29197
    name theta97
    short.name theta97
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta98
    hyperid 29198
    name theta98
    short.name theta98
    initial 1048576
    fixed FALSE
```

```
prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta99
    hyperid 29199
    name theta99
    short.name theta99
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta100
    hyperid 29200
    name theta100
    short.name theta100
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta101
    hyperid 29201
    name theta101
    short.name theta101
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta102
    hyperid 29202
    name theta102
    short.name theta102
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
```

```
theta103
    hyperid 29203
    name theta103
    short.name theta103
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta104
    hyperid 29204
    name theta104
    short.name theta104
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta105
    hyperid 29205
    name theta105
    short.name theta105
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta106
    hyperid 29206
    name theta106
    short.name theta106
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta107
    hyperid 29207
    name theta107
    short.name theta107
```

```
initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta108
    hyperid 29208
    name theta108
    short.name theta108
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta109
    hyperid 29209
    name theta109
    short.name theta109
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta110
    hyperid 29210
    name theta110
    short.name theta110
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta111
    hyperid 29211
    name theta111
    short.name theta111
    initial 1048576
    fixed FALSE
    prior none
    param
```

```
to.theta function(x) x
    from.theta function(x) x
theta112
    hyperid 29212
    name theta112
    short.name theta112
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta113
    hyperid 29213
    name theta113
    short.name theta113
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta114
    hyperid 29214
    name theta114
    short.name theta114
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta115
    hyperid 29215
    name theta115
    short.name theta115
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta116
    hyperid 29216
```

```
name theta116
    short.name theta116
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta117
    hyperid 29217
    name theta117
    short.name theta117
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta118
    hyperid 29218
    name theta118
    short.name theta118
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta 119
    hyperid 29219
    name theta119
    short.name theta119
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta 120
    hyperid 29220
    name theta120
    short.name theta120
    initial 1048576
    fixed FALSE
```

```
prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta121
    hyperid 29221
    name theta121
    short.name theta121
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta122
    hyperid 29222
    name theta122
    short.name theta122
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta123
    hyperid 29223
    name theta123
    short.name theta123
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta124
    hyperid 29224
    name theta124
    short.name theta124
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
```

```
theta125
    hyperid 29225
    name theta125
    short.name theta125
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta126
    hyperid 29226
    name theta126
    short.name theta126
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta127
    hyperid 29227
    name theta127
    short.name theta127
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta128
    hyperid 29228
    name theta128
    short.name theta128
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta129
    hyperid 29229
    name theta129
    short.name theta129
```

```
initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta130
    hyperid 29230
    name theta130
    short.name theta130
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta131
    hyperid 29231
    name theta131
    short.name theta131
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta132
    hyperid 29232
    name theta132
    short.name theta132
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta133
    hyperid 29233
    name theta133
    short.name theta133
    initial 1048576
    fixed FALSE
    prior none
    param
```

```
to.theta function(x) x
    from.theta function(x) x
theta134
    hyperid 29234
    name theta134
    short.name theta134
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta135
    hyperid 29235
    name theta135
    short.name theta135
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta136
    hyperid 29236
    name theta136
    short.name theta136
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta137
    hyperid 29237
    name theta137
    short.name theta137
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta138
    hyperid 29238
```

```
name theta138
    short.name theta138
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta139
    hyperid 29239
    name theta139
    short.name theta139
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta140
    hyperid 29240
    name theta140
    short.name theta140
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta 141
    hyperid 29241
    name theta141
    short.name theta141
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta142
    hyperid 29242
    name theta142
    short.name theta142
    initial 1048576
    fixed FALSE
```

```
prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta 143
    hyperid 29243
    name theta143
    short.name theta143
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta144
    hyperid 29244
    name theta144
    short.name theta144
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta145
    hyperid 29245
    name theta145
    short.name theta145
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta146
    hyperid 29246
    name theta146
    short.name theta146
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
```

```
theta147
    hyperid 29247
    name theta147
    short.name theta147
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta148
    hyperid 29248
    name theta148
    short.name theta148
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta149
    hyperid 29249
    name theta149
    short.name theta149
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta150
    hyperid 29250
    name theta150
    short.name theta150
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta151
    hyperid 29251
    name theta151
    short.name theta151
```

```
initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta152
    hyperid 29252
    name theta152
    short.name theta152
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta153
    hyperid 29253
    name theta153
    short.name theta153
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta154
    hyperid 29254
    name theta154
    short.name theta154
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta155
    hyperid 29255
    name theta155
    short.name theta155
    initial 1048576
    fixed FALSE
    prior none
    param
```

```
to.theta function(x) x
    from.theta function(x) x
theta156
    hyperid 29256
    name theta156
    short.name theta156
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta157
    hyperid 29257
    name theta157
    short.name theta157
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta158
    hyperid 29258
    name theta158
    short.name theta158
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta159
    hyperid 29259
    name theta159
    short.name theta159
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta160
    hyperid 29260
```

```
name theta160
    short.name theta160
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta161
    hyperid 29261
    name theta161
    short.name theta161
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta162
    hyperid 29262
    name theta162
    short.name theta162
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta 163
    hyperid 29263
    name theta163
    short.name theta163
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta164
    hyperid 29264
    name theta164
    short.name theta164
    initial 1048576
    fixed FALSE
```

```
prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta165
    hyperid 29265
    name theta165
    short.name theta165
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta166
    hyperid 29266
    name theta166
    short.name theta166
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta167
    hyperid 29267
    name theta167
    short.name theta167
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta168
    hyperid 29268
    name theta168
    short.name theta168
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
```

```
theta169
    hyperid 29269
    name theta169
    short.name theta169
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta170
    hyperid 29270
    name theta170
    short.name theta170
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta171
    hyperid 29271
    name theta171
    short.name theta171
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta172
    hyperid 29272
    name theta172
    short.name theta172
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta173
    hyperid 29273
    name theta173
    short.name theta173
```

```
initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta174
    hyperid 29274
    name theta174
    short.name theta174
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta175
    hyperid 29275
    name theta175
    short.name theta175
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta176
    hyperid 29276
    name theta176
    short.name theta176
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta177
    hyperid 29277
    name theta177
    short.name theta177
    initial 1048576
    fixed FALSE
    prior none
    param
```

```
to.theta function(x) x
    from.theta function(x) x
theta178
    hyperid 29278
    name theta178
    short.name theta178
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta179
    hyperid 29279
    name theta179
    short.name theta179
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta180
    hyperid 29280
    name theta180
    short.name theta180
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta181
    hyperid 29281
    name theta181
    short.name theta181
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta182
    hyperid 29282
```

```
name theta182
    short.name theta182
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta183
    hyperid 29283
    name theta183
    short.name theta183
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta184
    hyperid 29284
    name theta184
    short.name theta184
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta 185
    hyperid 29285
    name theta185
    short.name theta185
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta186
    hyperid 29286
    name theta186
    short.name theta186
    initial 1048576
    fixed FALSE
```

```
prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta187
    hyperid 29287
    name theta187
    short.name theta187
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta188
    hyperid 29288
    name theta188
    short.name theta188
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta189
    hyperid 29289
    name theta189
    short.name theta189
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta190
    hyperid 29290
    name theta190
    short.name theta190
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
```

```
theta191
    hyperid 29291
    name theta191
    short.name theta191
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta192
    hyperid 29292
    name theta192
    short.name theta192
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta193
    hyperid 29293
    name theta193
    short.name theta193
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta194
    hyperid 29294
    name theta194
    short.name theta194
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta195
    hyperid 29295
    name theta195
    short.name theta195
```

```
initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta196
    hyperid 29296
    name theta196
    short.name theta196
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta197
    hyperid 29297
    name theta197
    short.name theta197
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta198
    hyperid 29298
    name theta198
    short.name theta198
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta199
    hyperid 29299
    name theta199
    short.name theta199
    initial 1048576
    fixed FALSE
    prior none
    param
```

```
to.theta function(x) x
    from.theta function(x) x
theta200
    hyperid 29300
    name theta200
    short.name theta200
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta 201
    hyperid 29301
    name theta201
    short.name theta201
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta202
    hyperid 29302
    name theta202
    short.name theta202
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta203
    hyperid 29303
    name theta203
    short.name theta203
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta204
    hyperid 29304
```

```
name theta204
    short.name theta204
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta205
    hyperid 29305
    name theta205
    short.name theta205
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta206
    hyperid 29306
    name theta206
    short.name theta206
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta207
    hyperid 29307
    name theta207
    short.name theta207
    initial 1048576
    fixed FALSE
    prior none
    param
    to.theta function(x) x
    from.theta function(x) x
theta208
    hyperid 29308
    name theta208
    short.name theta208
    initial 1048576
    fixed FALSE
```

```
prior none
         param
         to.theta function(x) x
         from.theta function(x) x
     theta209
         hyperid 29309
         name theta209
         short.name theta209
         initial 1048576
         fixed FALSE
         prior none
         param
         to.theta function(x) x
         from.theta function(x) x
     theta210
         hyperid 29310
         name theta210
         short.name theta210
         initial 1048576
         fixed FALSE
         prior none
         param
         to.theta function(x) x
         from.theta function(x) x
constr FALSE
nrow.ncol FALSE
augmented TRUE
aug.factor 1
aug.constr 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
n.div.by -1
n.required TRUE
set.default.values TRUE
status experimental
\mathbf{pdf} iidkd
```

Example

Just simulate some data and estimate the parameters back. This is for order=4.

```
library(mvtnorm)
n <- 300
m <- 4
N \leftarrow m*n
rho <- 0.8
Sigma <- matrix(NA, m, m)</pre>
diag(Sigma) \leftarrow (1/(1:m))^2
for(i in 1:m) {
    for (j in 1:m) {
        if (i != j) {
            Sigma[i, j] <- rho^abs(i-j) * sqrt(Sigma[i, i] * Sigma[j, j])</pre>
    }
}
y <- c()
yy <- rmvnorm(n, sigma = Sigma)
for(i in 1:m) {
    y \leftarrow c(y, yy[, i])
r <- inla(y ~ f(i, model = "iidkd", order = m, n=N,
                 ## set parameters using 'theta1'.
                 ## these are the default parameters.
                 hyper = list(theta1 = list(
                                    param = c(100, rep(1, m), rep(0, m*(m-1)/2)))),
         data = data.frame(i = 1:N, y),
         ## fix precision as we have exact observations
         control.family = list(hyper = list(
                                     prec = list(initial = 15, fixed = TRUE))),
         verbose = FALSE)
## this is how the internal parameters are defined
L <- t(chol(solve(Sigma)))
diag(L) <- log(diag(L))</pre>
LL <- t(chol(solve(cov(yy))))
diag(LL) <- log(diag(LL))</pre>
## compare the estimated (internal) parameters with MLE and the truth
round(dig = 3, cbind(true = c(diag(L), L[lower.tri(L)]),
                      mle = c(diag(LL), LL[lower.tri(LL)]),
                      inla = r$mode$theta))
## this gives a list of sampled matrices (stdev's and correlations)
xx <- inla.iidkd.sample(10^4, r, "i")</pre>
## compute the mean
qq <- matrix(rowMeans(matrix(unlist(xx), nrow = m^2)), m, m)
iSigma <- 1/sqrt(diag(Sigma))
Cor <- diag(iSigma) %*% Sigma %*% diag(iSigma)</pre>
round(dig = 3, cbind(inla = c(diag(qq), qq[lower.tri(qq)]),
                      true = c(sqrt(diag(Sigma)), Cor[lower.tri(Cor)])))
```

Notes

Note that for higher values of k the only integration scheme that is supported is control.inla=list(int.strategy="eb").