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

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

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 $\mathbf{W}$ is Wishart distributed

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

with density

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

and

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

Then,

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

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

$$\mathbf{R} = \begin{pmatrix} R_1 & R_4 & R_5 \\ R_4 & R_2 & R_6 \\ R_5 & R_6 & R_3 \end{pmatrix}$$

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

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

Specification

The model `iidkd` is specified as

```
y ~ f(i, model="iidkd", order=3, n = <length>) + ...
```

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

$$\sum u_i = 0, \quad \sum v_i = 0 \quad \text{and} \quad \sum w_i = 0.$$

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

        param 21 1048576 1048576 1048576 1048576 1048576 1048576 1048576 1048576 1048576 104

        to.theta function(x) x

        from.theta function(x) x

    theta2

        hyperid 29102

        name theta2

        short.name theta2

        initial 1048576

        fixed FALSE

        prior none

        param

        to.theta function(x) x

        from.theta function(x) x

    theta3

        hyperid 29103

        name theta3

        short.name theta3

        initial 1048576

        fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta4

hyperid 29104

name theta4

short.name theta4

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta5

hyperid 29105

name theta5

short.name theta5

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta6

hyperid 29106

name theta6

short.name theta6

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta7

hyperid 29107

name theta7

short.name theta7

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta8

    hyperid `29108`

    name `theta8`

    short.name `theta8`

    initial `1048576`

    fixed `FALSE`

    prior `none`

    param

    to.theta `function(x) x`

    from.theta `function(x) x`

theta9

    hyperid `29109`

    name `theta9`

    short.name `theta9`

    initial `1048576`

    fixed `FALSE`

    prior `none`

    param

    to.theta `function(x) x`

    from.theta `function(x) x`

theta10

    hyperid `29110`

    name `theta10`

    short.name `theta10`

    initial `1048576`

    fixed `FALSE`

    prior `none`

    param

    to.theta `function(x) x`

    from.theta `function(x) x`

theta11

    hyperid `29111`

    name `theta11`

    short.name `theta11`

    initial `1048576`

    fixed `FALSE`

    prior `none`

    param

    to.theta `function(x) x`

    from.theta `function(x) x`

theta12

    hyperid `29112`

    name `theta12`

    short.name `theta12`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta13

hyperid `29113`

name `theta13`

short.name `theta13`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta14

hyperid `29114`

name `theta14`

short.name `theta14`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta15

hyperid `29115`

name `theta15`

short.name `theta15`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta16

hyperid `29116`

name `theta16`

short.name `theta16`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta function(x) x

from.theta function(x) x

theta17

    hyperid 29117

    name theta17

    short.name theta17

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta18

    hyperid 29118

    name theta18

    short.name theta18

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta19

    hyperid 29119

    name theta19

    short.name theta19

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta20

    hyperid 29120

    name theta20

    short.name theta20

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta21

    hyperid 29121

name `theta21`

short.name `theta21`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta22

hyperid `29122`

name `theta22`

short.name `theta22`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta23

hyperid `29123`

name `theta23`

short.name `theta23`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta24

hyperid `29124`

name `theta24`

short.name `theta24`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta25

hyperid `29125`

name `theta25`

short.name `theta25`

initial `1048576`

fixed `FALSE`

prior none

param

to.theta function(x) x

from.theta function(x) x

theta26

hyperid 29126

name theta26

short.name theta26

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta27

hyperid 29127

name theta27

short.name theta27

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta28

hyperid 29128

name theta28

short.name theta28

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta29

hyperid 29129

name theta29

short.name theta29

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta30

    hyperid 29130

    name theta30

    short.name theta30

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta31

    hyperid 29131

    name theta31

    short.name theta31

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta32

    hyperid 29132

    name theta32

    short.name theta32

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta33

    hyperid 29133

    name theta33

    short.name theta33

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta34

    hyperid 29134

    name theta34

    short.name theta34

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta35

    hyperid 29135

    name theta35

    short.name theta35

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta36

    hyperid 29136

    name theta36

    short.name theta36

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta37

    hyperid 29137

    name theta37

    short.name theta37

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta38

    hyperid 29138

    name theta38

    short.name theta38

    initial 1048576

    fixed FALSE

    prior none

    param

to.theta `function(x) x`

from.theta `function(x) x`

theta39

hyperid `29139`

name `theta39`

short.name `theta39`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta40

hyperid `29140`

name `theta40`

short.name `theta40`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta41

hyperid `29141`

name `theta41`

short.name `theta41`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta42

hyperid `29142`

name `theta42`

short.name `theta42`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta43

hyperid `29143`

name theta43

short.name theta43

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta44

hyperid 29144

name theta44

short.name theta44

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta45

hyperid 29145

name theta45

short.name theta45

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta46

hyperid 29146

name theta46

short.name theta46

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta47

hyperid 29147

name theta47

short.name theta47

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta48

    hyperid 29148

    name theta48

    short.name theta48

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta49

    hyperid 29149

    name theta49

    short.name theta49

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta50

    hyperid 29150

    name theta50

    short.name theta50

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta51

    hyperid 29151

    name theta51

    short.name theta51

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta52

    hyperid 29152

    name theta52

    short.name theta52

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta53

    hyperid 29153

    name theta53

    short.name theta53

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta54

    hyperid 29154

    name theta54

    short.name theta54

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta55

    hyperid 29155

    name theta55

    short.name theta55

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta56

    hyperid 29156

    name theta56

    short.name theta56

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta57

hyperid 29157

name theta57

short.name theta57

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta58

hyperid 29158

name theta58

short.name theta58

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta59

hyperid 29159

name theta59

short.name theta59

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta60

hyperid 29160

name theta60

short.name theta60

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta61

    hyperid 29161

    name theta61

    short.name theta61

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta62

    hyperid 29162

    name theta62

    short.name theta62

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta63

    hyperid 29163

    name theta63

    short.name theta63

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta64

    hyperid 29164

    name theta64

    short.name theta64

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta65

    hyperid 29165

name theta65

short.name theta65

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta66

hyperid 29166

name theta66

short.name theta66

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta67

hyperid 29167

name theta67

short.name theta67

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta68

hyperid 29168

name theta68

short.name theta68

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta69

hyperid 29169

name theta69

short.name theta69

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta70

hyperid 29170

name theta70

short.name theta70

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta71

hyperid 29171

name theta71

short.name theta71

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta72

hyperid 29172

name theta72

short.name theta72

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta73

hyperid 29173

name theta73

short.name theta73

initial 1048576

fixed FALSE

prior none

param

to.theta function(x) x

from.theta function(x) x

theta74

    hyperid 29174

    name theta74

    short.name theta74

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta75

    hyperid 29175

    name theta75

    short.name theta75

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta76

    hyperid 29176

    name theta76

    short.name theta76

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta77

    hyperid 29177

    name theta77

    short.name theta77

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta78

    hyperid 29178

    name theta78

    short.name theta78

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta79

hyperid `29179`

name `theta79`

short.name `theta79`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta80

hyperid `29180`

name `theta80`

short.name `theta80`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta81

hyperid `29181`

name `theta81`

short.name `theta81`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta82

hyperid `29182`

name `theta82`

short.name `theta82`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta83

hyperid 29183

name theta83

short.name theta83

initial 1048576

fixed FALSE

prior none

param

to.theta `function(x) x`

from.theta `function(x) x`

theta84

hyperid 29184

name theta84

short.name theta84

initial 1048576

fixed FALSE

prior none

param

to.theta `function(x) x`

from.theta `function(x) x`

theta85

hyperid 29185

name theta85

short.name theta85

initial 1048576

fixed FALSE

prior none

param

to.theta `function(x) x`

from.theta `function(x) x`

theta86

hyperid 29186

name theta86

short.name theta86

initial 1048576

fixed FALSE

prior none

param

to.theta `function(x) x`

from.theta `function(x) x`

theta87

hyperid 29187

name `theta87`

short.name `theta87`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta88

hyperid `29188`

name `theta88`

short.name `theta88`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta89

hyperid `29189`

name `theta89`

short.name `theta89`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta90

hyperid `29190`

name `theta90`

short.name `theta90`

initial `1048576`

fixed `FALSE`

prior `none`

param

to.theta `function(x) x`

from.theta `function(x) x`

theta91

hyperid `29191`

name `theta91`

short.name `theta91`

initial `1048576`

fixed `FALSE`

prior none

param

to.theta function(x) x

from.theta function(x) x

theta92

    hyperid 29192

    name theta92

    short.name theta92

    initial 1048576

    fixed FALSE

    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

theta119

    hyperid 29219

    name theta119

    short.name theta119

    initial 1048576

    fixed FALSE

    prior none

    param

    to.theta function(x) x

    from.theta function(x) x

theta120

    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

theta141

    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

theta143

    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

theta163

    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

theta185

    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`

theta201

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`

pdf `iidkd`

Example

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

```
library(mvtnorm)

n <- 300
m <- 4
N <- m*n
rho <- 0.8

Sigma <- matrix(NA, m, m)
diag(Sigma) <- (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])
        }
    }
}

y <- c()
yy <- rmvnorm(n, sigma = Sigma)
for(i in 1:m) {
    y <- 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))
LL <- t(chol(solve(cov(yy))))
diag(LL) <- log(diag(LL))

## 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")
## 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)
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")`.