Package ‘CoTiMA’

Type Package
Title Continuous Time Meta-Analysis (‘CoTiMA’)
Version 0.7.0
Date 2023-12-14
Description The ‘CoTiMA’ package performs meta-analyses of correlation matrices of repeatedly measured variables taken from studies that used different time intervals. Different time intervals between measurement occasions impose problems for meta-analyses because the effects (e.g. cross-lagged effects) cannot be simply aggregated, for example, by means of common fixed or random effects analysis. However, continuous time math, which is applied in ‘CoTiMA’, can be used to extrapolate or intrapolate the results from all studies to any desired time lag. By this, effects obtained in studies that used different time intervals can be meta-analyzed. ‘CoTiMA’ fits models to empirical data using the structural equation model (SEM) package ‘ctsem’, the effects specified in a SEM are related to parameters that are not directly included in the model (i.e., continuous time parameters; together, they represent the continuous time structural equation model, CTSEM). Statistical model comparisons and significance tests are then performed on the continuous time parameter estimates. ‘CoTiMA’ also allows analysis of publication bias (Egger’s test, PET-PEESE estimates, zcurve analysis etc.) and analysis of statistical power (post hoc power, required sample sizes). See Dormann, C., Guthier, C., & Cortina, J. M. (2019) <doi:10.1177/1094428119847277>, and Guthier, C., Dormann, C., & Voelkle, M. C. (2020) <doi:10.1037/bul0000304>.

License GPL-3
URL https://github.com/CoTiMA/CoTiMA
Encoding UTF-8
LazyData true
Depends R (>= 3.5.0), OpenMx (>= 2.18.1), ctsem (>= 3.8.1), lavaan (>= 0.6), foreach (>= 1.5.1)
Imports  MBESS (>= 4.6.0), crayon (>= 1.3.4), psych (>= 1.9.12), doParallel (>= 1.0.15), rootSolve (>= 1.8.2), abind (>= 1.4-5), RPushbullet (>= 0.3.3), openxlsx (>= 4.2.2), zcurve (>= 1.0.7), scholar (>= 0.2.0), stringi (>= 1.0.7), MASS, methods

Suggests  R.rsp
VignetteBuilder  R.rsp
RoxygenNote  7.2.3
NeedsCompilation  no

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Repository  CRAN
Date/Publication  2023-12-16 12:40:03 UTC

R topics documented:

- A128 ................................................................. 5
- A313 ................................................................. 6
- addedByResearcher2 ............................................. 6
- addedByResearcher3 ............................................. 7
- addedByResearcher313 ......................................... 7
- ageM128 ............................................................. 8
- ageM18 .............................................................. 8
- ageM2 ............................................................... 9
- ageM201 ............................................................. 9
- ageM3 .............................................................. 10
- ageM313 ............................................................. 10
- ageM32 ............................................................. 11
- ageSD128 ........................................................... 11
- ageSD18 ............................................................. 12
- ageSD2 ............................................................. 12
- ageSD201 ........................................................... 13
- ageSD3 ............................................................. 13
- ageSD313 ........................................................... 14
- ageSD32 ............................................................. 14
- alphas128 ........................................................ 15
- alphas313 ........................................................ 15
- burnout128 ......................................................... 16
- burnout18 ......................................................... 16
- burnout2 ........................................................ 17
- burnout201 ......................................................... 17
- burnout3 ........................................................ 18
- burnout313 ......................................................... 18
<table>
<thead>
<tr>
<th>R topics documented:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>burnout32</td>
<td>19</td>
</tr>
<tr>
<td>combineVariables128</td>
<td>19</td>
</tr>
<tr>
<td>combineVariablesNames128</td>
<td>20</td>
</tr>
<tr>
<td>CoTiMABiG_D_BO</td>
<td>20</td>
</tr>
<tr>
<td>CoTiMAFullFit_3</td>
<td>21</td>
</tr>
<tr>
<td>CoTiMAFullFit_6</td>
<td>21</td>
</tr>
<tr>
<td>CoTiMAFullFit_6_new</td>
<td>22</td>
</tr>
<tr>
<td>CoTiMAFullInv23Fit_6</td>
<td>22</td>
</tr>
<tr>
<td>CoTiMAFullInvEq23Fit_6</td>
<td>23</td>
</tr>
<tr>
<td>CoTiMAInitFit_3</td>
<td>23</td>
</tr>
<tr>
<td>CoTiMAInitFit_6</td>
<td>24</td>
</tr>
<tr>
<td>CoTiMAInitFit_6_new</td>
<td>24</td>
</tr>
<tr>
<td>CoTiMAInitFit_6_NUTS</td>
<td>25</td>
</tr>
<tr>
<td>CoTiMAInitFit_D_BO</td>
<td>25</td>
</tr>
<tr>
<td>CoTiMAMod1onFullFit_6</td>
<td>26</td>
</tr>
<tr>
<td>CoTiMAMod1onFullFit_6_cats12</td>
<td>26</td>
</tr>
<tr>
<td>CoTiMAMod2on23Fit_6</td>
<td>27</td>
</tr>
<tr>
<td>CoTiMAoptimFit313</td>
<td>27</td>
</tr>
<tr>
<td>CoTiMAPart134Inv3Fit_6</td>
<td>28</td>
</tr>
<tr>
<td>CoTiMAPower_D_BO</td>
<td>28</td>
</tr>
<tr>
<td>CoTiMASnactArgs</td>
<td>29</td>
</tr>
<tr>
<td>CoTiMAstudyList_3</td>
<td>29</td>
</tr>
<tr>
<td>CoTiMAstudyList_6</td>
<td>30</td>
</tr>
<tr>
<td>CoTiMAstudyList_6_new</td>
<td>30</td>
</tr>
<tr>
<td>country128</td>
<td>31</td>
</tr>
<tr>
<td>country18</td>
<td>31</td>
</tr>
<tr>
<td>country2</td>
<td>32</td>
</tr>
<tr>
<td>country201</td>
<td>32</td>
</tr>
<tr>
<td>country3</td>
<td>33</td>
</tr>
<tr>
<td>country313</td>
<td>33</td>
</tr>
<tr>
<td>country32</td>
<td>34</td>
</tr>
<tr>
<td>ctmaAllInvFit</td>
<td>34</td>
</tr>
<tr>
<td>ctmaBiG</td>
<td>36</td>
</tr>
<tr>
<td>ctmaBiGOMX</td>
<td>38</td>
</tr>
<tr>
<td>ctmaCombPRaw</td>
<td>38</td>
</tr>
<tr>
<td>ctmaCompFit</td>
<td>39</td>
</tr>
<tr>
<td>ctmaCorRel</td>
<td>40</td>
</tr>
<tr>
<td>ctmaEmpCov</td>
<td>40</td>
</tr>
<tr>
<td>ctmaEqual</td>
<td>42</td>
</tr>
<tr>
<td>ctmaFit</td>
<td>43</td>
</tr>
<tr>
<td>ctmaFitList</td>
<td>47</td>
</tr>
<tr>
<td>ctmaFitToPrep</td>
<td>48</td>
</tr>
<tr>
<td>ctmaGetPub</td>
<td>49</td>
</tr>
<tr>
<td>ctmaInit</td>
<td>50</td>
</tr>
<tr>
<td>ctmaLabels</td>
<td>53</td>
</tr>
<tr>
<td>ctmaLCS</td>
<td>54</td>
</tr>
<tr>
<td>ctmaOptimizeFit</td>
<td>55</td>
</tr>
<tr>
<td>ctmaOptimizeInit</td>
<td>58</td>
</tr>
<tr>
<td>R topics documented</td>
<td>Page</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>ctmaPlot</td>
<td>60</td>
</tr>
<tr>
<td>ctmaPlotCtsemMod</td>
<td>61</td>
</tr>
<tr>
<td>ctmaPower</td>
<td>63</td>
</tr>
<tr>
<td>ctmaPRaw</td>
<td>66</td>
</tr>
<tr>
<td>ctmaPrep</td>
<td>67</td>
</tr>
<tr>
<td>ctmaPub</td>
<td>69</td>
</tr>
<tr>
<td>ctmaRedHet</td>
<td>71</td>
</tr>
<tr>
<td>ctmaSaveFile</td>
<td>72</td>
</tr>
<tr>
<td>ctmaScaleInits</td>
<td>72</td>
</tr>
<tr>
<td>ctmaShapeRawData</td>
<td>73</td>
</tr>
<tr>
<td>ctmaStanResample</td>
<td>77</td>
</tr>
<tr>
<td>ctmaStdParams</td>
<td>77</td>
</tr>
<tr>
<td>ctmaSV</td>
<td>78</td>
</tr>
<tr>
<td>delta_t128</td>
<td>79</td>
</tr>
<tr>
<td>delta_t18</td>
<td>80</td>
</tr>
<tr>
<td>delta_t2</td>
<td>80</td>
</tr>
<tr>
<td>delta_t1201</td>
<td>81</td>
</tr>
<tr>
<td>delta_t3</td>
<td>81</td>
</tr>
<tr>
<td>delta_t313</td>
<td>82</td>
</tr>
<tr>
<td>delta_t32</td>
<td>82</td>
</tr>
<tr>
<td>demands128</td>
<td>83</td>
</tr>
<tr>
<td>demands18</td>
<td>83</td>
</tr>
<tr>
<td>demands2</td>
<td>84</td>
</tr>
<tr>
<td>demands201</td>
<td>84</td>
</tr>
<tr>
<td>demands3</td>
<td>85</td>
</tr>
<tr>
<td>demands313</td>
<td>85</td>
</tr>
<tr>
<td>demands32</td>
<td>86</td>
</tr>
<tr>
<td>dl_link</td>
<td>86</td>
</tr>
<tr>
<td>empcov128</td>
<td>87</td>
</tr>
<tr>
<td>empcov18</td>
<td>87</td>
</tr>
<tr>
<td>empcov2</td>
<td>88</td>
</tr>
<tr>
<td>empcov201</td>
<td>88</td>
</tr>
<tr>
<td>empcov3</td>
<td>89</td>
</tr>
<tr>
<td>empcov313</td>
<td>89</td>
</tr>
<tr>
<td>empcov32</td>
<td>90</td>
</tr>
<tr>
<td>malePercent128</td>
<td>90</td>
</tr>
<tr>
<td>malePercent18</td>
<td>91</td>
</tr>
<tr>
<td>malePercent2</td>
<td>91</td>
</tr>
<tr>
<td>malePercent201</td>
<td>92</td>
</tr>
<tr>
<td>malePercent3</td>
<td>92</td>
</tr>
<tr>
<td>malePercent313</td>
<td>93</td>
</tr>
<tr>
<td>malePercent32</td>
<td>93</td>
</tr>
<tr>
<td>moderator128</td>
<td>94</td>
</tr>
<tr>
<td>moderator18</td>
<td>94</td>
</tr>
<tr>
<td>moderator2</td>
<td>95</td>
</tr>
<tr>
<td>moderator201</td>
<td>95</td>
</tr>
<tr>
<td>moderator3</td>
<td>96</td>
</tr>
<tr>
<td>moderator313</td>
<td>96</td>
</tr>
</tbody>
</table>
moderator32 .................................................. 97
moderatorLabels ........................................... 97
moderatorValues ........................................... 98
occupation128 ............................................. 98
occupation18 ................................................ 99
occupation2 ............................................... 99
occupation201 .......................................... 100
occupation3 ............................................... 100
occupation313 ............................................ 101
occupation32 ............................................. 101
pairwiseN128 ............................................. 102
plot.CoTiMAFit ........................................... 102
pubList_8 .................................................... 103
rawData128 ................................................ 103
recodeVariables128 ..................................... 104
results128 ................................................. 104
sampleSize128 ............................................ 105
sampleSize18 ............................................. 105
sampleSize2 .............................................. 106
sampleSize201 .......................................... 106
sampleSize3 .............................................. 107
sampleSize313 ........................................... 107
sampleSize32 ............................................. 108
source128 ................................................. 108
source2 .................................................. 109
source201 ................................................ 109
source3 .................................................. 110
source313 ................................................ 110
summary.CoTiMAFit ..................................... 111
targetVariables128 ..................................... 111
targetVariables2 ....................................... 112
targetVariables3 ....................................... 112
targetVariables313 .................................. 113
variableNames128 ..................................... 113

Index 114

A128

A128 example matrix

Description

A128 example matrix

Usage

A128
Format

An object of class matrix (inherits from array) with 2 rows and 2 columns.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

A313 example matrix

---

Description

A313 example matrix

Usage

A313

Format

An object of class matrix (inherits from array) with 2 rows and 2 columns.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

addedByResearcher2 example vector

---

Description

addedByResearcher2 example vector

Usage

addedByResearcher2

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
Description
addedByResearcher3 example vector

Usage
addedByResearcher3

Format
An object of class character of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

Description
addedByResearcher313 example vector

Usage
addedByResearcher313

Format
An object of class character of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
ageM128  

ageM128 example vector

Description

ageM128 example vector

Usage

ageM128

Format

An object of class numeric of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

ageM18  

ageM18 example vector

Description

ageM18 example vector

Usage

ageM18

Format

An object of class numeric of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
### ageM2

**Description**

ageM2 example vector

**Usage**

ageM2

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

### ageM201

**Description**

ageM201 example vector

**Usage**

ageM201

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**Description**

ageM3 example vector

**Usage**

ageM3

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**Description**

ageM313 example vector

**Usage**

ageM313

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
ageM32

ageM32 example vector

Description
ageM32 example vector

Usage
ageM32

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

ageSD128

ageSD128 example vector

Description
ageSD128 example vector

Usage
ageSD128

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
ageSD18

Description
ageSD18 example vector

Usage
ageSD18

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

ageSD2

Description
ageSD2 example vector

Usage
ageSD2

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
ageSD201  

Description

ageSD201 example vector

Usage

ageSD201

Format

An object of class numeric of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

ageSD3  

Description

ageSD3 example vector

Usage

ageSD3

Format

An object of class numeric of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
ageSD313 example vector

Description
ageSD313 example vector

Usage
ageSD313

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

ageSD32 example vector

Description
ageSD32 example vector

Usage
ageSD32

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
alphas128

alphas128 example vector

Description
alphas128 example vector

Usage
alphas128

Format
An object of class numeric of length 9.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

alphas313

alphas313 example vector

Description
alphas313 example vector

Usage
alphas313

Format
An object of class numeric of length 6.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
burnout128    *burnout128 example vector*

**Description**

burnout128 example vector

**Usage**

burnout128

**Format**

An object of class character of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

burnout18    *burnout18 example vector*

**Description**

burnout18 example vector

**Usage**

burnout18

**Format**

An object of class character of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**burnout2**  

**burnout2 example vector**

**Description**

burnout2 example vector

**Usage**

burnout2

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**burnout201**  

**burnout201 example vector**

**Description**

burnout201 example vector

**Usage**

burnout201

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
burnout3

**Description**

burnout3 example vector

**Usage**

burnout3

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

burnout313

**Description**

burnout313 example vector

**Usage**

burnout313

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**burnout32**

**burnout32 example vector**

**Description**

burnout32 example vector

**Usage**

burnout32

**Format**

An object of class character of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**combineVariables128**

**combineVariables128 example vector**

**Description**

combineVariables128 example vector

**Usage**

combineVariables128

**Format**

An object of class list of length 3.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
Description
combineVariablesNames128 example vector

Usage
combineVariablesNames128

Format
An object of class character of length 3.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

ctmaBiG-object reproducing results of Guthier et al. (2020)

Description
cdmaBiG-object reproducing results of Guthier et al. (2020)

Usage
CoTiMABiG_D_BO

Format
An object of class CoTiMAfit of length 10.

Author(s)
C. Guthier, C. Dormann & J. Cortina <CoTiMA@uni-mainz.org>
CoTiMAFullFit_3

ctmaFit-object with a 'full' CoTiMA of 3 studies

Description
ctmaFit-object with a 'full' CoTiMA of 3 studies

Usage
CoTiMAFullFit_3

Format
An object of class CoTiMAFit of length 16.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

CoTiMAFullFit_6

ctmaFit-object with a 'full' CoTiMA of 6 studies

Description
ctmaFit-object with a 'full' CoTiMA of 6 studies

Usage
CoTiMAFullFit_6

Format
An object of class CoTiMAFit of length 12.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**CoTiMAFullFit_6_new**

tmaFit-object with a 'full' CoTiMA of 6 studies

**Usage**

CoTiMAFullFit_6_new

**Format**

An object of class CoTiMAFit of length 13.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**CoTiMAFullInv23Fit_6**

1st fitted ctmaFit-object in a series of 2 to test equality of 2 cross effects

**Description**

1st fitted ctmaFit-object in a series of 2 to test equality of 2 cross effects

**Usage**

CoTiMAFullInv23Fit_6

**Format**

An object of class CoTiMAFit of length 14.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
CoTiMAFullInvEq23Fit_6

2nd fitted ctmaFit-object in a series of 2 to test equality of 2 cross effects

Description
2nd fitted ctmaFit-object in a series of 2 to test equality of 2 cross effects

Usage
CoTiMAFullInvEq23Fit_6

Format
An object of class CoTiMAFit of length 12.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

CoTiMAInitFit_3
cdmaInit-object with of 3 primary studies

Description
cdmaInit-object with of 3 primary studies

Usage
CoTiMAInitFit_3

Format
An object of class CoTiMAFit of length 15.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
CoTiMAInitFit_6

Description
ctmaInit-object with 6 primary studies

Usage
CoTiMAInitFit_6

Format
An object of class CoTiMAFit of length 17.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

CoTiMAInitFit_6_new

Description
ctmaInit-object with 6 primary studies

Usage
CoTiMAInitFit_6_new

Format
An object of class CoTiMAFit of length 15.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**CoTiMAInitFit_6_NUTS**

CtmaInit-object with a 'full' CoTiMA of 6 studies using NUTS sampler

**Description**

ctmaInit-object with a 'full' CoTiMA of 6 studies using NUTS sampler

**Usage**

CoTiMAInitFit_6_NUTS

**Format**

An object of class CoTiMAFit of length 16.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**CoTiMAInitFit_D_BO**

CtmaInit-object created by Guthier et al. (2020) with 48 primary studies

**Description**

ctmaInit-object created by Guthier et al. (2020) with 48 primary studies

**Usage**

CoTiMAInitFit_D_BO

**Format**

An object of class CoTiMAFit of length 12.

**Author(s)**

C. Guthier, C. Dormann & J. Cortina <CoTiMA@uni-mainz.org>
Description
ctmaFit-object with a categorical moderator of the full drift matrix

Usage
CoTiMAMod1onFullFit_6

Format
An object of class CoTiMAFit of length 15.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

Description
ctmaFit-object with a categorical moderator of the full drift matrix

Usage
CoTiMAMod1onFullFit_6_cats12

Format
An object of class CoTiMAFit of length 13.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
Description

cmmaFit-object with a continuous moderator of 2 cross effects

Usage

CoTIMAMod2on23Fit_6

Format

An object of class CoTIMAfit of length 15.

Author(s)

C. Dormann & M. Homburg <CoTIMA@uni-mainz.org>

Description

CoTIMAoptimFit313 example vector

Usage

CoTIMAoptimFit313

Format

An object of class CoTIMAfit of length 4.

Author(s)

C. Dormann & M. Homburg <CoTIMA@uni-mainz.org>
**Description**

cmaFit-object with with only one cross effect and this one set equal across primary studies

**Usage**

CoTiMAPart134Inv3Fit_6

**Format**

An object of class CoTiMAFit of length 16.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**Description**

cmaPower-object reproducing results of Guthier et al. (2020)

**Usage**

CoTiMAPower_D_BO

**Format**

An object of class CoTiMAFit of length 10.

**Author(s)**

C. Guthier, C. Dormann & J. Cortina <CoTiMA@uni-mainz.org>
**CoTiMAStanctArgs**

This are preset arguments

Object created to store standard parameters passed forward to \texttt{ctStanFit}

**Usage**

\texttt{CoTiMAStanctArgs}

**Format**

An object of class \texttt{list} of length 36.

**Author(s)**

C. Dormann & M. Homburg \texttt{<CoTiMA@uni-mainz.org>}

---

**CoTiMAstudyList\_3**

\texttt{ctmaPrep-object created with 3 primary studies}

**Description**

\texttt{ctmaPrep-object created with 3 primary studies}

**Usage**

\texttt{CoTiMAstudyList\_3}

**Format**

An object of class \texttt{CoTiMAFit} of length 28.

**Author(s)**

C. Guthier, C. Dormann & J. Cortina \texttt{<CoTiMA@uni-mainz.org>}

---
Description

cmaPrep-object created with 6 primary studies

Usage

CoTiMAstudyList_6

Format

An object of class CoTiMFit of length 29.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

Description

cmaPrep-object created with 6 primary studies

Usage

CoTiMAstudyList_6_new

Format

An object of class CoTiMFit of length 29.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
country128  

country128 example vector

**Description**

country128 example vector

**Usage**

country128

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

country18  

country18 example vector

**Description**

country18 example vector

**Usage**

country18

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
<table>
<thead>
<tr>
<th>country2</th>
<th>country2 example vector</th>
</tr>
</thead>
</table>

**Description**

country2 example vector

**Usage**

country2

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

<table>
<thead>
<tr>
<th>country201</th>
<th>country201 example vector</th>
</tr>
</thead>
</table>

**Description**

country201 example vector

**Usage**

country201

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**Description**

country3 example vector

**Usage**

country3

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTIMA@uni-mainz.org>

---

**Description**

country313 example vector

**Usage**

country313

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTIMA@uni-mainz.org>
Description

country32 example vector

Usage

country32

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

description

Fit a CoTiMA model with all params (drift, T0var, diffusion) invariant across primary studies

Usage

cDMAIInvFit(
  ctmaInitFit = NULL,
  activeDirectory = NULL,
  activateRPB = FALSE,
  digits = 4,
  drift = drift,
  coresToUse = c(1),
  n.manifest = 0,
  indVarying = FALSE,
  scaleTime = NULL,
  optimize = TRUE,
  nopriors = TRUE,
  priors = FALSE,
  finishsamples = NULL,
  iter = NULL,
  chains = NULL,
  verbose = NULL,
loadAllInvFit = c(),
saveAllInvFit = c(),
silentOverwrite = FALSE,
customPar = FALSE,
T0means = 0,
manifestMeans = 0,
CoTiMAStanctArgs = NULL,
lambda = NULL,
manifestVars = NULL,
indVaryingT0 = TRUE
)

Arguments

ctmaInitFit       ctmaInitFit
activeDirectory   activeDirectory
activateRPB       activateRPB
digits            digits
drift             Labels for drift effects. Have to be either of the type V1toV2 or 0 for effects to be excluded, which is usually not recommended.
coresToUse        coresToUse
n.manifest        Number of manifest variables of the model (if left empty it will assumed to be identical with n.latent).
indVarying        Allows ct intercepts to vary at the individual level (random effects model, accounts for unobserved heterogeneity)
scaleTime         scaleTime
optimize          optimize
nopriors          nopriors (TRUE, but deprecated)
priors            priors (FALSE)
finishesamples    finishesamples
iter              iter
chains            chains
verbose           verbose
loadAllInvFit     loadAllInvFit
saveAllInvFit     saveAllInvFit
silentOverwrite   silentOverwrite
customPar         logical. If set TRUE (default) leverages the first pass using priors and ensure that the drift diagonal cannot easily go too negative (helps since ctsem > 3.4)
T0means           Default 0 (assuming standardized variables). Can be assigned labels to estimate them freely.
manifestMeans Default 0 (assuming standardized variables). Can be assigned labels to estimate them freely.

CoTiMAStanctArgs parameters that can be set to improve model fitting of the \texttt{ctStanFit} Function

lambda R-type matrix with pattern of fixed (=1) or free (any string) loadings.

manifestVars define the error variances of the manifests with a single time point using R-type lower triangular matrix with nrow=n.manifest & ncol=n.manifest.

indVaryingT0 Allows ct intercepts to vary at the individual level (random effects model, accounts for unobserved heterogeneity)

Value returns a fitted CoTiMA object, in which all drift parameters, Time 0 variances and covariances, and diffusion parameters were set invariant across primary studies

\texttt{ctmaBiG}

Description

Analysis of publication bias and generalizability. The function takes a CoTiMA fit object (created with \texttt{ctmaInit}) and estimates fixed and random effects of single drift coefficients, heterogeneity (Q, I square, H square, tau square), PET-PEESE corrections, Egger's tests, and z-curve analysis yielding expected replication and detection rates (ERR, EDR).

Usage

\begin{verbatim}
ctmaBiG(
  ctmaInitFit = NULL,
  activeDirectory = NULL,
  PETPEESEalpha = 0.1,
  activateRPB = FALSE,
  digits = 4,
  zcurve = FALSE,
  undoTimeScaling = TRUE,
  dt = NULL
)
\end{verbatim}

Arguments

\texttt{ctmaInitFit} fit object created with \texttt{ctmaInit} containing the fitted ctsem model of each primary study

\texttt{activeDirectory} the directory where to save results (if not specified, it is taken from ctmaInitFit)

\texttt{PETPEESEalpha} probability level (condition) below which to switch from PET to PEESE (cf. Stanley, 2017, p. 582, below Eq. 2; default p = .10)
activateRPB if TRUE, messages (warning, finished) could be send to smart phone (default = FALSE)
digits rounding (default = 4)
zcurve performs z-curve analysis. Could fail if too few studies (e.g. around 10) are supplied. default=FALSE
undoTimeScaling if TRUE, the original time scale is used (timeScale argument possibly used in ctmaInit is undone )
dt A scalar indicating a time interval across which discrete time effects should be estimated and then used for ctmaBiG.

Value
ctmaBiG returns a list containing some arguments supplied, the results of analyses of publication bias and generalizability, model type, and the type of plot that could be performed with the returned object. The arguments in the returned object are activeDirectory, and coresToUse. Further arguments, which are just copied from the init-fit object supplied, are, n.studies, n.latent, studyList, statisticsList, modelResults (all parameter estimates and their standard error), and parameter names. All new results are returned as the list element "summary", which is printed if the summary function is applied to the returned object. The summary list element comprises a title (model='Analysis of Publication Bias & Generalizability') and "estimates", which is another list comprising "Fixed Effects of Drift Coefficients", "Heterogeneity", "Random Effects of Drift Coefficients", "PET-PEESE corrections", "Egger’s tests" (constant of the WLS regression of drift coefficients on their standard errors (SE) with 1/SE^2 as weights), "Egger’s tests Alt. Version" (constant of the OLS regression of the standard normal deviates of the drift coefficients on their precision), and "Z-Curve 2.0 Results". Plot type is plot.type=c("funnel", "forest") and model.type="BiG".

Examples

## Not run:

# perform analyses of publication bias and generalizability
CoTiMAInitFit_D_BO$activeDirectory <- "/Users/tmp/" # adapt!
CoTiMABiG_D_BO <- ctmaBiG(ctmaInitFit=CoTiMAInitFit_D_BO, zcurve=FALSE)

## End(Not run)

# display results
summary(CoTiMABiG_D_BO)

## Not run:

# get funnel & forest plots
CoTiMABiG_D_BO$activeDirectory <- "/Users/tmp/" # adapt!
plot(CoTiMABiG_D_BO)

## End(Not run)
ctmaBiGOMX

Description

Analysis of publication bias and fixed and ranom effects analysis of single drift coefficients if OLD OpenMx fit files are supplied

Usage

cdmaBiGOMX(
    ctmaInitFit = NULL,
    activeDirectory = NULL,
    PETPEESEalpha = 0.1,
    activateRPB = FALSE,
    digits = 4
)

Arguments

ctmaInitFit fit object created with ctmaInti containing the fitted ctsem model of each primary study
activeDirectory the directory where to save results (if not specified, it is taken from ctmaInitFit)
PETPEESEalpha # probability level (condition) below which to switch from PET to PEESE (Stanley, 2017, SPPS,p. 582, below Eq. 2; (default p = .10)
activateRPB if TRUE, messages (warning, finishes) could be send to smart phone (default = FALSE)
digits rounding (default = 4)

Value

returns a CoTiMA fit object with results of publication bias analysis, fixed and random effect analy- 

sis, Egger’s tests, PET-PEESE corrections.

cdmaCombPRaw

Description

Combine Pseudo Raw Data (extract them from 'CoTiMAFit object'$studyFitList)

Usage

cdmaCombPRaw(listOfStudyFits = NULL, moderatorValues = NULL)
**ctmaCompFit**

**Arguments**

- `listOfStudyFits`  
  "Listobject of Studyfits"
- `moderatorValues`  
  "Moderators"

**Value**

returns a pseudo raw data set that combines pseudo raw data and moderators of primary studies

---

**ctmaCompFit**

**Description**

Performs log-likelihood ratio tests to compare the fit of 2 models (CoTiMAFit objects created with `ctmaFit` or `ctmaEqual`), i.e., the difference between the two -2 times LLs between the first model and the more constrained second model. The nested structure of the two models is assumed to be given and not checked.

**Usage**

```r
ctmaCompFit(model1 = NULL, model2 = NULL)
```

**Arguments**

- `model1`  
  Model 1
- `model2`  
  Model 2

**Value**

Returns the the difference between the two -2 times LLs (Diff_Minus2LL), the associated difference in degrees of freedom (Diff_df (= Diff_n.params)), and the probability (prob).

**Examples**

```r
minus2llDiffTest <- ctmaCompFit(CoTiMAFullInv23Fit_6,  
                               CoTiMAFullInvEq23Fit_6)
summary(minus2llDiffTest)
```
Description
Disattenuates the entries in a correlation matrix using a vector of reliabilities.

Usage
ctmaCorRel(empcov = NULL, alphas = NULL)

Arguments
empcov Empirical correlation matrix
alphas Vector reliabilities

Value
A corrected correlation matrix (corEmpcov). Corrections leading to r > 1.0 are set to 1.0.

Examples
empcov313new <- ctmaCorRel(empcov=empcov313, alphas=alphas313)

Description
changes a full covariance matrix by selecting target variables, recoding them, combining them (compute the mean of two or more variables), and by adding rows/columns with NA if focal variables are not available.

Usage
cDMAEmpCov(
    targetVariables = NULL,
    recodeVariables = c(),
    combineVariables = c(),
    combineVariablesNames = c(),
    missingVariables = c(),
    nlatents = NULL,
    Tpoints = NULL,
    sampleSize = NULL,
    pairwiseN = NULL,
    empcov = NULL
)
Arguments

targetVariables
(col-/row-) number or names of the target variables

recodeVariables
(col-/row-) number or names of the target variables require inverse coding

combineVariables
list of vectors, which put together the targeted variables that should be used for composite variables

combineVariablesNames
new names for combined variables - not really important

missingVariables
missing variables

nlatents
number of (latent) variables - actually it is the number of all variables

Tpoints
number of time points.
sampleSize
sample size

pairwiseN
matrix of same dimensions as empcov containing possible pairwiseN.

empcov
empirical correlation matrix

Value
returns a list with two elements. The first element (results$r) contains the adapted correlation matrix, and the second element (results$pairwiseNNew) an adapted version of a matrix of pairwise N if pairwiseN was provided for the original correlation matrix supplied.

Examples

```r
source17 <- c()
delta_t17 <- c(12)
sampleSize17 <- 440
empcov17 <- matrix(
  c(1.00, -0.60, -0.36, 0.20, 0.62, -0.47, -0.18, 0.20,
    -0.60, 1.00, 0.55, -0.38, -0.43, 0.52, 0.27, -0.21,
    -0.36, 0.55, 1.00, -0.47, -0.26, 0.37, 0.51, -0.28,
    0.20, -0.38, -0.47, 1.00, 0.15, -0.28, -0.35, 0.56,
    0.62, -0.43, -0.26, 0.15, 1.00, -0.63, -0.30, 0.27,
    -0.47, 0.52, 0.37, -0.28, -0.63, 1.00, 0.55, -0.37,
    -0.18, 0.27, 0.51, -0.35, -0.30, 0.55, 1.00, -0.51,
    0.20, -0.21, -0.28, 0.56, 0.27, -0.37, -0.51, 1.00),
  nrow=8, ncol=8)
rownames(empcov17) <- colnames(empcov17) <-
c("Workload_1", "Exhaustion_1", "Cynicism_1", "Values_1",
  "Workload_2", "Exhaustion_2", "Cynicism_2", "Values_2")
targetVariables17 <-
c("Workload_1", "Exhaustion_1", "Cynicism_1",
  "Workload_2", "Exhaustion_2", "Cynicism_2")
recodeVariables17 <- c("Workload_1", "Workload_2")
```
ctmaEqual

Description

test if the two or more invariant drift parameters in the CoTiMAFit object supplied are equal. The
supplied CoTiMA fit-object (ctmaInvariantFit) has to be a model fitted with ctmaFit where at least
two parameters were set invariant across primary studies (e.g., 2 cross effects). All parameters
that are set invariant in the supplied model are then constrained to be equal by ctmaEqual (no user
action required), the model is fitted, and a log-likelihood ratio test is performed informing about the
probability that equality applies.

Usage

cdmaEqual(
  ctmaInvariantFit = NULL,
  activeDirectory = NULL,
  activateRPB = FALSE,
  digits = 4,
  coresToUse = 2
)

Arguments

cdmaInvariantFit
  object to which a CoTiMA fit has been assigned to (i.e., what has been returned by ctmaFit). In most cases probably a model in which (only) two effects were
  specified with invariantDrift.

activeDirectory
  defines another active directory than the one used in ctmaInvariantFit

activateRPB
  set to TRUE to receive push messages with CoTiMA notifications on your phone

digits
  Number of digits used for rounding (in outputs)

coresToUse
  If neg., the value is subtracted from available cores, else value = cores to use
Value

returns a model where two or more parameters were set equal across primary studies and a log-likelihood difference test informing about the probability that the equality assumption is correct.

Examples

# Fit a CoTiMA with a set of parameters set equal that were set # invariant in a previous model (of which the fit object is # supplied in argument ctmaInvariantFit)
## Not run:
CoTiMAFullInv23Fit_6$activeDirectory <- "/Users/tmp/" # adapt!
CoTiMAFullInvEq23Fit_6 <- ctmaEqual(ctmaInvariantFit=CoTiMAFullInv23Fit_6)
## End(Not run)

Description

Fits a ctsem model with invariant drift effects across primary studies, possible multiple moderators (but all of them of the the same type, either "cont" or "cat"), and possible cluster (e.g., countries where primary studies were conducted).

Usage

ctmaFit(
  activateRPB = FALSE,
  activeDirectory = NULL,
  allInvModel = FALSE,
  binaries = NULL,
  catsToCompare = NULL,
  chains = NULL,
  cint = 0,
  cluster = NULL,
  coresToUse = c(2),
  CoTiMAStanctArgs = NULL,
  ctmaInitFit = NULL,
  customPar = FALSE,
  digits = 4,
  drift = NULL,
  driftsToCompare = NULL,
  equalDrift = NULL,
  finishsamples = NULL,
  fit = TRUE,
  ind.mod.names = NULL,
  ind.mod.number = NULL,
ind.mod.type = "cont",
inVarying = FALSE,
inVaryingT0 = NULL,
inits = NULL,
invariantDrift = NULL,
iter = NULL,
lambda = NULL,
manifestMeans = 0,
manifestVars = 0,
mod.names = NULL,
mod.number = NULL,
mod.type = "cont",
moderatedDrift = NULL,
modsToCompare = NULL,
nopriors = TRUE,
optimize = TRUE,
primaryStudyList = NULL,
priors = FALSE,
sameInitialTimes = FALSE,
scaleClus = TRUE,
scaleMod = NULL,
scaleTI = TRUE,
scaleTime = NULL,
T0means = 0,
T0var = "auto",
transfMod = NULL,
useSampleFraction = NULL,
verbose = NULL
)

Arguments

activateRPB set to TRUE to receive push messages with 'CoTiMA' notifications on your phone
activeDirectory defines another active directory than the one used in ctmaInitFit
allInvModel estimates a model with all parameters invariant (DRIFT, DIFFUSION, T0VAR) if set TRUE (default = FALSE)
binaries which manifest is a binary. Still experimental
catsToCompare when performing contrasts for categorical moderators, the categories (values, not positions) for which effects are set equal
chains number of chains to sample, during HMC or post-optimization importance sampling.
cint default 'auto' (= 0). Are set free if random intercepts model with varying cints is requested (by indvarying='cint')
cluster vector with cluster variables (e.g., countries). Has to be set up carefully. Will be included in ctmaPrep in later 'CoTiMA' versions.
ctmaFit

coresToUse
if negative, the value is subtracted from available cores, else value = cores to use

CoTiMAStanctArgs
parameters that can be set to improve model fitting of the ctStanFit Function

ctmaInitFit
object to which all single ctsem fits of primary studies has been assigned to (i.e., what has been returned by ctmaInit)

customPar
logical. If set TRUE leverages the first pass using priors and ensure that the drift diagonal cannot easily go too negative (helps since ctsem > 3.4)

digits
Number of digits used for rounding (in outputs)

drift
labels for drift effects. Have to be either of the type 'V1toV2' or '0' for effects to be excluded.

driftsToCompare
when performing contrasts for categorical moderators, the (subset of) drift effects analyzed

equalDrift
Constrains all listed effects to be equal (e.g., equalDrift = c("V1toV2", "V2toV1")). Note that this is not required for testing the assumption that two effects are equal in the population. Use the invariantDrift argument and then ctmaEqual

finishsamples
number of samples to draw (either from hessian based covariance or posterior distribution) for final results computation (default = 1000).

fit
TRUE (default) fits the requested model. FALSE returns the ctsem code CoTiMA uses to set up the model, the ctsemmodellbase which can be modified to match users requirements, and the data set (in long format created). The model can then be fitted using ctStanFit

ind.mod.names
vector of names for individual level (!) moderators used in output

ind.mod.number
which in the vector of individual level (!) moderator values shall be used (e.g., 2 for a single moderator or 1:3 for 3 moderators simultaneously)

ind.mod.type
'cont' or 'cat' of the individual level (!) moderators (mixing them in a single model not yet possible)

indVarying
allows continuous time intercepts to vary at the individual level (random intercepts model, accounts for unobserved heterogeneity)

indVaryingT0
(default = NULL). Automatically set to TRUE if not set to FALSE if indVarying is set TRUE. indVaryingT0=TRUE forces T0MEANS (T0 scores) to vary interindividually, which undos the nesting of T0(co-)variances in primary studies. Was standard until Aug. 2022. Could provide better estimates if set to FALSE.

inits
vector of start values

invariantDrift
drift labels for drift effects that are set invariant across primary studies (default = all drift effects).

iter
number of iterations (default = 1000). Sometimes larger values could be required from Bayesian estimation

lambda
R-type matrix with pattern of fixed (=1) or free (any string) loadings.

manifestMeans
default = 0. Are automatically set free if indvarying is set to TRUE. Can be assigned labels to estimate them freely.

manifestVars
define the error variances (default = 0) of the manifests with a single time point using R-type lower triangular matrix with nrow=n.manifest & ncol=n.manifest.
mod.names  vector of names for moderators used in output  
mod.number  which in the vector of moderator values shall be used (e.g., 2 for a single moderator or 1:3 for 3 moderators simultaneously)  
mod.type  'cont' or 'cat' (mixing them in a single model not yet possible)  
moderatedDrift  labels for drift effects that are moderated (default = all drift effects)  
modsToCompare  when performing contrasts for categorical moderators, the moderator numbers (position in mod.number) that is used  
nopriors  Deprecated, but still working. If TRUE, any priors are disabled – sometimes desirable for optimization  
optimize  if set to FALSE, Stan’s Hamiltonian Monte Carlo sampler is used (default = TRUE = maximum a posteriori / importance sampling)  
primaryStudyList  could be a list of primary studies compiled with ctmaPrep that defines the subset of studies in ctmaInitFit that should actually be used  
priors  if FALSE, any priors are disabled – sometimes desirable for optimization  
sameInitialTimes  Only important for raw data. If TRUE (default=FALSE), T0MEANS occurs for every subject at the same time, rather than just at the earliest observation.  
scaleClus  scale vector of cluster indicators - TRUE (default) yields avg. drift estimates, FALSE yields drift estimates of last cluster  
scaleMod  scale moderator variables - TRUE (default) recommended for continuous and categorical moderators, to separate within and between effects  
scaleTI  scale TI predictors - not recommended until version 0.5.3.1. Does not change aggregated results anyways, just interpretation of effects for dummies representing primary studies.  
scaleTime  scale time (interval) - sometimes desirable to improve fitting  
T0means  Default 0 (assuming standardized variables). Can be assigned labels to estimate them freely.  
T0var  (default = 'auto')  
transfMod  more general option to change moderator values. A vector as long as number of moderators analyzed (e.g., c("mean(x)", "x - median(x)"))  
useSampleFraction  to speed up debugging. Provided as fraction (e.g., 1/10).  
verbose  integer from 0 to 2. Higher values print more information during model fit – for debugging  

Value  
ctmaFit returns a list containing some arguments supplied, the fitted model, different elements summarizing the main results, model type, and the type of plot that could be performed with the returned object. The arguments in the returned object are activeDirectory, coresToUse, moderator names (mod.names), and moderator type (mod.type). Further arguments, which are just copied from the init-fit object supplied, are, n.latent, studyList, parameterNames, and statisticsList. The
fitted model is found in studyFitList, which is a large list with many elements (e.g., the ctsem model specified by CoTiMA, the rstan model created by ctsem, the fitted rstan model etc.). Further results returned are n.studies = 1 (required for proper plotting), data (created pseudo raw data), and a list with modelResults (i.e., DRIFT=model_Drift_Coef, DIFFUSION=model_Diffusion_Coef, T0VAR=model_T0var_Coef, CINT=model_Cint_Coef, MOD=modTI_Coeff, and CLUS=clusTI_Coeff). Possible invariance constraints are included in invariantDrift. The number of moderators simultaneously analyzed are included in `n.moderators`. The most important new results are returned as the list element "summary", which is printed if the summary function is applied to the returned object. The summary list element comprises "estimates" (the aggregated effects), possible randomEffects (not yet fully working), the minus2ll value and its n.parameters, the opt.lag sensu Dormann & Griffen (2015) and the max.effects that occur at the opt.lag, clus.effects and mod.effects, and possible warning messages (message). Plot type is plot.type=c("drift") and model.type="stanct" ("omx" was deprecated).

Examples

```r
## Not run:
# Example 1. Fit a CoTiMA to all primary studies previously fitted one by one
# with the fits assigned to CoTiMAInitFit_6
CoTiMAFullFit_6 <- ctmaFit(ctmaInitFit=CoTiMAInitFit_6)
summary(CoTiMAFullFit_6)
## End(Not run)

## Not run:
# Example 2. Fit a CoTiMA with only 2 cross effects invariant (not the auto
# effects) to all primary studies previously fitted one by one with the fits
# assigned to CoTiMAInitFit_6
CoTiMAInitFit_6$activeDirectory <- "/Users/tmp/" # adapt!
CoTiMAFullInv23Fit_6 <- ctmaFit(ctmaInitFit=CoTiMAInitFit_6,
    invariantDrift=c("V1toV2", "V2toV1"))
summary(CoTiMAFullInv23Fit_6)
## End(Not run)

## Not run:
# Example 3. Fit a moderated CoTiMA
CoTiMAInitFit_6$activeDirectory <- "/Users/tmp/" # adapt!
CoTiMAMod1onFullFit_6 <- ctmaFit(ctmaInitFit=CoTiMAInitFit_6,
    mod.number=1, mod.type="cont",
    mod.names=c("Control"))
summary(CoTiMAMod1onFullFit_6)
## End(Not run)
```
**ctmaFitToPrep**

**Description**

Extracts information from fitted CoTiMA objects to (re-)create list of primary studies originally created with `ctmaPrep`.

**Usage**

```r
cdmaFitToPrep(ctmaFitObject = NULL, reUseEmprawData = FALSE)
```

**Arguments**

- `ctmaFitObject`: CoTiMAFit objects
- `reUseEmprawData`: logical indicating whether data should be transferred (will be re-used in subsequent fit attempts)

**Value**

A list that could be used for fitting new CoTiMA models with `ctmaInit` or `ctmaFit`.

---

**ctmaFitList**

**Description**

Combines CoTiMAFit objects into a list with class CoTiMAFit to inform generic functions what to do.

**Usage**

```r
cdmaFitList(...)
```

**Arguments**

- `...`: any number of CoTiMAFit objects

**Value**

A list that combines all objects supplied and is assigned the class `CoTiMAFit`.

**Examples**

```r
## Not run:
CoTiMAInitFit_3$activeDirectory <- "/Users/tmp/" # adapt!
CoTiMAFullFit_3$activeDirectory <- "/Users/tmp/" # adapt!
plot(ctmaFitList(CoTiMAInitFit_3, CoTiMAFullFit_3),
     timeUnit="Months",
     timeRange=c(1, 144, 1) )
## End(Not run)
```
Examples

cnewStudyList <- ctmaFitToPrep(CoTiMAInitFit_3)

description

Retrieves publication and citation information from google scholar based on the supplied author
names and their google ID (user)

Usage

cmaGetPub(authorList = NULL, flush = FALSE, yearsToExclude = NULL)

Arguments

authorList list of authors and googe scholar addresses
flush if TRUE, the cache will be cleared and the data reloaded from Google.
yearsToExclude the years to be excluded (default = current year)

Value

list with (cumulative) frequencies and (cumulative) citations in google scholar

Note

Set flush=TRUE only if retrieving is necessary (e.g., first retrieval on a day)

Examples

pubList_8 <- ctmaGetPub(authorList = list( c("J; de Jonge",  
"https://scholar.google.de/citations?hl=de&user=0q271ckAAAAJ"),
c("Arnold B.; Bakker", "user=FTL3bwUAAAAJ"),
c("Evangelia; Demerouti", "user=9mj5LvMAAAAJ"),
c("Joachim; Stoebner", "user=T9xdvusAAAAJ"),
c("Claude; Fernet", "user=KwzjP4sAAAAJ"),
c("Frederic; Guay", "user=99vnhX4AAAJ"),
c("Caroline; Senecal", "user=64ArFWQQAAAAJ"),
c("Stéphanie; Austin", "user=PPyT17EAAAAJ"),
flush=FALSE)

summary(pubList_8)
Description

Fits ctsem models to each primary study in the supplied list of primary studies prepared by `ctmaPrep`.

Usage

```r
ctmaInit(
  activateRPB = FALSE,
  activeDirectory = NULL,
  binaries = NULL,
  chains = NULL,
  checkSingleStudyResults = FALSE,
  cint = 0,
  coresToUse = c(2),
  CoTiMAStanctArgs = NULL,
  customPar = FALSE,
  diff = NULL,
  digits = 4,
  doPar = 1,
  drift = NULL,
  experimental = FALSE,
  finishsamples = NULL,
  indVarying = FALSE,
  indVaryingT0 = NULL,
  iter = NULL,
  lambda = NULL,
  loadSingleStudyModelFit = c(),
  manifestMeans = 0,
  manifestVars = NULL,
  n.latent = NULL,
  n.manifest = 0,
  nopriors = FALSE,
  optimize = TRUE,
  posLL = TRUE,
  primaryStudies = NULL,
  priors = FALSE,
  sameInitialTimes = FALSE,
  saveRawData = list(),
  saveSingleStudyModelFit = c(),
  scaleTI = NULL,
  scaleTime = NULL,
  silentOverwrite = FALSE,
  T0means = 0,
  T0var = "auto",
)```
ctmaInit

useSV = FALSE,
verbose = NULL
)

Arguments

activateRPB set to TRUE to receive push messages with 'CoTiMA' notifications on your phone
activeDirectory defines another active directory than the one used in ctmaPrep
binaries which manifest is a binary. Still experimental
chains number of chains to sample, during HMC or post-optimization importance sampling.
checkSingleStudyResults Displays estimates from single study ctsem models and waits for user input to continue. Useful to check estimates before they are saved.
cint default 'auto' (= 0). Are set free if random intercepts model with varying cints is requested (by indvarying='cint')
coresToUse if neg., the value is subtracted from available cores, else value = cores to use
CoTiMAStanctArgs parameters that can be set to improve model fitting of the ctStanFit Function
customPar logical. If set TRUE leverages the first pass using priors and ensure that the drift diagonal cannot easily go too negative (helps since ctsem > 3.4)
diff labels for diffusion effects. Have to be either of the character strings of the type "diff_eta1" or "diff_eta2_eta1" (= freely estimated) or values (e.g., 0 for effects to be excluded, which is usually not recommended)
digits number of digits used for rounding (in outputs)
doPar parallel and multiple fitting if single studies. A value > 1 will fit each study doPar times in parallel mode during which no output is generated (screen remains silent). Useful to obtain best fit.
drift labels for drift effects. Have to be either of the character strings of the type V1toV2 (= freely estimated) or values (e.g., 0 for effects to be excluded, which is usually not recommended)
experimental set TRUE to try new pairwise N function
finishesamples number of samples to draw (either from hessian based covariance or posterior distribution) for final results computation (default = 1000).
indVarying control for unobserved heterogeneity by having randomly (inter-individually) varying manifest means
indVaryingT0 (default = NULL). Automatically set to TRUE if not set to FALSE if indVarying ist set TRUE. indVaryingT0=TRUE fits the regular random intercept models.
iter number of iteration (default = 1000). Sometimes larger values could be required from Bayesian estimation
lambda R-type matrix with pattern of fixed (=1) or free (any string) loadings.
loadSingleStudyModelFit

manifestMeans

manifestVars

n.latent

n.manifest

nopriors

optimize

posLL

primaryStudies

priors

sameInitialTimes

saveRawData

saveSingleStudyModelFit

scaleTI

scaleTime

silentOverwrite

T0means

T0var

useSV

verbose

Value

ctmaFit returns a list containing some arguments supplied, the fitted models, different elements summarizing the main results, model type, and the type of plot that could be performed with the returned object. The arguments in the returned object are activeDirectory, coresToUse, n.latent, n.manifest, and primaryStudyList. The study count is returned as n.studies, the created matrix of loadings of manifest on latent factors is returned as lambda, and a re-organized list of primary studies with some information omitted is returned as studyList. The fitted models for
each primary study are found in studyFitList, which is a large list with many elements (e.g.,
the ctsem model specified by CoTiMA, the rstan model created by ctsem, the fitted rstan model
etc.). Further results returned are emprawList (containing the pseudo raw data created), statisticsList (comprising basic stats such as average sample size, no. of measurement points, etc.), a list with modelResults (i.e., DRIFT=model_Drift_Coef, DIFFUSION=model_Diffusion_Coef, T0VAR=model_T0var_Coef, CINT=model_Cint_Coef), and the parameter names internally used. The summary list, which is printed if the summary function is applied to the returned object, comprises "estimates" (the aggregated effects), possible randomEffects (not yet fully working), confidenceIntervals, the minus2ll value and its n.parameters, and possible warning messages (message). Plot type is plot.type=c("drift") and model.type="stanct" ("omx" was deprecated).

Examples

# Fit a ctsem model to all three primary studies summarized in
# CoTiMAstudyList_3 and save the three fitted models
## Not run:
CoTiMAInitFit_3 <- ctmaInit(primaryStudies=CoTiMAstudyList_3,
n.latent=2,
checkSingleStudyResults=FALSE,
activeDirectory="/Users/tmp") # adapt!

summary(CoTiMAInitFit_3)

## End(Not run)

---

cdmaLabels

**ctmaLabels**

*Description*

used for consistent labeling of names and parameters

**Usage**

cdmaLabels(
  n.latent = NULL,
  n.manifest = 0,
  lambda = NULL,
  manifestVars = NULL,
  drift = NULL,
  diff = NULL,
  invariantDrift = NULL,
  moderatedDrift = NULL,
  equalDrift = NULL,
  T0means = 0,
  manifestMeans = 0
)

---

ctmaLabels

cdmaLabels
Arguments

- **n.latent**: n.latent
- **n.manifest**: n.manifest
- **lambda**: lambda
- **manifestVars**: manifestVar
- **drift**: drift
- **diff**: diffusion
- **invariantDrift**: invariantDrift
- **moderatedDrift**: moderatedDrift
- **equalDrift**: equalDrift
- **T0means**: T0means
- **manifestMeans**: manifestMeans

Value

Returns consistently named parameters (e.g., "V1toV2") as well as their symbolic values, which are used to fix or free parameters when fitting a ‘CoTiMA’ model

Description

Transforms estimates obtained with `ctmaFit` into LCS (latent change score) terminology. LCS models can be estimated with CT CLPM, but results have to be transformed. When time intervals vary much between and within persons, LCS models are virtually impossible to fit. However, CT CLPM models can be fitted, and the results - after transformation - show what LCS estimates would have been (cf Voelke & Oud, 2015; their terminology to label LCS effects is used in the output created by `ctmaLCS`)

Usage

```r
ctmaLCS(
  CoTiMAFit = NULL,
  undoTimeScaling = TRUE,
  digits = 4,
  activateRPB = FALSE
)
```
ctmaOptimizeFit

Arguments

CoTiMAFit | Fitted CoTiMA object.
undoTimeScaling | Whether (TRUE) or not (FALSE) LCS results should be provided ignoring the scaleTime argument used in ctmaFit.
digits | Number of digits used for rounding (in outputs)
activateRPB | set to TRUE to receive push messages with 'CoTiMA' notifications on your phone

Value

Returns LCS effects derived from CT CoTiMA CLPM estimates.

Examples

## Not run:
LCSresults <- ctmaLCS(CoTiMAFullFit_6)
## End(Not run)

description

Replaces deprecated ctmaOptimizeInit, which was limited to initial fitting (i.e., applies ctmaInit) of a primary study reFits times to capitalize on chance for obtaining a hard-to-find optimal fit. Now, optimizing a CoTiMA model generated with ctmaFit can also be done. Using ctmaOptimizeFit could be helpful if a model yields out-of-range estimates, which could happen if the fitting algorithm unfortunately used random start values that resulted in a locally but not globally optimal fit. Essentially, using ctmaOptimizeFit is like gambling, hoping that at least one set of starting values (the number it tries is specified in the reFits argument) enables finding the global optimal fit. On unix-like machines (e.g. MacOS), this could be done in parallel mode if coresToUse > 1.

Usage

cdmaOptimizeFit(
    activateRPB = FALSE,
    activeDirectory = NULL,
    checkSingleStudyResults = FALSE,
    coresToUse = c(2),
    CoTiMAStanctArgs = NULL,
    ctmaFitFit = NULL,
    ctmaInitFit = NULL,
    customPar = FALSE,
finishsamples = NULL,
indVarying = FALSE,
lambda = NULL,
manifestMeans = 0,
manifestVars = NULL,
n.latent = NULL,
posLL = TRUE,
primaryStudies = NULL,
problemStudy = NULL,
randomPar = FALSE,
randomScaleTime = c(1, 1),
reFits = NULL,
scaleMod = NULL,
scaleTime = NULL,
T0means = 0,
transfMod = NULL
)

Arguments

activateRPB set to TRUE to receive push messages with 'CoTiMA' notifications on your phone
activeDirectory
activeDirectory
checkSingleStudyResults displays estimates from single study 'ctsem' models and waits for user input to continue.
coresToUse if neg., the value is subtracted from available cores, else value = cores to use
CoTiMAStanctArgs parameters that can be set to improve model fitting of the ctStanFit Function
cdmaFitFit a object fitted with ctmaFit
cdmaInitFit the ctmaInitFit object that was used to create the ctmaFitFit object with ctmaFit
customPar logical. If set TRUE (default) leverages the first pass using priors and ensure that the drift diagonal cannot easily go too negative (helps since ctsem > 3.4)
finishsamples number of samples to draw (either from hessian based covariance or posterior distribution) for final results computation (default = 1000).
indVarying control for unobserved heterogeneity by having randomly (inter-individually) varying manifest means
lambda R-type matrix with pattern of fixed (=1) or free (any string) loadings.
manifestMeans Default 0 (assuming standardized variables). Can be assigned labels to estimate them freely.
manifestVars define the error variances of the manifests within a single time point using R-type lower triangular matrix with nrow=n.manifest & ncol=n.manifest. Useful to check estimates before they are saved.
n.latent number of latent variables of the model (nast to be specified)!
ctmaOptimizeFit

posLL logical. Allows (default = TRUE) of positive loglik (neg -2ll) values

primaryStudies list of primary study information created with ctmaPrep or ctmaFitToPrep

problemStudy number (position in list) where the problem study in primaryStudies is found

randomPar logical. Overrides arguments used fo customPar and randomly selects customPar either TRUE or FALSE

randomScaleTime lower and upper limit of uniform distribution from which timeScale argument for ctmaInit is uniformly shuffled (integer)

reFits how many reFits should be done

scaleMod scale moderator variables - TRUE (default) recommended for continuous and categorical moderators, to separate withing and between efects

cscaleTime scale time (interval) - sometimes desirable to improve fitting

T0means Default 0 (assuming standardized variables). Can be assigned labels to estimate them freely.

transfMod more general option to change moderator values. A vector as long as number of moderators analyzed (e.g., c("mean(x)", "x - median(x)"))

Value

returns a list with bestFit (= the best fit achieved), all_minus2ll (= all -2ll values for all fitted models), and summary, which is printed if the summary function is applied to the returned object, and which shows the summary information of the ctsem model with the best fit.

Note

All but one of multiple cores are used on unix-type machines for parallel fitting

During fitting, not output is generated. Be patient.

Examples

```r
## Not run:
optimFit313 <- ctmaOptimizeFit(primaryStudies=CoTiMAstudyList_3,
                                 activeDirectory="/Users/tmp/", # adapt!
                                 problemStudy=which(CoTiMAstudyList_3$studyNumbers == 313),
                                 reFits=10,
                                 n.latent=2)

summary(optimFit313)

## End(Not run)
```
**ctmaOptimizeInit**

**Description**

Initial fitting (i.e., applies `ctmaInit`) to a primary study reFit times to capitalize on chance for obtaining a hard-to-find optimal fit. This could be very helpful if a primary yields out-of-range estimates, which could happen if the fitting algorithm unfortunately used random start values that resulted in a locally but not globally optimal fit. Essentially, using `ctmaOptimizeInit` is like gambling, hoping that at least one set of starting values (the number is tries is specified in the `reFits` argument) enables finding the global optimal fit. On unix-like machines (e.g. MacOS), this could be done in parallel mode if `coresToUse > 1`.

**Usage**

```r
ctmaOptimizeInit(
  primaryStudies = NULL,
  activeDirectory = NULL,
  problemStudy = NULL,
  reFits = NULL,
  finishesamples = NULL,
  n.latent = NULL,
  coresToUse = c(1),
  indVarying = FALSE,
  randomScaleTime = c(1, 1),
  activateRPB = FALSE,
  checkSingleStudyResults = FALSE,
  customPar = FALSE,
  T0means = 0,
  manifestMeans = 0,
  manifestVars = NULL,
  CoTiMAStanctArgs = NULL,
  scaleTime = NULL
)
```

**Arguments**

- `primaryStudies`  list of primary study information created with `ctmaPrep` or `ctmaFitToPrep`
- `activeDirectory`  activeDirectory
- `problemStudy`  number (position in list) where the problem study in `primaryStudies` is found
- `reFits`  how many reFits should be done
- `finishesamples`  number of samples to draw (either from hessian based covariance or posterior distribution) for final results computation (default = 1000).
- `n.latent`  number of latent variables of the model (hast to be specified)!
ctmaOptimizeInit

- **coresToUse**: if neg., the value is subtracted from available cores, else value = cores to use
- **indVarying**: control for unobserved heterogeneity by having randomly (inter-individually) varying manifest means
- **randomScaleTime**: lower and upper limit of uniform distribution from which timeScale argument for ctmaInit is uniformly shuffled (integer)
- **activateRPB**: set to TRUE to receive push messages with 'CoTiMA' notifications on your phone
- **checkSingleStudyResults**: displays estimates from single study 'ctsem' models and waits for user input to continue. Useful to check estimates before they are saved.
- **customPar**: logical. If set TRUE (default) leverages the first pass using priors and ensure that the drift diagonal cannot easily go too negative (helps since ctsem > 3.4)
- **T0means**: Default 0 (assuming standardized variables). Can be assigned labels to estimate them freely.
- **manifestMeans**: Default 0 (assuming standardized variables). Can be assigned labels to estimate them freely.
- **manifestVars**: define the error variances of the manifests with a single time point using R-type lower triangular matrix with nrow=n.manifest & ncol=n.manifest.
- **CoTiMAStanctArgs**: parameters that can be set to improve model fitting of the ctStanFit Function
- **scaleTime**: scale time (interval) - sometimes desirable to improve fitting

**Value**

returns a list with bestFit (= the best fit achieved), all_minus2ll (= all -2ll values for all fitted models), and summary, which is printed if the summary function is applied to the returned object, and which shows the summary information of the ctsem model with the best fit.

**Note**

All but one of multiple cores are used on unix-type machines for parallel fitting

During fitting, not output is generated. Be patient.

**Examples**

```r
## Not run:
optimFit313 <- ctmaOptimizeInit(primaryStudies=CoTiMAstudyList_3,
                                 activeDirectory="/Users/tmp/", # adapt!
                                 problemStudy=which(CoTiMAstudyList_3$studyNumbers == 313),
                                 n.latent=2)

summary(optimFit313)

## End(Not run)
```
Description

Forest plot, funnel plots, plots of discrete time cross-lagged and autoregressive effect, and plots of required sample sizes

Usage

```r
cdmaPlot(
  ctmaFitObject = NULL,
  activeDirectory = NULL,
  saveFilePrefix = "ctmaPlot",
  activateRPB = FALSE,
  plotCrossEffects = TRUE,
  plotAutoEffects = TRUE,
  timeUnit = "timeUnit (not specified)",
  timeRange = c(),
  yLimitsForEffects = c(),
  mod.number = 1,
  mod.values = -2:2,
  aggregateLabel = "",
  xLabels = NULL,
  undoTimeScaling = TRUE,
  ...
)
```

Arguments

- `ctmaFitObject` : 'CoTiMA' Fit object
- `activeDirectory` : defines another active directory than the one used in ctmaInitFit
- `saveFilePrefix` : Prefix used for saved plots
- `activateRPB` : set to TRUE to receive push messages with 'CoTiMA' notifications on your phone
- `plotCrossEffects` : logical
- `plotAutoEffects` : logical
- `timeUnit` : label for x-axis when plotting discrete time plots
- `timeRange` : vector describing the time range for x-axis as sequence from/to/stepSize (e.g., c(1, 144, 1))
- `yLimitsForEffects` : range for y-axis
ctmaPlotCtsemMod

mod.number  moderator number that should be used for plots
mod.values  moderator values that should be used for plots
aggregateLabel  label to indicate aggregated discrete time effects
xLabels  lables used for x-axis
undoTimeScaling  if TRUE, the original time scale is used (timeScale argument possibly used in ctmaInit is undone )
...  arguments passed through to plot()

Value

depending on the CoTiMA fit object supplied, generates funnel plots, forest plots, discrete time plots of autoregressive and cross-lagged effects, plots of required samples sizes across a range of discrete time intervals to achieve desired levels of statistical power, and post hoc power of primary studies. Plots are saved to disk.

Examples

## Not run:
# cannot run without proper activeDirectory specified. Adapt!
CoTiMAFullFit_3$activeDirectory <- "/Users/tmp/" # adapt!
plot(ctmaFitList(CoTiMAInitFit_3, CoTiMAFullFit_3),
     timeUnit="Months", timeRange=c(1, 144, 1),
     plotAutoEffects=FALSE)

## End(Not run)

## Not run:
# cannot run without proper activeDirectory specified. Adapt!
CoTiMABiG_D_BO$activeDirectory <- "/Users/tmp/" # adapt!
plot(CoTiMABiG_D_BO)

## End(Not run)


description
Plots moderator models using ctsm fit objects

Usage

ctmaPlotCtsemMod(
ctStanFitObject = NULL,
fitSummary = NULL,
activeDirectory = NULL,
Tipred.pos = 1,
saveFilePrefix = "Moderator Plot",
scaleTime = 1,
mod.sd.to.plot = -1:1,
timeUnit = "not specified",
timeRange = NULL,
mod.type = "cont",
no.mod.cats = NULL,
n.x.labels = NULL,
plot.xMin = 0,
plot.xMax = NULL,
plot.yMin = -1,
plot.yMax = 1,
plot.type = "l",
plot.lty = 1,
plot.col = "grey",
plot.lwd = 1.5,
dot.plot.type = "b",
dot.plot.col = "black",
dot.plot.lwd = 0.5,
dot.plot.lty = 3,
dot.plot.pch = 16,
dot.plot.cex = 3
)

Arguments

ctStanFitObject The fit object with moderator (Tipred) effects to be plotted
fitSummary Mainlor debugging purpose. Saves computation time if provided in addition to the fit object
activeDirectory defines the active directory (where to save plots)
Tipred.pos the Tipred that represent the moderator. Could be more than one in case of categorical moderators (e.g., Tipred.pos = c(3,4))
saveFilePrefix Prefix used for saved plots
scaleTime factor to increase or decrease the time scale (e.g., 1/12 if estimates where based on yearly intervals and figure should show monthly intervals)
mod.sd.to.plot The standard deviation values (default -1, 0, +1) for which the drift effects are plotted
timeUnit Label for the x-axis
timeRange time range across which drift effects are plotted
mod.type Could be either "cont" or "cat"
no.mod.cats Need to be specified if type = "cat". The number of categories should usually be equal the number of dummy variables used to represent the categorical moderator + 1.
n.x.labels        How many values to be used for indicating time points on the x-axis (0 is automatically added and should not be counted)
plot.xMin          default = 0
plot.xMax          default = NULL
plot.yMin          default = -1
plot.yMax          default = 1
plot.type          default = "l", # 2 dots .. are correct
plot.lty           default = 1
plot.col           default = "grey"
plot.lwd           default = 1.5
dot.plot.type      default = "b" for the dots indicating the moderator values
dot.plot.col       default = "black" for the dots indicating the moderator values
dot.plot.lwd       default = .5 for the dots indicating the moderator values
dot.plot.lty       default = 3 for the dots indicating the moderator values
dot.plot.pch       default = 16 for the dots indicating the moderator values
dot.plot.cex       default = 3 for the dots indicating the moderator values

Value

writes png figures to disc using the path specified in the activeDirectory arguments.

Examples

# Plot a categorical moderator
## Not run:
ctmaPlotCtsemMod(ctStanFitObject = ctsemFit,
activeDirectory=NULL,
mod.sd.to.plot = NULL,
timeUnit = "Months",
timeRange = c(0, 12, .1),
mod.type = "cat",
no.mod.cats = NULL

## End(Not run)
Usage

cmmaPower(
    ctmaInitFit = NULL,
    activeDirectory = NULL,
    statisticalPower = c(),
    failSafeN = NULL,
    failSafeP = NULL,
    timeRange = NULL,
    useMBESS = FALSE,
    coresToUse = 1,
    digits = 4,
    indVarying = FALSE,
    activateRPB = FALSE,
    silentOverwrite = FALSE,
    loadAllInvFit = c(),
    saveAllInvFit = c(),
    loadAllInvWOSingFit = c(),
    saveAllInvWOSingFit = c(),
    skipScaling = TRUE,
    useSampleFraction = NULL,
    optimize = TRUE,
    nopriors = TRUE,
    finishsamples = NULL,
    iter = NULL,
    chains = NULL,
    verbose = NULL,
    customPar = FALSE,
    scaleTime = NULL
)

Arguments

cmmaInitFit          object to which all single 'ctsem' fits of primary studies has been assigned to
                    (i.e., what has been returned by cmmaInit)
activeDirectory      defines another active directory than the one used in cmmaInit
statisticalPower     vector of requested statistical power values
failSafeN            sample size used to determine across which time intervals effects become non-
                    significant
failSafeP            p-value used to determine across which time intervals effects become non-significant
timeRange            vector describing the time range for x-axis as sequence from/to/stepSize (e.g.,
                    c(1, 144, 1))
useMBESS             use 'MBESS' package to calculate statistical power (slower)
coresToUse           if negative, the value is subtracted from available cores, else value = cores to use
digits               number of digits used for rounding (in outputs)
indVarying: Allows continuous time intercepts to vary at the individual level (random effects model, accounts for unobserved heterogeneity).
activateRPB: set to TRUE to receive push messages with 'CoTiMA' notifications on your phone.
silentOverwrite: overwrite old files without asking.
loadAllInvFit: load the fit of fully constrained 'CoTiMA' model.
saveAllInvFit: save the fit of fully constrained 'CoTiMA' model.
loadAllInvWOSingFit: load series of fits of fully constrained 'CoTiMA' model with single cross effects excluded, respectively.
saveAllInvWOSingFit: save series of fits of fully constrained 'CoTiMA' model with single cross effects excluded, respectively.
skipScaling: does not (re-)scale raw data (re-scaling of imported pseudo raw data achieves correlations = 1).
useSampleFraction: to speed up debugging. Provided as fraction (e.g., 1/10).
optimize: if set to FALSE, Stan's Hamiltonian Monte Carlo sampler is used (default = TRUE = maximum a posteriori / importance sampling).
nopriors: if TRUE, any priors are disabled – sometimes desirable for optimization.
finishesamples: number of samples to draw (either from hessian based covariance or posterior distribution) for final results computation (default = 1000).
iter: number of iterations (default = 1000). Sometimes larger values could be required from Bayesian estimation.
chains: number of chains to sample, during HMC or post-optimization importance sampling.
verbose: integer from 0 to 2. Higher values print more information during model fit – for debugging.
customPar: logical. If set TRUE (default) leverages the first pass using priors and ensure that the drift diagonal cannot easily go too negative (helps since ctsem > 3.4).
scaleTime: scale time (interval) - sometimes desirable to improve fitting.

Value:

cmaPower returns a list containing some arguments supplied, a fitted model with all (!) parameters invariant across primary studies, different elements summarizing the main results, model type, and the type of plot that could be performed with the returned object. The arguments in the returned object are activeDirectory, coresToUse, n.latent, n.manifest, and primaryStudyList. A further result returned is n.studies = 1 (required for proper plotting). Further arguments, which are just copied from the init-fit object supplied, are, n.latent, studyList, and the statisticsList. The fitted model is found in studyFitList, which is a large list with many elements (e.g., the ctsem model specified by CoTiMA, the rstan model created by ctsem, the fitted rstan model etc.). Further results returned are a list with modelResults (i.e., DRIFT=DRIFT, DIFFUSION=DIFFUSION, T0VAR=T0VAR,
CINT=NULL) and the parameter names internally used. The summary list, which is printed if the summary function is applied to the returned object, contains "estimates", which is itself a list comprising "Estimates of Model with all Effects Invariant", "Requested Statistical Power" (which just returns the argument statisticalPower), "Power (post hoc) for Drift Effects", "Required Sample Sizes" "Effect Sizes (based on discrete-time calcs; used for power calcs.)", and "Range of significant effects" (across which intervals effects were significant). Plot type is plot.type=c("power") and model.type="stanct" ("omx" was deprecated).

Examples

## Not run:
CoTiMAInitFit_D_BO$activeDirectory <- "/Users/tmp/" # adapt!
CoTiMAPower_D_BO <- ctmaPower(ctmaInitFit=CoTiMAInitFit_D_BO,
                          statisticalPower = c(.50, .80, .95),
                          finishsamples = 10000)
summary(CoTiMAPower_D_BO)
## End(Not run)

description

Converts empirical correlation matrices to pseudo raw data (i.e. random data, that perfectly reproduce the correlations)

Usage

chmaPRaw(
  empCovMat = NULL,
  empNMat = matrix(0, 0, 0),
  empN = NULL,
  studyNumber = NULL,
  empMeanVector = NULL,
  empVarVector = NULL,
  activateRPB = FALSE,
  experimental = FALSE
)

Arguments

empCovMat empirical primary study covariance matrix
empNMat matrix of (possibly pairwise) N
empN N (in case of listwise N)
studyNumber internal number
Description

Combines information of primary studies into a list object and returns this list. This list is then used as input to fit 'ctsem' models. Primary study information is expected to be assigned to 'numbered' objects. Some of these objects are pre-defined (e.g., 'empcov', 'ageM'). Most of the pre-defined objects could be empty, or they could be dropped by entering their names in the excludedElements-object (e.g., excludedElements = c('ageM')), but dropping them is not really necessary. Additional elements could also be added, which could be useful to put together all information about primary studies at the convenience of the researcher.

Usage

cmaPrep(
  selectedStudies = NULL,
  excludedElements = NULL,
  addElements = NULL,
  digits = 4,
  moderatorLabels = NULL,
  moderatorValues = NULL,
  summary = TRUE,
  activeDirectory = NULL
)

Arguments

selectedStudies

Vector of primary study numbers (numeric values with no leading 0; e.g., '2' but not '02')

excludedElements

Vector of predefined objects used to code primary study information. Some predefined objects are strongly defined; they have to be used in a special way because they are actually used in subsequent analyses. Some other objects could be used at the researcher’s convenience (information is just collected). Strongly predefined objects are 'delta_t' (vector of time intervals; the only mandatory requirement; should be of the type c(NA, NA) in cases when raw data are provided), 'sampleSize' (single number), 'pairwiseN' (matrix of pairwise N; could be used if correlation matrix is based on pairwise N), 'empcov' (correlation matrix), 'moderator' (vector of numbers; could be continuous or categorical),
'startValues' (vector of start values), 'rawData' (information about file name and structure of raw data), 'empMeans' (means for variables; usually 0), and 'empVars' (variances for variables; usually 1). Weakly predefined objects are 'studyNumber' (intended as a special number used for the outputs of subsequently fitted CoTiMA models), 'source' (intended as vector of authors’ names and publication year), 'ageM' (intended as value indicating the mean age of participants in a primary study), 'malePercent' (intended as value indicating the percentage of male participants in a primary study), 'occupation' (intended as vector of character strings representing the occupations of participants in a primary study), 'country' (intended as single character string representing the country in which a primary study was conducted), 'alphas' (intended as vector of Cronbach’s alphas of the variables of a primary study; not yet functional), and 'targetVariables' (intended as vector of character strings representing information about the variables used).

addElements User-added objects that are handled as the weakly predefined objects. The major purpose is to collect information a researcher regards as important.
digits Rounding used for summary function
moderatorLabels character vector of names
moderatorValues list of character vectors
summary if TRUE (default) creates summary table and xlsx sheets. Could be set to FALSE in case of errors.
activeDirectory Mandatory. If subsequent fitting is done using different folders or on different computers, it can be changed so that raw data files can be loaded.

Value

List of primary studies and parameters for the following CoTiMA (plus StudyInformation which could be saved to Excel)

Note

The following example shows information a researcher has about three studies, which have the numbers '2', '4' and '17'. All information about these studies are stored in objects ending with '2', '4', and '17', respectively. In most instances, one relevant piece of information is the empirical correlation (or covariance) matrix reported in this study, which is stored in the objects 'empcov2', 'empcov4', and 'empcov17'. Note that full and symmetric matrices are required for ctmaPrep. Usually, sample sizes ('sampleSize2', 'sampleSize4', & 'sampleSize17') and time lags ('delta_t2', 'delta_t4', & 'delta_t17'), are required, too.

Examples

# First Study
empcov2 <- matrix(c(1.00, 0.45, 0.57, 0.18,
                      0.45, 1.00, 0.31, 0.66,
                      0.57, 0.31, 1.00, 0.40,
                      0.18, 0.66, 0.40, 1.00),
                     nrow = 4, byrow = TRUE)

...
```r
0.18, 0.66, 0.40, 1.00), nrow=4, ncol=4)
delta_t2 <- 12
sampleSize2 <- 148
moderator2 <- c(1, 0.72)
& Bakker, A, B", "Study1", "2003")
addedByResearcher2 <- "something you want to add"

# Second Study
empcov3 <- matrix(c(1.00, 0.43, 0.71, 0.37, 
0.43, 1.00, 0.34, 0.69, 
0.71, 0.34, 1.00, 0.50, 
0.37, 0.69, 0.50, 1.00), nrow=4, ncol=4)
delta_t3 <- 12
sampleSize3 <- 88
moderator3 <- c(1, 0.72)
& Bakker, A, B", "Study2", "2003")
addedByResearcher3 <- ""

# Third Study
empcov313 <- matrix(c(1.00, 0.38, 0.54, 0.34, 0.60, 0.28, 
0.38, 1.00, 0.34, 0.68, 0.28, 0.68, 
0.54, 0.34, 1.00, 0.47, 0.66, 0.39, 
0.34, 0.68, 0.47, 1.00, 0.38, 0.72, 
0.60, 0.28, 0.66, 0.38, 1.00, 0.38, 
0.28, 0.68, 0.39, 0.72, 0.38, 1.00), nrow=6, ncol=6)
delta_t313 <- c(1.5, 1.5)
sampleSize313 <- 335
moderator313 <- c(0.8, 2.47)
source313 <- c("Demerouti", "Bakker", & Bulters", "2004")
addedByResearcher313 <- "check correlation matrix"

# Add Labels and Values for Moderators (just for optional excel tables)
moderatorLabels <- c("Control", "Social Support")
moderatorValues <- list("continuous", c("1 = very low", "2 = low", 
"3 = medium", "4 = high", "5 = very high"))

CoTiMAstudyList_3 <- ctmaPrep(selectedStudies = c(2, 3, 313),
activeDirectory="/user/",
excludedElements = "ageM",
addedElements = "addedByResearcher",
moderatorLabels=moderatorLabels,
moderatorValues=moderatorValues)
```
Description

Compute publication and citation scores for studies based on the (team of) authors’ publication scores.

Usage

cdmaPub(
  getPubObj = NULL,
  primaryStudyList = NULL,
  yearsToExclude = 0,
  recency = 5,
  targetYear = NULL,
  indFUN = "sum",
  colFUN = "mean",
  addAsMod = FALSE
)

Arguments

getPubObj publication information compiled with cdmaGetPub
primaryStudyList vector with numbers of studies (e.g., c(1,3); requires source1 and source3 to be available)
yearsToExclude years to exclude from publications
recency years before targetYear that are considered for recency analysis
targetYear year (default = last year) after which publications are ignored
indFUN function (default = sum) how publications of each author within a collective (team) are summarized
colFUN function (default = mean) how publications all authors of collective (team) are summarized
addAsMod currently disabled. Add to existing moderator objects (or create them) in primaryStudyList, which is part of the returned object

Value

returns NEPP (= the "number" of studies published by the authors of the primary studies supplied UNTIL the year when the primary study was published), NEPPRecency (like NEPP, but limited to the number of years before the publication as specified with the recency argument), "Meaning of NEPP" and "Meaning of NEPPRecency" which explain what "number" exactly means (e.g., could be the mean of the sum of each author's publication, or the sum of the maximum publications per year of the authors), and "primaryStudyList(full)", which just returns the primaryStudyList supplied.

Examples

pubResults_6 <- cdmaPub(getPubObj=pubList_8,
### ctmaRedHet

*primaryStudyList=CoTiMAstudyList_6*)

*summary(pubResults_6)*

---

<table>
<thead>
<tr>
<th>ctmaRedHet</th>
<th>ctmaRedHet</th>
</tr>
</thead>
</table>

#### Description

Computes the Reduction in Heterogeneity in drift effects after introducing study-level moderators.

#### Usage

```r
cdmaRedHet(
  activateRPB = FALSE,
  activeDirectory = NULL,
  ctmaFitObject = NULL,
  ctmaFitObjectMod = NULL,
  digits = 4,
  dt = NULL,
  undoTimeScaling = TRUE
)
```

#### Arguments

- **activateRPB**: if TRUE, messages (warning, finished) could be send to smart phone (default = FALSE).
- **activeDirectory**: the directory where to save results (if not specified, it is taken from ctmaInitFit).
- **ctmaFitObject**: ctmaFit Object WITHOUT Moderators (obtained from `ctmaFit` with the arguments invariantDrift=’none’ and scaleTI=FALSE).
- **ctmaFitObjectMod**: ctmaFit Object WITH Moderators (obtained from `ctmaFit` with the arguments invariantDrift=’none’ and scaleTI=FALSE).
- **digits**: rounding (default = 4).
- **dt**: A scalar indicating a time interval across which discrete time effects should be estimated and then used for ctmaBiG.
- **undoTimeScaling**: if TRUE, the original time scale is used (timeScale argument possibly used in `ctmaInit` is undone).
Description

Internal function to save files

Usage

cdmaSaveFile(
  activateRPB,
  activeDirectory = activeDirectory,
  SaveObject,
  FileName,
  Directory,
  silentOverwrite = FALSE
)

Arguments

activateRPB set TRUE to receive push messages with 'CoTiMA' notifications on your phone
activeDirectory directory name
SaveObject object to save
FileName filename
Directory directory to save file in
silentOverwrite override old files without asking

Value

No return value. Just saves files

description

This function recales inits for drifts and sets all other inits to 0 (because it is too complicated
to re-scale inits for diffusions). It uses the internal trasformations of cStanFit (i.e., tforms) to
transform the raw estimates, then re-scale them, and finally use the inverse of tfrom to supplie raw
estimates as inits.
**ctmaScaleInits**

```r
ctmaScaleInits(
    CoTiMAFit = NULL,
    ctsemFit = NULL,
    newTimeScale = NULL,
    autoRefit = FALSE
)
```

**Arguments**

- `CoTiMAFit`: Fit object created with `ctmaFit`
- `ctsemFit`: Fit object created with `ctStanFit`
- `newTimeScale`: New Time scale `ctStanFit`
- `autoRefit`: Whether to automatically refit the original model using the new inits

---

**ctmaShapeRawData**

```r
cDMAShapeRawData(
    dataFrame = NULL,
    id = NULL,
    inputDataFrameFormat = NULL,
    inputTimeFormat = "time",
    missingValues = NA,
    n.manifest = NULL,
    manifest.per.latent = NULL,
    Tpoints = NULL,
    allInputVariablesNames = NULL,
    orderInputVariablesNames = NULL,
    targetInputVariablesNames = NULL,
    targetInputTDPredNames = NULL,
    targetInputTIpredNames = NULL,
    targetTimeVariablesNames = NULL,
    outputDataFrameFormat = "long",
    outputVariablesNames = "Y",
    outputTDPredNames = NULL,
    outputTIpredNames = NULL,
    outputTimeVariablesNames = "time",
    outputTimeFormat = "time",
    scaleTime = 1,
)```

**Description**

Raw data objects are re-shaped (dealing with missing time points, wrong time intervals etc)
minInterval = 1e-04,
minTolDelta = NULL,
maxTolDelta = NULL,
negTolDelta = FALSE,
min.val.n.Vars = 1,
min.val.Tpoints = 1,
standardization = "none",
keepTimePoints = FALSE,
experimental = FALSE
)

Arguments

dataFrame an R object containing data
id the identifier of subjects if data are in long format
inputDataFrameFormat "wide" or "long"
inputTimeFormat "time" (default) or "delta"
missingValues Missing value indicator, e.g., -999 or NA (default)
n.manifest Number of process variables (e.g, 2 in a bivariate model)
manifest.per.latent n.manifest per latent factor. Frequently 1 manifest per latent, but e.g. c(2,3,1) also possible for 6 manifest loading on 3 latents
Tpoints Number of time points in the data frame
allInputVariablesNames vector of all process variable names, time dependent predictor names, time independent predictor names, and names of times/deltas. Only required if the dataFrame does not have column names.
orderInputVariablesNames = "names" vs "time" (e.g., names: X1, X2, X3, Y1, Y2, X3 vs time: X1, Y1, X2, Y2, ... ). For ctsem/CoTiMA, the output file will order by time.
targetInputVariablesNames = the process variables in the dataFrame that should be used (in "names" or in "times" order; e.g., c("X1", "X3", "Y1", "X3")). This is used to delete variables from the data frame that are not required.
targetInputTDpredNames The actual time dependent (TD) predictor variable names, e.g, 3, or 6, or 9, ... names if Tpoints = 3. Internally, each of the 3, 6, etc represents one TDpred. One typically does NOT have TD predictors in a CoTiMA.
targetInputTIpredNames time independent (TI) predictor names names in the dataFrame. One typically does NOT have TI predictors in CoTiMA except it uses raw data only, where TIpreds are available for individual cases.
targetTimeVariablesNames The time variables names in the dataFrame. They also define which Tpoints will be included in the output file, e.g., c("Time4", "Time9").
outputDataFrameFormat
"long" (default) or "wide"

outputVariablesNames
"Y" (default; creates Y1_T0, Y2_T0, Y1_T1, Y2_T1, etc.), but can also be, e.g.,
c("X", "Y"; creates X_T0, Y_T0, X_T1, Y_T1, etc.).

outputTDpredNames
Will become "TD" if not specified

outputTIpredNames
Will become "TI" if not specified

outputTimeVariablesNames
"time" (default)

outputTimeFormat
"time" (default) or "delta"

scaleTime
A scalar that is used to multiply the time variable. Typical use is rescaling
primary study time to the time scale use in other primary studies. For example,
scaleTime=1/(60 x 60 x 24 x 365.25) rescales time provided in seconds (frequent
case when imported from SPSS) into years (60sec x 60min x 24hrs x 365.25days
incl. leap years).

minInterval
A parameter (default = 0.0001) supplied to ctIntervalise. Set to smaller values
than any possible observed measurement interval, but larger than 0.0001. The
value is used for indicating unavailable time interval information (caused by
missing values) because NA is technically not possible for time intervals.

minTolDelta
Set, e.g. to 1/24, to delete variables from time points that are too close (e.g.,
1hr; or even before) after another time point. Could be useful to delete values
generated by unreliable responding, e.g., in diary studies. Note that minTolDelta
applies to the time intervals AFTER the scaleTime argument has applied (i.e.,
scaleTime may need adaptation for each primary study, but minTolDelta does
not).

maxTolDelta
Set, e.g., to 7, to delete variables from time points that are too far after another
time point (e.g., 7 days, if all participants should have responded within a week).
Note that maxTolDelta applies to the time intervals AFTER the scaleTime argu-
ment has applied (i.e., scaleTime may need adaptation for each primary study,
but minTolDelta does not).

negTolDelta
FALSE (default) or TRUE. Delete entire cases that have at least one negative
delta ('unreliable responding'; use minTolDelta to delete certain variables only)

min.val.n.Vars
min.val.n.Vars = Minimum no. of valid variables. Default = 1 (retains cases
with only 1 valid variable), 0 would retain cases will all variables missing (not
very useful). Retaining participants who provide a single valid variable is tech-
nically possible, but these participants contribute to the estimation of the vari-
ance/mean of this variable only. Since variance/mean are 1/0 in most CoTiMA
applications, this is not very informative but at the cost of additional computa-
tional burden. Setting min.val.n.Vars = 2 is recommended.

min.val.Tpoints
Minimum no. of valid Tpoints (i.e. Tpoints where min.val.n.Vars is met). De-
fault = 1 retains participants with full set of valid variables at least at one single
Tpoint (which will become T0). Setting min.val.Tpoints = 2 or higher values retains participants which provide longitudinal information. Since T0 covariances are usually not too interesting, min.val.Tpoints = 2 may be more reasonable then the default = 1.

standardization

the way to standardize possible raw ("none", "withinTimeA", "withinTimeB", "withinColumn", "withinPerson", or "overall"). Only applies if the list for specifying raw data information contains the list element 'standardize=TRUE'. 'WithinTimeA' standardizes within time points and deletes cases with missing T0 data. 'WithinTimeB' does not delete cases, and in subsequent ctsem or CoTiMA applications the user is advised to use the argument 'sameInitialTimes=TRUE'.

keepTimePoints Do not fill any gaps in the data (no left shift).

experimental FALSE (default) or TRUE. Deprecated.

Value

A reshaped raw data file

Examples

## Not run:
tmpData <- data.frame(matrix(c(1, 2, 1, 2, 1, 2, 11, 26, 1,
                              NA, NA, 3, NA, 3, NA, 12, 27, 1,
                              1, 2, 1, 2, 1, 2, NA, 24, 0 ),
nrow=3, byrow=TRUE))
colnames(tmpData) <- c("first_T0", "second_T0", "first_T1", "second_T1",
                      "TD1_0", "TD1_1",
                      "time1", "time2", "sex")
shapedData <- ctmaShapeRawData(dataFrame=tmpData,
                                inputDataFrameFormat="wide",
                                inputTimeFormat="time",
                                n.manifest=2,
                                Tpoints=2,
                                orderInputVariablesNames="time",
                                targetInputVariablesNames=c("first_T0", "second_T0",
                                                            "first_T1", "second_T1"),
                                targetInputTDpredNames=c("TD1_0", "TD1_1"),
                                targetInputTIpredNames="sex",
                                targetTimeVariablesNames=c("time1", "time2"),
                                scaleTime=1/12,
                                maxTolDelta=1.2)

head(shapedData)

## End(Not run)
ctmaStanResample

Description

re-sample from a fitted stanct model to achieve desired number of finishsamples (could be useful to prevent exhausted memory)

Usage

cdmaStanResample(ctmaFittedModel = NULL, nsamples = 25, overallSamples = 500)

Arguments

cdmaFittedModel
da 'CoTiMA' fit object, usually with few 'finishsamples' to prevent memory exhaustion

nsamples sample size per run

overallSamples overall samples size to be achieved

Value

returns a CoTiMA fit object with an increased number of finish samples

cdmaStdParams

description

Computes standardized drift effects from a CoTiMA or ctsem fit object. Can only handle CLPM or RI-CLPM fit objects.

Usage

cdmaStdParams(
  fit = NULL,
  times = 1,
  digits = 4,
  standardize = TRUE,
  oneTailed = FALSE
)

Arguments

**fit**  
CoTiMA or ctsem fit object with or without random intercepts

**times**  
scalar (1 by default) or vector of scalars defining the discrete time lags for which standardized drift effects are computed.

**digits**  
rounding (4 by default)

**standardize**  
logical. TRUE (default) or FALSE (does not standardize and just computes discrete time effects)

**oneTailed**  
logical. FALSE (default) or TRUE. If TRUE, one-tailed CIs will be reported

Value

cmaStdParams returns a list of standardized discrete time drift matrices for different time intervals.

Examples

```r
## Not run:
cmaStdParams(CoTiMAFullFit_3_orig, times=c(.1, 1, 2), digits=6, standardize=TRUE)
## End(Not run)
```

Description

derives start values by average discrete time SEM effects, converting them to continuous time, and inversely apply transformations used by 'ctsem'

Usage

cmamSV(
  ctmaInitFit = NULL,
  activeDirectory = NULL,
  primaryStudies = NULL,
  coresToUse = 1,
  replaceSV = TRUE
)

Arguments

**ctmaInitFit**  
object to which all single 'ctsem' fits of primary studies has been assigned to (i.e., what has been returned by `ctmaInit`)

**activeDirectory**  
defines another active directory than the one used in `ctmaInit`
primaryStudies if ctmaInitFit does not contain the primaryStudies object created with \texttt{ctmaPrep} it could be added

coresToUse if negative, the value is subtracted from available cores, else value = cores to use

replaceSV if TRUE replaces startValues in primaryStudies, else it saves them as list element inits

Value

returns a modified list of primary studies with starting values added or replaced

Examples

```r
## Not run:
newPrimaryStudyList <- ctmaSV(ctmaInitFit=CoTiMAInitFit_6)

## End(Not run)
```

---

**delta_t128**  
*delta_t128 example vector*

Description

delta_t128 example vector

Usage

delta_t128

Format

An object of class \texttt{numeric} of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
delta_t18

Description

delta_t18 example vector

Usage

delta_t18

Format

An object of class numeric of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

-------------

delta_t2

delta_t2 example vector

Description

delta_t2 example vector

Usage

delta_t2

Format

An object of class numeric of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**delta_t201**

**delta_t201 example vector**

**Description**

delta_t201 example vector

**Usage**

delta_t201

**Format**

An object of class **numeric** of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**delta_t3**

**delta_t3 example vector**

**Description**

delta_t3 example vector

**Usage**

delta_t3

**Format**

An object of class **numeric** of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
### delta_t313 example vector

#### Description

delta_t313 example vector

#### Usage

delta_t313

#### Format

An object of class numeric of length 2.

#### Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

### delta_t32 example vector

#### Description

delta_t32 example vector

#### Usage

delta_t32

#### Format

An object of class numeric of length 1.

#### Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
demands128 example vector

Description

demands128 example vector

Usage

demands128

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

demands18 example vector

Description

demands18 example vector

Usage

demands18

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
demands2  demands2 example vector

Description

demands2 example vector

Usage

demands2

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

demands201  demands201 example vector

Description

demands201 example vector

Usage

demands201

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
demands3
demands3 example vector

Description
demands3 example vector

Usage
demands3

Format
An object of class character of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

demands313
demands313 example vector

Description
demands313 example vector

Usage
demands313

Format
An object of class character of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
<table>
<thead>
<tr>
<th>demands32</th>
<th>demands32 example vector</th>
</tr>
</thead>
</table>

**Description**

demands32 example vector

**Usage**

demands32

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

<table>
<thead>
<tr>
<th>dl_link</th>
<th>dl_link example path</th>
</tr>
</thead>
</table>

**Description**

dl_link example path

**Usage**

dl_link

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
empcov128

empcov128 example matrix

Description
empcov128 example matrix

Usage
empcov128

Format
An object of class list of length 2.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

empcov18

empcov18 example matrix

Description
empcov18 example matrix

Usage
empcov18

Format
An object of class matrix (inherits from array) with 4 rows and 4 columns.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
empcov2 example matrix

Description
empcov2 example matrix

Usage
empcov2

Format
An object of class matrix (inherits from array) with 4 rows and 4 columns.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

empcov201 example matrix

Description
empcov201 example matrix

Usage
empcov201

Format
An object of class matrix (inherits from array) with 6 rows and 6 columns.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**empcov3**

**Description**

empcov3 example matrix

**Usage**

empcov3

**Format**

An object of class `matrix` (inherits from `array`) with 4 rows and 4 columns.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**empcov313**

**Description**

empcov313 example matrix

**Usage**

empcov313

**Format**

An object of class `matrix` (inherits from `array`) with 6 rows and 6 columns.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
empcov32  

Description
empcov32 example matrix

Usage
empcov32

Format
An object of class matrix (inherits from array) with 4 rows and 4 columns.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

malePercent128  

Description
malePercent128 example vector

Usage
malePercent128

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**malePercent18**

**Description**

malePercent18 example vector

**Usage**

malePercent18

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**malePercent2**

**Description**

malePercent2 example vector

**Usage**

malePercent2

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**malePercent201**

**example vector**

**Description**

malePercent201 example vector

**Usage**

malePercent201

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**malePercent3**

**example vector**

**Description**

malePercent3 example vector

**Usage**

malePercent3

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
Description
malePercent313 example vector

Usage
malePercent313

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTima@uni-mainz.org>

Description
malePercent32 example vector

Usage
malePercent32

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTima@uni-mainz.org>
Description

moderator128 example vector

Usage

moderator128

Format

An object of class numeric of length 2.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

Description

moderator18 example vector

Usage

moderator18

Format

An object of class numeric of length 2.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
Description
moderator2 example vector

Usage
moderator2

Format
An object of class numeric of length 2.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

Description
moderator201 example vector

Usage
moderator201

Format
An object of class numeric of length 2.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
moderator3  moderator3 example vector

Description
moderator3 example vector

Usage
moderator3

Format
An object of class numeric of length 2.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

moderator313  moderator313 example vector

Description
moderator313 example vector

Usage
moderator313

Format
An object of class numeric of length 2.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**moderator32**

**Description**

moderator32 example vector

**Usage**

moderator32

**Format**

An object of class numeric of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**moderatorLabels**

**Description**

moderatorLabels example vector

**Usage**

moderatorLabels

**Format**

An object of class character of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
moderatorValues example vector

Description
moderatorValues example vector

Usage
moderatorValues

Format
An object of class list of length 2.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

occupation128 example vector

Description
occupation128 example vector

Usage
occupation128

Format
An object of class character of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
occupation18

Description

occupation18 example vector

Usage

occupation18

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

occupation2

Description

occupation2 example vector

Usage

occupation2

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
occupation201  

**Description**

occupation201 example vector

**Usage**

occupation201

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

occupation3  

**Description**

occupation3 example vector

**Usage**

occupation3

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**occupation313**

**Description**

occupation313 example vector

**Usage**

occupation313

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**occupation32**

**Description**

occupation32 example vector

**Usage**

occupation32

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
pairwiseN128  

Description  

pairwiseN128 example vector  

Usage  

pairwiseN128  

Format  

An object of class list of length 2.  

Author(s)  

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>  

plot.CoTiMAFit  

Description  

call ctmaPlot if a CoTiMAFit object is supplied to plot()  

Usage  

## S3 method for class 'CoTiMAFit'
plot(x, ...)  

Arguments  

x  list  

...  further arguments to be passed through to summary()  

Value  

returns a call to `ctmaPlot`, which is used to plot CoTiMA fit objects
**Description**

pubList_8 example list

**Usage**

pubList_8

**Format**

An object of class CoTiMAFit of length 9.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**Description**

rawData128 example list

**Usage**

rawData128

**Format**

An object of class list of length 7.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
recodeVariables128 example vector

Description
recodeVariables128 example vector

Usage
recodeVariables128

Format
An object of class character of length 2.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

results128 example list

Description
results128 example list

Usage
results128

Format
An object of class list of length 2.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**sampleSize128**  

**sampleSize128 example vector**

**Description**  
sampleSize128 example vector

**Usage**  
sampleSize128

**Format**  
An object of class NULL of length 0.

**Author(s)**  
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**sampleSize18**  

**sampleSize18 example vector**

**Description**  
sampleSize18 example vector

**Usage**  
sampleSize18

**Format**  
An object of class numeric of length 1.

**Author(s)**  
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
sampleSize2  

**sampleSize2 example vector**

**Description**

sampleSize2 example vector

**Usage**

sampleSize2

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

sampleSize201  

**sampleSize201 example vector**

**Description**

sampleSize201 example vector

**Usage**

sampleSize201

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
### sampleSize3

**Description**

sampleSize3 example vector

**Usage**

sampleSize3

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

### sampleSize313

**Description**

sampleSize313 example vector

**Usage**

sampleSize313

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
### sampleSize32

**sampleSize32 example vector**

**Description**

sampleSize32 example vector

**Usage**

sampleSize32

**Format**

An object of class `numeric` of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

### source128

**source128 example vector**

**Description**

source128 example vector

**Usage**

source128

**Format**

An object of class `character` of length 4.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
source2  source2 example vector

Description
source2 example vector

Usage
source2

Format
An object of class character of length 6.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

source201  source201 example vector

Description
source201 example vector

Usage
source201

Format
An object of class character of length 6.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
source3

Description

source3 example vector

Usage

source3

Format

An object of class character of length 6.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

source313

Description

source313 example vector

Usage

source313

Format

An object of class character of length 4.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**Description**

defines summary for 'CoTiMA' fit objects

**Usage**

```r
## S3 method for class 'CoTiMAFit'
summary(object, ...)
```

**Arguments**

- `object` one CoTiMAFit object or more as ctmaFitList(object1, object2, ...)
- `...` further arguments to be passed through to summary()

**Value**

returns a printed summary of a 'CoTiMA' fit object

---

**targetVariables128**

**Example vector**

**Description**

targetVariables128 example vector

**Usage**

targetVariables128

**Format**

An object of class `character` of length 7.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
targetVariables2  example vector

Description

targetVariables2 example vector

Usage

targetVariables2

Format

An object of class character of length 4.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

targetVariables3  example vector

Description

targetVariables3 example vector

Usage

targetVariables3

Format

An object of class character of length 4.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**targetVariables313 example vector**

**Description**

`targetVariables313` example vector

**Usage**

`targetVariables313`

**Format**

An object of class `character` of length 6.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**variableNames128 example vector**

**Description**

`variableNames128` example vector

**Usage**

`variableNames128`

**Format**

An object of class `character` of length 9.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
## Index

* **datasets**
  - CoTiMAStanctArgs, 29

* **data**
  - A128, 5
  - A313, 6
  - addedByResearcher2, 6
  - addedByResearcher3, 7
  - addedByResearcher313, 7
  - ageM128, 8
  - ageM18, 8
  - ageM2, 9
  - ageM201, 9
  - ageM3, 10
  - ageM313, 10
  - ageM32, 11
  - ageSD128, 11
  - ageSD18, 12
  - ageSD2, 12
  - ageSD201, 13
  - ageSD3, 13
  - ageSD313, 14
  - ageSD32, 14
  - alphas128, 15
  - alphas313, 15
  - burnout128, 16
  - burnout18, 16
  - burnout2, 17
  - burnout201, 17
  - burnout3, 18
  - burnout313, 18
  - burnout32, 19
  - combineVariables128, 19
  - combineVariablesNames128, 20
  - CoTiMABig_D_BO, 20
  - CoTiMAFullFit_3, 21
  - CoTiMAFullFit_6, 21
  - CoTiMAFullFit_6_new, 22
  - CoTiMAFullInv23Fit_6, 22
  - CoTiMAFullInvEq23Fit_6, 23
  - CoTiMAInitFit_3, 23
  - CoTiMAInitFit_6, 24
  - CoTiMAInitFit_6_new, 24
  - CoTiMAInitFit_6_NUTS, 25
  - CoTiMAInitFit_D_BO, 25
  - CoTiMAMod1onFullFit_6, 26
  - CoTiMAMod1onFullFit_6_cats12, 26
  - CoTiMAMod2on23Fit_6, 27
  - CoTiMAnopticFit313, 27
  - CoTiMAPart134Inv3Fit_6, 28
  - CoTiMAPower_D_BO, 28
  - CoTiMAStanctArgs, 29
  - CoTiMAstudyList_3, 29
  - CoTiMAstudyList_6, 30
  - CoTiMAstudyList_6_new, 30
  - country128, 31
  - country18, 31
  - country2, 32
  - country201, 32
  - country3, 33
  - country313, 33
  - country32, 34
  - delta_t128, 79
  - delta_t18, 80
  - delta_t2, 80
  - delta_t201, 81
  - delta_t3, 81
  - delta_t313, 82
  - delta_t32, 82
  - demands128, 83
  - demands18, 83
  - demands2, 84
  - demands201, 84
  - demands3, 85
  - demands313, 85
  - demands32, 86
  - dl_link, 86
  - empcov128, 87
  - empcov18, 87
<table>
<thead>
<tr>
<th>INDEX</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>empcov2, 88</td>
<td>88</td>
</tr>
<tr>
<td>empcov201, 88</td>
<td>88</td>
</tr>
<tr>
<td>empcov3, 89</td>
<td>89</td>
</tr>
<tr>
<td>empcov313, 89</td>
<td>89</td>
</tr>
<tr>
<td>empcov32, 90</td>
<td>90</td>
</tr>
<tr>
<td>malePercent128, 90</td>
<td>90</td>
</tr>
<tr>
<td>malePercent18, 91</td>
<td>91</td>
</tr>
<tr>
<td>malePercent2, 91</td>
<td>91</td>
</tr>
<tr>
<td>malePercent201, 92</td>
<td>92</td>
</tr>
<tr>
<td>malePercent3, 92</td>
<td>92</td>
</tr>
<tr>
<td>malePercent313, 93</td>
<td>93</td>
</tr>
<tr>
<td>malePercent32, 93</td>
<td>93</td>
</tr>
<tr>
<td>moderator128, 94</td>
<td>94</td>
</tr>
<tr>
<td>moderator18, 94</td>
<td>94</td>
</tr>
<tr>
<td>moderator2, 95</td>
<td>95</td>
</tr>
<tr>
<td>moderator201, 95</td>
<td>95</td>
</tr>
<tr>
<td>moderator3, 96</td>
<td>96</td>
</tr>
<tr>
<td>moderator313, 96</td>
<td>96</td>
</tr>
<tr>
<td>moderator32, 97</td>
<td>97</td>
</tr>
<tr>
<td>moderatorLabels, 97</td>
<td>97</td>
</tr>
<tr>
<td>moderatorValues, 98</td>
<td>98</td>
</tr>
<tr>
<td>occupation128, 98</td>
<td>98</td>
</tr>
<tr>
<td>occupation18, 99</td>
<td>99</td>
</tr>
<tr>
<td>occupation2, 99</td>
<td>99</td>
</tr>
<tr>
<td>occupation201, 100</td>
<td>100</td>
</tr>
<tr>
<td>occupation3, 100</td>
<td>100</td>
</tr>
<tr>
<td>occupation313, 101</td>
<td>101</td>
</tr>
<tr>
<td>occupation32, 101</td>
<td>101</td>
</tr>
<tr>
<td>pairwiseN128, 102</td>
<td>102</td>
</tr>
<tr>
<td>pubList_8, 103</td>
<td>103</td>
</tr>
<tr>
<td>rawData128, 103</td>
<td>103</td>
</tr>
<tr>
<td>recodeVariables128, 104</td>
<td>104</td>
</tr>
<tr>
<td>results128, 104</td>
<td>104</td>
</tr>
<tr>
<td>sampleSize128, 105</td>
<td>105</td>
</tr>
<tr>
<td>sampleSize18, 105</td>
<td>105</td>
</tr>
<tr>
<td>sampleSize2, 106</td>
<td>106</td>
</tr>
<tr>
<td>sampleSize201, 106</td>
<td>106</td>
</tr>
<tr>
<td>sampleSize3, 107</td>
<td>107</td>
</tr>
<tr>
<td>sampleSize313, 107</td>
<td>107</td>
</tr>
<tr>
<td>sampleSize32, 108</td>
<td>108</td>
</tr>
<tr>
<td>source128, 108</td>
<td>108</td>
</tr>
<tr>
<td>source2, 109</td>
<td>109</td>
</tr>
<tr>
<td>source201, 109</td>
<td>109</td>
</tr>
<tr>
<td>source3, 110</td>
<td>110</td>
</tr>
<tr>
<td>source313, 110</td>
<td>110</td>
</tr>
<tr>
<td>targetVariables128, 111</td>
<td>111</td>
</tr>
<tr>
<td>targetVariables2, 112</td>
<td>112</td>
</tr>
<tr>
<td>targetVariables3, 112</td>
<td>112</td>
</tr>
<tr>
<td>targetVariables313, 113</td>
<td>113</td>
</tr>
<tr>
<td>variableNames128, 113</td>
<td>113</td>
</tr>
<tr>
<td>A128, 5</td>
<td></td>
</tr>
<tr>
<td>A313, 6</td>
<td></td>
</tr>
<tr>
<td>addedByResearcher2, 6</td>
<td>6</td>
</tr>
<tr>
<td>addedByResearcher3, 7</td>
<td>7</td>
</tr>
<tr>
<td>addedByResearcher313, 7</td>
<td>7</td>
</tr>
<tr>
<td>ageM128, 8</td>
<td></td>
</tr>
<tr>
<td>ageM18, 8</td>
<td></td>
</tr>
<tr>
<td>ageM2, 9</td>
<td></td>
</tr>
<tr>
<td>ageM201, 9</td>
<td></td>
</tr>
<tr>
<td>ageM3, 10</td>
<td></td>
</tr>
<tr>
<td>ageM313, 10</td>
<td></td>
</tr>
<tr>
<td>ageM32, 11</td>
<td></td>
</tr>
<tr>
<td>ageSD128, 11</td>
<td></td>
</tr>
<tr>
<td>ageSD18, 12</td>
<td></td>
</tr>
<tr>
<td>ageSD2, 12</td>
<td></td>
</tr>
<tr>
<td>ageSD201, 13</td>
<td></td>
</tr>
<tr>
<td>ageSD3, 13</td>
<td></td>
</tr>
<tr>
<td>ageSD313, 14</td>
<td></td>
</tr>
<tr>
<td>ageSD32, 14</td>
<td></td>
</tr>
<tr>
<td>alphas128, 15</td>
<td></td>
</tr>
<tr>
<td>alphas313, 15</td>
<td></td>
</tr>
<tr>
<td>burnout128, 16</td>
<td></td>
</tr>
<tr>
<td>burnout18, 16</td>
<td></td>
</tr>
<tr>
<td>burnout2, 17</td>
<td></td>
</tr>
<tr>
<td>burnout201, 17</td>
<td></td>
</tr>
<tr>
<td>burnout3, 18</td>
<td></td>
</tr>
<tr>
<td>burnout313, 18</td>
<td></td>
</tr>
<tr>
<td>burnout32, 19</td>
<td></td>
</tr>
<tr>
<td>combineVariables128, 19</td>
<td></td>
</tr>
<tr>
<td>combineVariablesNames128, 20</td>
<td></td>
</tr>
<tr>
<td>CoTiMABiG_D_BO, 20</td>
<td></td>
</tr>
<tr>
<td>CoTiMAFullFit_3, 21</td>
<td></td>
</tr>
<tr>
<td>CoTiMAFullFit_6, 21</td>
<td></td>
</tr>
<tr>
<td>CoTiMAFullFit_6_new, 22</td>
<td></td>
</tr>
<tr>
<td>CoTiMAFullInv23Fit_6, 22</td>
<td></td>
</tr>
<tr>
<td>CoTiMAFullInvEq23Fit_6, 23</td>
<td></td>
</tr>
<tr>
<td>CoTiMAMod1onFullFit_6, 26</td>
<td></td>
</tr>
<tr>
<td>CoTiMAMod1onFullFit_6_cats12, 26</td>
<td></td>
</tr>
<tr>
<td>CoTiMAMod2on23Fit_6, 27</td>
<td></td>
</tr>
</tbody>
</table>
CoTiMAoptimFit313, 27
doCoTiMAPart134Inv3Fit_6, 28
doCoTiMAPower_D_BO, 28
doCoTiMastanctArgs, 29
doCoTiMastudyList_3, 29
doCoTiMastudyList_6, 30
doCoTiMastudyList_6_new, 30
doCoTiMAstudyList_3
doCoTiMAstudyList_6
doCoTiMAstudyList_6_new
doneu128, 31
doneu18, 31
doneu2, 32
doneu201, 32
doneu3, 33
doneu313, 33
doneu32, 34
doneuallInvFit, 34
donctmaBiG, 36
donctmaBiGOMX, 38
donctmaCombPRaw, 38
donctmaCompFit, 39
donctmaCorel, 40
donctmaEmpCov, 40
donctmaEqual, 39, 42, 45
donctmaf, 39, 42, 43, 48, 54–56, 71, 73
donctmafList, 47
donctmafToPrep, 48, 57, 58
donctmaGetPub, 49, 70
donctmaInit, 36, 37, 45, 48, 50, 55, 58, 61, 64, 71, 78
donctmaLabels, 53
donctmaLCS, 54
donctmaOptimizeFit, 55, 55
donctmaOptimizeInit, 55, 58
donctmaPlot, 60, 102
donctmaPlotCtsemMod, 61
donctmaPower, 63
donctmaPr, 66
donctmaPrep, 44, 46, 48, 50–52, 57, 58, 67, 79
donctmaPub, 69
donctmaRedHet, 71
donctmaSaveFile, 72
donctmaScaleInit, 72
donctmaShapeRawData, 73
donctmaStanResample, 77
donctmaStdParams, 77
donctmaSV, 78
donctsem, 45, 61
donctstanFit, 36, 45, 51, 56, 59, 72, 73

delta_t128, 79
delta_t18, 80
delta_t2, 80
delta_t201, 81
delta_t3, 81
delta_t313, 82
delta_t32, 82
demands128, 83
demands18, 83
demands2, 84
demands201, 84
demands3, 85
demands313, 85
demands32, 86
dl_link, 86

demands18, 87
demands201, 88
demands3, 89
demands313, 89
demands32, 90

demands18, 91
demands201, 92
demands3, 92
demands313, 93
demands32, 93

demands18, 94
demands201, 94
demands3, 95
demands313, 95
demands32, 95

demands18, 96
demands201, 96
demands3, 96
demands313, 96
demands32, 96

demands18, 99
demands201, 100
demands3, 100
demands313, 101
demands32, 101

demands18, 102

demands18, 103

demands18, 104

INDEX

plot.CoTiMAFit, 102
pubList_8, 103

rawData128, 103
recodeVariables128, 104
results128, 104

sampleSize128, 105
sampleSize8, 105
sampleSize2, 106
sampleSize201, 106
sampleSize3, 107
sampleSize313, 107
sampleSize32, 108
source128, 108
source2, 109
source201, 109
source3, 110
source313, 110
summary.CoTiMAFit, 111

targetVariables128, 111
targetVariables2, 112
targetVariables3, 112
targetVariables313, 113

variableNames128, 113