

README file for
norm.hm
an S+ function for a Normal Regression Interactive Multilevel Model
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DRAFT
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This program should be cited if used in published research.
The results from the program are not guaranteed. The authors will appreciate notification of any errors by emailing everson@stat.harvard.edu
Users may not modify the program code without the author's permission.

To obtain the program:

```
ftp figaro.med.harvard.edu (login as 'anonymous', password is your name)
cd pub/Norm.hm
mget *
```

quit
(The files will need to be uncompressed before use. This file 'README' is a latex file. The file norm.hm needs to be in your .Data directory for use.)

```

#Copyright Sept 1993, Phil Everson and Carl Morris,
#Dept. of Statistics, Harvard University.

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#This is a test version. The results are not guaranteed.
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#  emailing everson@stat.harvard.edu
#Permission from the authors is necessary for further distribution
#  and use of this program. We will notify users of new versions.
#Reference:
#  Parametric Empirical Bayes Inference: Theory and Applications
#  Carl N. Morris, JASA, March 1983

#estimate parameters for normal/normal hierarchical model.
#Allows matrix of covariates, X, for estimating prior mean.

#Inputs: Y = vector of observed values (unbiased estimates for
#  true parameters)
#  V = vector of variances for each observation
#  X = k x r matrix of covariates (include
#  column of 1's for a constant term)
#  title = title for output
#  labelx = labels for the regression coefficients
#  labelobs = labels for observations
#  srt = if true, will sort output on V
#  alpha = confidence level (for 100(1-alpha)% confidence interval)
#  tol = tolerance level for convergence
#  dig = number of digits after decimal for output

#Output:
#  Convergence Iterations for tau^2
#  $hyperparameter: beta^ estimates, standard errors and ratio
#  $tau: estimate of prior standard deviation
#  $aveB: average of estimated shrinkage factors
#  $output: matrix of:
#  Y = observed outcomes
#  sqrt(V) = standard deviation of Y|theta
#  mu^ = estimated prior mean
#  B^ = estimated shrinkage factor
#  theta^ = estimated posterior mean
#  se(thet^ ) = estimated standard error for theta^
#

```

EXAMPLE

DATA SET:

	Y	V	const	sex	age
1	22.915	2.667	1	1	20
2	10.259	2.667	1	-1	11
3	18.053	1.455	1	-1	18
4	24.441	1.455	1	1	21
5	22.327	1.000	1	1	21
6	20.954	1.000	1	-1	22
7	17.914	0.762	1	-1	22
8	20.525	0.762	1	1	18
9	16.625	0.615	1	-1	17
10	11.586	0.615	1	1	10

COMMAND:

```
norm.hm(Y,V,X,title="scores",labelx=c("const","sex","age"),
        labelobs=1:10,srt=T, dig=3)
```

OUTPUT:

```
[1] "***** scores *****"
[1] "           Hierarchical Normal Regression Model"
[1] "   copyright Sept. 1993 P. J. Everson & C. N. Morris"
```

*****CONVERGENCE ITERATIONS FOR TAU²*****

```
0.7368877 ,1.049176 ,1.010386 ,1.014794 ,1.014288
,1.014346 ,1.014339 ,1.01434 ,
```

\$hyperparameter:

	estimate	se	est/se
b [^] const	1.273	2.105	0.605
b [^] sex	1.768	0.469	3.774
b [^] age	0.953	0.114	8.358

\$tau:

```
[1] 1.007
```

\$aveB:

```
[1] 0.374
```

output:

	Y	sqrtV	mu	B	theta^	se(thet^)	lower	upper
9	16.625	0.784	15.707	0.270	16.377	0.727	14.953	17.802
10	11.586	0.784	12.572	0.270	11.852	0.774	10.334	13.370
7	17.914	0.873	20.472	0.306	18.698	0.947	16.841	20.554
8	20.525	0.873	20.196	0.306	20.424	0.768	18.919	21.930
5	22.327	1.000	23.055	0.355	22.585	0.883	20.854	24.316
6	20.954	1.000	20.472	0.355	20.783	0.870	19.078	22.489
3	18.053	1.206	16.660	0.421	17.467	1.034	15.441	19.493
4	24.441	1.206	23.055	0.421	23.858	1.053	21.793	25.923
1	22.915	1.633	22.102	0.517	22.495	1.234	20.076	24.913
2	10.259	1.633	9.989	0.517	10.119	1.320	7.532	12.706