Package 'accrual'

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Type Package

Title Bayesian Accrual Prediction

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Depends R(>= 3.1.3), tcltk2

Imports fgui, SMPracticals

Description
Subject recruitment for medical research is challenging. Slow patient accrual leads to delay in research. Accrual monitoring during the process of recruitment is critical. Researchers need reliable tools to manage the accrual rate. We developed a Bayesian method that integrates researcher's experience on previous trials and data from the current study, providing reliable prediction on accrual rate for clinical studies. In this R package, we present functions for Bayesian accrual prediction which can be easily used by statisticians and clinical researchers.

License GPL-2

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R topics documented:

`accrual-package` *Bayesian Accrual Prediction*

Description

Description: Subject recruitment for medical research is challenging. Slow patient accrual leads to delay in research. Accrual monitoring during the process of recruitment is critical. Researchers need reliable tools to manage the accrual rate. We developed a Bayesian method that integrates researcher's experience on previous trials and data from the current study,providing reliable prediction on accrual rate for clinical studies. In this R package, we present functions for Bayesian accrual prediction which can be easily used by statisticiana and clinical researchers.

Details

Package:	accrual
Type:	Package
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There are major eight funtions in the package. The accrual.gui function provides the gui version.

Author(s)

Junhao Liu, Yu Jiang, Cen Wu, Steve Simon, Matthew S. Mayo, Rama Raghavan, Byron J. Gajewski

Maintainer:Junhao Liu <jliu4@kumc.edu>

References

[1] Gajewski BJ, Simon SD, Carlson SE (2008). Predicting accrual in clinical trials with Bayesian posterior predictive distributions. Stat Med. 27(13):2328-40.

[2] Jiang, Y., Simon, S., Mayo, M. S., & Gajewski, B. J. (2015). Modeling and validating Bayesian accrual models on clinical data and simulations using adaptive priors. Statistics in medicine, 34(4), 613-629.

Examples

```
accrual.n.inform(n=300, T=36, P=0.5, m=100, tm=10, Tp=36)
```

```
accrual.n.plot(n=300, T=36, P=0.5, m=100, tm=10, Tp=36, Method="Informative Prior")
accrual.T.plot(n=300, T=36, P=0.5, m=100, tm=10, np=300, Method="Informative Prior")
accrual.gui()
```

---

accrual.data *Example Accrual Data*

Description

An example dataset for subject accrual.

Usage

```
accrual.data
```

Examples

```
str(accrual.data)
plot(accrual.data)
accrual.plots(accrual.data)
```

---

accrual.gui *GUI Version of the Bayesian Accrual Prediciton*

Description

The R GUI interface only needs the researchers to input the original design information that are required information for IRBs (total time proposed and total subjects proposed) and the updated accrual data (time since start and subjects accrual). It uses Bayesian prediction model in the background of calculation.

Usage

```
accrual.gui()
```

Author(s)

Junhao Liu, Yu Jiang, Cen Wu, Steve Simon, Matthew S. Mayo, Rama Raghavan, Byron J. Gajewski

Examples

```
accrual.gui()
```

`accrual.multi.n` *Prediction of Multicenter Accrual with Informative Prior in Fixed Time Frame*

Description

Produce an output for prediction of the number of subjects can be recruited in a fixed time frame with Informative Prior for a multicenter trial.

Usage

```
accrual.multi.n(n,T,P,J,Tm,Tsj,m,Tpred,all)
```

Arguments

`n`	Target sample size
`T`	Target completion time
`P`	The prior certainty, range 0-1
`J`	The number of sites
`Tm`	Time to date
`Tsj`	The start date for each site
`m`	Sample observed to date for each site
`Tpred`	The specific time that want to predict the recruitment
`all`	Using all the sites (True/False)

Author(s)

Junhao Liu, Yu Jiang, Cen Wu, Steve Simon, Matthew S. Mayo, Rama Raghavan, Byron J. Gajewski

Examples

```
accrual.multi.n(n=300,T=36,P=0.5,J=10,Tm=10,Tsj=c(0,0,0,0,0,0,0,0,0,0),
m=c(9,10,10,10,11,11,11,12,12,12),Tpred=36,all=TRUE)[[1]]
```

accrual.n.hedging *Prediction of Accrual with Hedging Prior in Fixed Time Frame*

Description

Produce an output for prediction of the number of subjects can be recruited in a fixed time frame with Hedging Prior.

Usage

```
accrual.n.hedging(n, T, m, tm, Tp)
```

Arguments

n	Target sample size
T	Target completion time
m	Sample observed to date
tm	Time to date
Tp	The specific time that want to predict the recruitment

Author(s)

Junhao Liu, Yu Jiang, Cen Wu, Steve Simon, Matthew S. Mayo, Rama Raghavan, Byron J. Gajewski

Examples

```
accrual.n.hedging(n=300, T=36, m=100, tm=10, Tp=36)[[1]]
```

accrual.n.inform *Prediction of Accrual with Informative Prior in Fixed Time Frame*

Description

Produce an output for prediction of the number of subjects can be recruited in a fixed time frame with Informative Prior.

Usage

```
accrual.n.inform(n, T, P, m, tm, Tp)
```

Arguments

n	Target sample size
T	Target completion time
P	The prior certainty, range 0-1
m	Sample observed to date
tm	Time to date
Tp	The specific time that want to predict the recruitment

Author(s)

Junhao Liu, Yu Jiang, Cen Wu, Steve Simon, Matthew S. Mayo, Rama Raghavan, Byron J. Gajewski

Examples

```
accrual.n.inform(n=300, T=36, P=0.5, m=100, tm=10, Tp=36)[[1]]
```

---

accrual.n.plot *Plot for Prediction of Accrual in Fixed Time Frame*

Description

Produce a plot and output for prediction of the number of subjects can be recruited in a fixed time frame.

Usage

```
accrual.n.plot(n, T, P, m, tm, Tp, Method)
```

Arguments

n	Target sample size
T	Target completion time
P	The prior certainty, range 0-1; For Accelerated Prior, P = 1-m/n
m	Sample observed to date
tm	Time to date
Tp	The specific time that want to predict the recruitment
Method	Informative Prior, Accelerated Prior, Hedging Prior

Author(s)

Junhao Liu, Yu Jiang, Cen Wu, Steve Simon, Matthew S. Mayo, Rama Raghavan, Byron J. Gajewski

Examples

```
accrual.n.plot(n=300, T=36, P=0.5, m=100, tm=10, Tp=36, Method="Informative Prior")
accrual.n.plot(n=300, T=36, m=100, tm=10, Tp=36, Method="Accelerated Prior")
accrual.n.plot(n=300, T=36, m=100, tm=10, Tp=36, Method="Hedging Prior")
```

accrual.plot.multicenter *Plot for Prediction of Multicenter Accrual in Fixed Time Frame*

Description

Produce a plot and output for prediction of the number of subjects for a multicenter trial can be recruited in a fixed time frame.

Usage

```
accrual.plot.multicenter(n,T,P,J,Tm,Tsj,m,all)
```

Arguments

n	Target sample size
T	Target completion time
P	The prior certainty, range 0-1
J	The number of sites
Tm	Time to date
Tsj	The start date for each site
m	Sample observed to date for each site
all	Using all the sites (True/False)

Author(s)

Junhao Liu, Yu Jiang, Cen Wu, Steve Simon, Matthew S. Mayo, Rama Raghavan, Byron J. Gajewski

Examples

```
accrual.plot.multicenter(n=300,T=36,P=0.5,J=10,Tm=10,Tsj=c(0,0,0,0,0,0,0,0,0,0),
m=c(9,10,10,10,11,11,11,12,12,12),all=TRUE)
```

accrual.plots *Dignostic Plots*

Description

The diagnostic panel shows four figures that help to understand the data distribution. The figure on the top left is the exponential quantile plot, which checks whether the distribution of waiting times is exponential. The top right figure shows the histogram of the waiting times, with the red line is the theoretical exponential distribution. The figure of waiting time verse cumulative accrual time is shown on the bottom left. The figure of total accrual verse cumulative accrual time is shown on the bottom right.

Usage

```
accrual.plots(w)
```

Arguments

w	The accrual dataset

Author(s)

Junhao Liu, Yu Jiang, Cen Wu, Steve Simon, Matthew S. Mayo, Rama Raghavan, Byron J. Gajewski

Examples

```
accrual.plots(accrual.data)
```

---

accrual.T.hedging *Prediction of Time with Hedging Prior*

Description

Prediction of time frame with Hedging Prior for a certain nubmer of subjects.

Usage

```
accrual.T.hedging(n, T, m, tm, np)
```

Arguments

n	Target sample size
T	Target completion time
m	Sample observed to date
tm	Time to date
np	The specific number of subjects want to be predicted

Author(s)

Junhao Liu, Yu Jiang, Cen Wu, Steve Simon, Matthew S. Mayo, Rama Raghavan, Byron J. Gajewski

Examples

```
accrual.T.hedging(n=300, T=36, m=100, tm=10, np=300)[[1]]
```

accrual.T.inform *Prediction of Time with Informative Prior*

Description

Prediction of time frame with Informative Prior for a certain nubmer of subjects.

Usage

```
accrual.T.inform(n, T, P, m, tm, np)
```

Arguments

n	Target sample size
T	Target completion time
P	The prior certainty, range 0-1
m	Sample observed to date
tm	Time to date
np	The specific number of subjects want to be predicted

Author(s)

Junhao Liu, Yu Jiang, Cen Wu, Steve Simon, Matthew S. Mayo, Rama Raghavan, Byron J. Gajewski

Examples

```
accrual.T.inform(n=300, T=36, P=0.5, m=100, tm=10, np=300)[[1]]
```

accrual.T.plot *Plot for Prediction of Time*

Description

Produce a plot and output for prediction of time frame for a certain nubmer of subjects.

Usage

```
accrual.T.plot(n, T, P, m, tm, np, Method)
```

Arguments

n	Target sample size
T	Target completion time
P	The prior certainty, range 0-1; For Accelerated Prior, P = 1-m/n
m	Sample observed to date
tm	Time to date
np	The specific number of subjects want to be predicted
Method	Informative Prior, Accelerated Prior, Hedging Prior

Author(s)

Junhao Liu, Yu Jiang, Cen Wu, Steve Simon, Matthew S. Mayo, Rama Raghavan, Byron J. Gajewski

Examples

```
accrual.T.plot(n=300, T=36, P=0.5, m=100, tm=10, np=300, Method="Informative Prior")
accrual.T.plot(n=300, T=36, m=100, tm=10, np=300, Method="Accelerated Prior")
accrual.T.plot(n=300, T=36, m=100, tm=10, np=300, Method="Hedging Prior")
```

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