Package: hopbyhop (via r-universe)

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Type Package

Title Transmissions and Receptions in a Hop by Hop Network

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Description Computes the expectation of the number of transmissions
and receptions considering a Hop-by-Hop transport model with
limited number of retransmissions per packet. It provides the
theoretical results shown in Palma et. al.(2016)
<DOI:10.1109/TLA.2016.7555237> and also estimated values based
on Monte Carlo simulations. It is also possible to consider
random data and ACK probabilities.

License GPL (>= 2)

Imports pastecs, ggplot2

Suggests endtoend, Opportunistic

NeedsCompilation no

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Repository https://chedgala.r-universe.dev

RemoteUrl https://github.com/cran/hopbyhop

RemoteRef HEAD

RemoteSha 5cbc994db3234847e70d50d0af45de40e7b7ee12

Contents

HBH	*Theoretical transmissions/receptions for a L-limited Hop by Hop model*

Description

This function computes the expected value of the number of transmissions/receptions for Hop by hop model with L-limited retransmissions per packet.

Usage

```
HBH(p1, p2, L, N)
```

Arguments

p1	Data success probability
p2	ACK success probability
L	Maximum number of retransmissions.
N	Number of Hops

Details

When there is no limitation, `L` value must be set as `L=Inf`.

Value

The ouput is a matrix containing the following values for each hop and total:

1	Success Probability
2	Expected Data Transmissions
3	Expected ACK Transmissions
4	Expected Total Transmissions
5	Expected Data Receptions
6	Expected ACK Receptions
7	Expected Total Receptions

Author(s)

Christian E. Galarza and Jonathan M. Olate

References

Palma, J.M.O.; Carvalho, L.D.P.; Goncalves, A.P.C.; Galarza, C.E.; De Oliveira, A.M., "Application of Control Theory Markov Systems to Minimize the Number of Transmissions in a Multi-hop Network," in Computer Aided System Engineering (APCASE), 2015 Asia-Pacific Conference on , vol., no., pp.296-301, 14-16 July 2015 <DOI:10.1109/APCASE.2015.59>

Olate, Jonathan Matias Palma, et al. "Networked control systems application: Minimization of the global number of interactions, transmissions and receptions in multi-hop network using discrete-time markovian jump linear systems." IEEE Latin America Transactions 14.6 (2016): 2675-2680.

See Also

MCHBH,stochastic_HBH

Examples

```
#An N=5 Hop by hop system with limited L=7 retransmission per hop
HBH(p1=0.65,p2=0.4,L=7,N=5)

#An ilimited N=5 Hop by hop system
HBH(p1=0.65,p2=0.4,L=Inf,N=5)
```

MCHBH	*Monte Carlo transmissions/receptions simulations for a L-limited Hop by Hop model*

Description

This function compute the mean of the number of transmissions/receptions for Hop by hop model with L-limited retransmissions per packet simulating via Monte Carlo.

Usage

```
MCHBH(p1, p2, L, N, M = 5000)
```

Arguments

p1	Data success probability
p2	ACK success probability
L	Maximum number of retransmissions
N	Number of Hops
M	Number of Monte Carlo Simulations

Value

The ouput is a matrix containing the following values for each hop and total:

1	MC Success Probability
2	MC Mean Data Transmissions
3	MC Mean ACK Transmissions
4	MC Mean Total Transmissions
5	MC Mean Data Receptions
6	MC Mean ACK Receptions
7	MC Mean Total Receptions

Author(s)

Christian E. Galarza and Jonathan M. Olate

References

Palma, J.M.O.; Carvalho, L.D.P.; Goncalves, A.P.C.; Galarza, C.E.; De Oliveira, A.M., "Application of Control Theory Markov Systems to Minimize the Number of Transmissions in a Multi-hop Network," in Computer Aided System Engineering (APCASE), 2015 Asia-Pacific Conference on , vol., no., pp.296-301, 14-16 July 2015 <DOI:10.1109/APCASE.2015.59>

Olate, Jonathan Matias Palma, et al. "Networked control systems application: Minimization of the global number of interactions, transmissions and receptions in multi-hop network using discrete-time markovian jump linear systems." IEEE Latin America Transactions 14.6 (2016): 2675-2680.

See Also

HBH,stochastic_HBH

Examples

```
#Monte Carlo simulations for an N=5 Hop by hop system
#with limited L=7 retransmission per hop

MCHBH(p1=0.65,p2=0.4,L=7,N=5)
```

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stochastic_HBH	*Random Probabilities Monte Carlo transmissions/receptions simulations for a L-limited Hop by Hop model*

Description

This function compute the mean of the number of transmissions/receptions for Hop by Hop model with L-limited retransmissions per packet simulating via Monte Carlo.

Usage

```
stochastic_HBH(dist1,p11,p12,dist2,p21,p22,L,N,M=10^5,printout=TRUE,plotspdf=TRUE)
```

Arguments

dist1	For the data success probability: probability density function. Options are "uniform" and "beta".
p11	For the data success probability: lower limit of the uniform distribution (dist1 == "uniform") or shape1 (alpha) paremHBHr of a Beta distribution (dist1 == "beta").
p12	For the data success probability: upper limit of the uniform distribution (dist1 == "uniform") or shape2 (beta) paremHBHr of a Beta distribution (dist1 == "beta").
dist2	For the ACK success probability: probability density function. Options are "uniform" and "beta".
p21	For the ACK success probability: lower limit of the uniform distribution (dist1 == "uniform") or shape1 (alpha) paremHBHr of a Beta distribution (dist1 == "beta").
p22	For the ACK success probability: upper limit of the uniform distribution (dist1 == "uniform") or shape2 (beta) paremHBHr of a Beta distribution (dist1 == "beta").
L	Maximum number of retransmissions
N	Number of Hops
M	Number of Monte Carlo Simulations
printout	If TRUE (by default), the function prints some outputs and plots
plotspdf	If TRUE (by default), the function exports all plots in pdf in the working directory

Value

The ouput is a matrix containing two elements:

data	a dataframe containing all Monte Carlo replications
stats	descriptive statistics

for

1	p1
2	p2
1	Success Probability
2	Expected Data Transmissions
3	Expected ACK Transmissions
4	Expected Total Transmissions
5	Expected Data Receptions
6	Expected ACK Receptions
7	Expected Total Receptions

Author(s)

Christian E. Galarza and Jonathan M. Olate

References

Palma, J.M.O.; Carvalho, L.D.P.; Goncalves, A.P.C.; Galarza, C.E.; De Oliveira, A.M., "Application of Control Theory Markov Systems to Minimize the Number of Transmissions in a Multi-hop Network," in Computer Aided System Engineering (APCASE), 2015 Asia-Pacific Conference on , vol., no., pp.296-301, 14-16 July 2015 <DOI:10.1109/APCASE.2015.59>

Olate, Jonathan Matias Palma, et al. "Networked control systems application: Minimization of the global number of interactions, transmissions and receptions in multi-hop network using discrete-time markovian jump linear systems." IEEE Latin America Transactions 14.6 (2016): 2675-2680.

See Also

HBH,MCHBH

Examples

```
#Monte Carlo simulations for an N=5 Hop by Hop system
#with limited L=7 retransmission per hop

#We now consider p1 ~ Uniform(0.2,0.6)
dist1 = "uniform"
p11 = 0.2
p12 = 0.6

#and p2 ~ Beta(3,1)
dist2 = "beta"
p21 = 3
p22 = 1

#no outputs and plots
out = stochastic_HBH(dist1,p11,p12,dist2,p21,p22,L=7,N=5,M=5*10^3,printout=FALSE,plotspdf=FALSE)
out$data  #simulations
out$stats #resume

#uncommnet next line for outputs plots and pdf file
#out = stochastic_HBH(dist1,p11,p12,dist2,p21,p22,L=7,N=5)
```

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