Package 'hopbyhop'

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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

Repository CRAN

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R topics documented:

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)
```

`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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