Description of the SimuBP function

Usage

`SimuBP(bran=list(span,para,offd),mupr=c(`μ_1,μ_2`),n0=c(`y_0,x_0`),tp)`

Arguments

`bran`: a list of 3 components `span`, `para`, and `offd`, determining the branching rule of cell proliferation.

`bran$span`: a character string taking value from `"fixed"`, `"exp"`, `"unif"`, and `"gam"`, specifying the cell lifespan. In particular, `span="fixed"` corresponds to a Galton-Watson process (GWP), and `span="exp"` corresponds to a Markov branching process (MBP).

`bran$para`: a vector or matrix specifying the parameters of the cell life distribution. For example, when `span="fixed"` and `para=c(l1,l2)`, the life spans of the wild-type and mutant cells in the resulting GWP are `l1` and `l2`, respectively; when `span="exp"` and `para=c(a1,a2)`, the rate parameters of the exponential distributed life times of the wild-type and mutant cells in the resulting MBP are `a1` and `a2`, respectively; when `span="unif"` or `"gam"`, `para=cbind(c(a1,b1),c(a2,b2))` specifies the pair of parameters for the life time distributions of the wild-type and mutant cells, respectively.

`bran$offd`: a vector `c(p0,p1,...)` specifying the offspring distribution. For example, `offd=c(0,0,1)` corresponds to a binary-fission (Yule) process, `offd=c(0.5,0,0.5)` corresponds to a birth-death process with equal birth and death rates.

`mupr`: a vector `c(`μ_1,μ_2`)` specifying the forward and backward mutation probabilities.

`n0`: a vector `c(`y_0,x_0`)` specifying the number of wild-type and mutant cells at `t=0`.

`tp`: a scalar specifying the time of plating.

Value

A vector `c(`z_t,x_t`)` where z_t is the total number of viable cells at `tp`, and x_t is the number of mutant cells at `tp`.

Example(s)

In the simulation code "Simu_S1a.R", the input arguments were set to be:

```
para = c(1,1)
offd = c(0,0,1)
bran = list(span="exp", para=para, offd=offd) # Specifies a
binary-fission MBP with exponential rate 1 for both wild-type and
mutant cell life distributions
mupr = c(2e-4, 0) # Specifies forward mutation probability 2e-4,
no backward mutations allowed
n0 = c(1, 0) # The cell population starts with 1 wild-type cell
tp = 11 # The time of plating is 11
```

Then in the double for-loop, the simulated data were generated by

```
data = SimuBP(bran, mupr, n0, tp)
```