

Discrete deterministic SIR using DifferentialEquations.jl

Simon Frost

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using DifferentialEquations
using SimpleDiffEq
using Plots
using BenchmarkTools

@inline function rate_to_proportion(r::Float64,t::Float64)
    1-exp(-r*t)
end

rate_to_proportion (generic function with 1 method)

function sir_discrete_deterministic(du,u,p,t)
    (S,I,R) = u
    ( $\beta$ , $\gamma$ , $\delta t$ ) = p
    N = S+I+R
    infection = rate_to_proportion( $\beta$ *I/N, $\delta t$ )*S
    recovery = rate_to_proportion( $\gamma$ , $\delta t$ )*I
    @inbounds begin
        du[1] = S-infection
        du[2] = I+infection-recovery
        du[3] = R+recovery
    end
    nothing
end

sir_discrete_deterministic (generic function with 1 method)

 $\delta t$  = 0.01
nsteps = 5000
tf = nsteps* $\delta t$ 
tspan = (0.0,nsteps)

(0.0, 5000)

u0 = [999,1,0]
p = [0.5,0.25,0.01]
prob_sir_discrete_deterministic = DiscreteProblem(sir_discrete_deterministic,u0,tspan,p)
sol_sir_discrete_deterministic =
solve(prob_sir_discrete_deterministic,solver=FunctionMap)

Error: InexactError: Int64(998.9950050124875)

plot(sol_sir_discrete_deterministic)

Error: UndefVarError: sol_sir_discrete_deterministic not defined

@benchmark solve(prob_sir_discrete_deterministic,solver=FunctionMap)

Error: InexactError: Int64(998.9950050124875)
```