

mRNA-sigmoidal

June 15, 2023

```
[1]: import random
import math
from SirIsaac import fittingProblem
```

```
[2]: import numpy as np
from scipy.integrate import solve_ivp
from matplotlib import pyplot as plt
```

$$\bar{m}(t) = \frac{\bar{M}(t)}{V} = \begin{cases} \frac{k_t}{k_d V_0} e^{-kt} & 0 < t < t_r \\ \frac{k_t}{k_d V_0} (2 - e^{k_d(t_r-t)}) e^{-kt} & t_r < t < t_D \end{cases} \quad \text{in our case:}$$

$k_t = 1.91, k_d = 0.279, t_r = 27, t_D = 70, k = 0.01$

$$\bar{m}(t) = \frac{\bar{M}(t)}{V} = \begin{cases} \frac{1.91}{0.279} e^{-0.01t} & 0 < t < 27 \\ \frac{1.91}{0.279} (2 - e^{0.279(27-t)}) e^{-0.01t} & 27 < t < 70 \end{cases}$$

```
[3]: '''
def mRNA_concentration(t, kt = 1.91, kd = 0.279, tr = 27, td = 70, k = 0.01):
    if 0 <= t < td-tr:
        return (kt / kd) * (2 - np.exp(kd * (-t))) * np.exp(-k * (t+tr))
    elif td-tr < t <= td:
        return (kt / kd) * np.exp(-k * (t-td+tr))
    else:
        return (kt / kd)
    return m_t
'''
```

```
[3]: '\ndef mRNA_concentration(t, kt = 1.91, kd = 0.279, tr = 27, td = 70, k =
0.01):\n    if 0 <= t < td-tr:\n        return (kt / kd) * (2 - np.exp(kd *
(-t))) * np.exp(-k * (t+tr))\n    elif td-tr < t <= td:\n        return (kt /
kd) * np.exp(-k * (t-td+tr))\n    else:\n        return (kt / kd) \n    return
m_t\n'
```

```
[4]: '''
def KTX(time, tr, td, k0):
    if time < td-tr:
        return 2*k0
    else:
```

```
    return k0
'''
```

```
[4]: '\ndef KTX(time,tr,td,k0):\n    if time < td-tr:\n        return 2*k0\n    else:\n        return k0\n'
```

```
[5]: # Define the function f(m, x, t)
def f(t, m, x):
    k_t = 1.26 # Set your value for k_t
    k_d = 0.126 # Set your value for k_d
    t_r = 27 # Set your value for t_r
    n = 20 # Set your value for n
    return k_t + (k_t * x**n) / (t_r**n + x**n) - k_d * m

# Define the function g(m, x, t)
def g(t, m, x):
    return 1.0

# Define the derivative function
def derivatives(t, y):
    m, x = y
    dm_dt = f(t, m, x)
    dx_dt = g(t, m, x)
    return [dm_dt, dx_dt]
```

```
[6]: # Set the initial conditions
initial_conditions = [0.0, 0.0]

# Set the time span
t_start = 0.0
t_end = 70.0
num_points = 140 # Number of points to evaluate the solution
t_span = np.linspace(t_start, t_end, num_points)

# Solve the system of differential equations
sol = solve_ivp(derivatives, [t_start, t_end], initial_conditions,
    ↪t_eval=t_span)

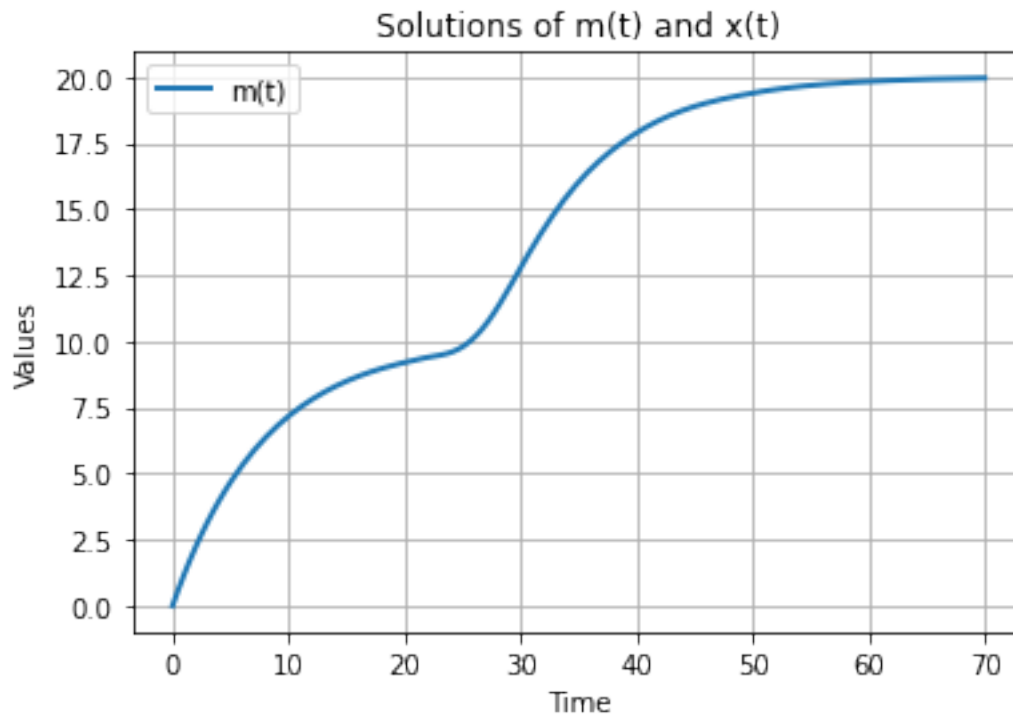
# Extract the solution
t_solution = sol.t
m_solution = sol.y[0]
x_solution = sol.y[1]
```

```
[7]: # Plot the solutions
plt.figure()
plt.plot(t_solution, m_solution, label='m(t)')
#plt.plot(t_solution, x_solution, label='x(t)')
```

```

plt.xlabel('Time')
plt.ylabel('Values')
plt.title('Solutions of m(t) and x(t)')
plt.legend()
plt.grid(True)
plt.show()

```



plot theoretical data

1 generate simulation data

questions for uncertainty!!!

```
[8]: N = 100 # we will have N data sets
```

```

uncertainty = 0.1 #we just set the uncertainty to be 0.1*value(t) #####
↳different uncertainty for each quantity?

```

```

indepParamsList = []
sirIsaacData = []
RNAtheoreticalData = []
ProteintheoreticalData = []
xtheoreticaldata = []

```

```

kmd = 0.126 #np.random.normal(0.279, 0.02)
kt = 1.26 #np.random.normal(1.91, 0.2)
tr = 27
td = 70
#here we study the time revolution from (0,60)

# define time range
start_time = 0
end_time = td # adjustable
num_points = 140

#
t_values = [start_time + (end_time - start_time) * i / (num_points - 1) for i in range(num_points)]
RNAtheoreticalData.append(t_values)
xtheoreticaldata.append(t_values)

```

```

[9]: outputNames = ['m', 'x']
indepParamNames = ['kd', 'kt'] #####important

```

```

[10]: for i in range(N):
    m0 = 0
    #p0 = 0

    # Set the initial conditions
    initial_conditions = [0.0, 0.0]

    # Set the time span
    t_start = 0.0
    t_end = td
    t_span = np.linspace(t_start, t_end, num_points)

    time = random.randint(1, num_points+1)-1

    # Solve the system of differential equations
    sol = solve_ivp(derivatives, [t_start, t_end], initial_conditions,
    t_eval=t_span)

    # Extract the solution
    t_solution = sol.t
    m_solution = sol.y[0]
    x_solution = sol.y[1]

```

```

# print(time)
# mRNA_values = [mRNA_concentration(t) for t in t_values]
RNAtheoreticalData.append(m_solution)
# k_values = [KTX(t, tr, td, kt) for t in t_values]
xtheoreticaldata.append(t_solution)
# Protein_values = [Protein(m0, p0, kt, ktr, kmd, kpd, t)/1000 for t in
→ t_values]
# ProteintheoreticalData.append(Protein_values)

indepParamsList.append([kmd, kt])
sirIsaacData.append( { 'm': { x_solution[time]: (m_solution[time], 0.1) },
                      'x': { x_solution[time]: (x_solution[time], 0.1) } } )

# print(delta, k, c, t, mRNA(t, delta, c, k))
# [ {'var1': { time0: ( value, uncertainty ) },
#   'var2': { time0: ( value, uncertainty ) },
#   ... },
#   {'var1': { time1: ( value, uncertainty ) },
#   'var2': { time1: ( value, uncertainty ) },
#   ... },
#   ... ]

```

```

[11]: # print(indepParamsList[:10])
# print(sirIsaacData)

```

2 Create SirIsaac FittingProblem

We'll attempt to fit a model in the “ssystem” class. To do this, we'll create an instance of a sFittingProblem. Here we set up its arguments and create it:

```

[12]: # complexityList lists which models in the model class may be tested.
# (Note that by default SirIsaac will still stop once 3 models have
# smaller estimated log-likelihood.)
complexityStepsize = 3 # increase complexity with steps of size 2
complexityMax = 25 # don't try models with complexity > 25
complexityList = range(0, complexityMax, complexityStepsize)

# ensGen controls the generation of the initial ensemble of
# parameter starting points.
# (We use a small number for totalSteps here so that the example
# runs faster; a more typical value for totalSteps is 1e3)
totalSteps = 20 # 1e3
keepSteps = 10
seeds = (1, 1) # use a fixed random seed
ensTemperature = 40.
ensGen = fittingProblem.EnsembleGenerator( totalSteps, keepSteps,

```

```

    temperature=ensTemperature, seeds=seeds )

# Parameters that control when local fitting stops.
avegtol = 1e-2
maxiter = 100

# priorSigma controls the width of priors on all parameters
priorSigma = 3.

# If you have mpi4py installed, you can run on multiple processors
numprocs = 4 #10

# We'll only use a subset of our data to make the example run faster
N = 20

p = fittingProblem.CTSNFittingProblem( complexityList,
    sirIsaacData[:N], indepParamsList=indepParamsList[:N],
    outputNames=outputNames, indepParamNames=indepParamNames,
    ensGen=ensGen, avegtol=avegtol, maxiter=maxiter,
    priorSigma=priorSigma, numprocs=numprocs, verbose=True )

```

for fitting problem, we can actually choose from `SimpleSinusoidalFittingProblem`, `SimplePhosphorylationFittingProblem`, `PolynomialFittingProblem`, `LaguerreFittingProblem`, `CTSNFittingProblem`, and `PowerLawFittingProblem`. `PowerLawFittingProblem`: $\frac{dx}{dt} = x^{c_1}a - x^{c_2}b$

3 Run parameter fitting

```
[13]: p.fitAll()
fittingProblem.save(p, 'mRNAconcentrationS2.pkl')
```

```

running build_ext
running build_src
build_src
building extension
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9021052_2624776861_96023"
sources
f2py options: []
f2py:
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9021052_2624776861_96023.pyf
Reading fortran codes...
    Reading file 'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_902105
2_2624776861_96023.pyf' (format:free)
Post-processing...
    Block:
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9021052_2624776861_96023
    Block: res_function

```

```

Block: ddaskr_jac
Block: root_func
Block: alg_deriv_func
Block: alg_res_func
Block: dres_dc_function
Block: dres_dcdot_function
Block: dres_dwself_2
Block: dres_dlog_tau_2
Block: dres_dw_2_0
Block: dres_dw_2_1
Block: dres_dm_init
Block: dres_dwself_3
Block: dres_dlog_tau_3
Block: dres_dw_3_0
Block: dres_dw_3_1
Block: dres_dx_init
Block: sens_rhs
Block: res_function_logdv
Block: root_func_logdv
Block: sens_rhs_logdv
Block: integrate_stochastic_tidbit

```

Post-processing (stage 2)...

Building modules...

Building module "CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9021052_2624776861_96023"...

```

Constructing wrapper function "res_function"...
    residual = res_function(time,dynamicVars,yprime,constants)
Constructing wrapper function "ddaskr_jac"...
    pd = ddaskr_jac(t,y,yprime,cj,rpar)
Constructing wrapper function "root_func"...
    root_devs = root_func(t,y,yp,constants)
Constructing wrapper function "alg_deriv_func"...
    alg_derivs_res =
alg_deriv_func(alg_yp,dynamicVars,yp,time,constants)
Constructing wrapper function "alg_res_func"...
    residual = alg_res_func(alg_vals,dynamicVars,time,constants)
Constructing wrapper function "dres_dc_function"...
    pd = dres_dc_function(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dcdot_function"...
    pd = dres_dcdot_function(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_2"...
    pd = dres_dwself_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_2"...
    pd = dres_dlog_tau_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_0"...
    pd = dres_dw_2_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_1"...
    pd = dres_dw_2_1(time,dynamicVars,yprime,constants)

```

```

Constructing wrapper function "dres_dm_init"...
    pd = dres_dm_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_3"...
    pd = dres_dwself_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_3"...
    pd = dres_dlog_tau_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_0"...
    pd = dres_dw_3_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_1"...
    pd = dres_dw_3_1(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dx_init"...
    pd = dres_dx_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "sens_rhs"...
    sens_res = sens_rhs(time,sens_y,sens_yp,constants)
Constructing wrapper function "res_function_logdv"...

```

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

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<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

```

    residual = res_function_logdv(time,log_dv,log_yp,constants)
Constructing wrapper function "root_func_logdv"...
    root_devs = root_func_logdv(t,log_dv,log_yp,constants)
Constructing wrapper function "sens_rhs_logdv"...
    sens_res =
sens_rhs_logdv(time,sens_y_log,sens_yp_log,constants)
Constructing wrapper function "integrate_stochastic_tidbit"...
    time_ptr,dv,stop_time_ptr,trajectory = integrate_stochastic_t
dbit(seed_ptr,reseed,time_ptr,dv,cv,rmsd_ptr,stop_time_ptr)

```

Wrote C/API module

"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9021052_2624776861_96023" to file "./CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9021052_2624776861_96023module.c"

adding 'build/src.macosx-10.9-x86_64-3.8/./fortranobject.c' to sources.

adding 'build/src.macosx-10.9-x86_64-3.8/.' to include_dirs.

creating build

creating build/src.macosx-10.9-x86_64-3.8

copying /Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-


```
packages/numpy/f2py/src/fortranobject.c -> build/src.macosx-10.9-x86_64-3.8/.
copying /Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/f2py/src/fortranobject.h -> build/src.macosx-10.9-x86_64-3.8/.
build_src: building npy-pkg config files
customize UnixCCompiler
customize UnixCCompiler using build_ext
CCompilerOpt.cc_test_flags[999] : testing flags (-march=native)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```
creating /var/folders/bg/39vt9f9n0q91qvxfx8t52r40000gn/T/tmpc015dkz5/Users
creating /var/folders/bg/39vt9f9n0q91qvxfx8t52r40000gn/T/tmpc015dkz5/Users/peng
uinaugustus
creating /var/folders/bg/39vt9f9n0q91qvxfx8t52r40000gn/T/tmpc015dkz5/Users/peng
uinaugustus/opt
creating /var/folders/bg/39vt9f9n0q91qvxfx8t52r40000gn/T/tmpc015dkz5/Users/peng
uinaugustus/opt/anaconda3
creating /var/folders/bg/39vt9f9n0q91qvxfx8t52r40000gn/T/tmpc015dkz5/Users/peng
uinaugustus/opt/anaconda3/lib
creating /var/folders/bg/39vt9f9n0q91qvxfx8t52r40000gn/T/tmpc015dkz5/Users/peng
uinaugustus/opt/anaconda3/lib/python3.8
creating /var/folders/bg/39vt9f9n0q91qvxfx8t52r40000gn/T/tmpc015dkz5/Users/peng
uinaugustus/opt/anaconda3/lib/python3.8/site-packages
creating /var/folders/bg/39vt9f9n0q91qvxfx8t52r40000gn/T/tmpc015dkz5/Users/peng
uinaugustus/opt/anaconda3/lib/python3.8/site-packages/numpy
creating /var/folders/bg/39vt9f9n0q91qvxfx8t52r40000gn/T/tmpc015dkz5/Users/peng
uinaugustus/opt/anaconda3/lib/python3.8/site-packages/numpy/distutils
creating /var/folders/bg/39vt9f9n0q91qvxfx8t52r40000gn/T/tmpc015dkz5/Users/peng
uinaugustus/opt/anaconda3/lib/python3.8/site-packages/numpy/distutils/checks
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-march=native'
CCompilerOpt.cc_test_flags[999] : testing flags (-O3)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-O3'
CCompilerOpt.cc_test_flags[999] : testing flags (-Werror)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
```

```

extra options: '-Werror'
CCompilerOpt.__init__[1674] : check requested baseline
CCompilerOpt.cc_test_flags[999] : testing flags (-msse)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse'
CCompilerOpt.cc_test_flags[999] : testing flags (-msse2)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse2'
CCompilerOpt.feature_test[1444] : testing feature 'SSE2' with flags (-msse
-msse2)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -Werror'
CCompilerOpt.feature_test[1444] : testing feature 'SSE' with flags (-msse
-msse2)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -Werror'
CCompilerOpt.cc_test_flags[999] : testing flags (-msse3)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse3'
CCompilerOpt.feature_test[1444] : testing feature 'SSE3' with flags (-msse
-msse2 -msse3)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes

```

```

-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -Werror'
CCompilerOpt.__init__[1683] : check requested dispatch-able features
CCompilerOpt.cc_test_flags[999] : testing flags (-mssse3)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-mssse3'
CCompilerOpt.cc_test_flags[999] : testing flags (-msse4.1)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse4.1'
CCompilerOpt.cc_test_flags[999] : testing flags (-mpopcnt)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-mpopcnt'
CCompilerOpt.feature_test[1444] : testing feature 'POPCNT' with flags (-msse
-msse2 -msse3 -mssse3 -msse4.1 -mpopcnt)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -Werror'
CCompilerOpt.cc_test_flags[999] : testing flags (-msse4.2)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse4.2'
CCompilerOpt.feature_test[1444] : testing feature 'SSE42' with flags (-msse

```

```
-msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -Werror'
CCompilerOpt.feature_test[1444] : testing feature 'SSSE3' with flags (-msse
-msse2 -msse3 -mssse3)
```

```
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -Werror'
CCompilerOpt.feature_test[1444] : testing feature 'SSE41' with flags (-msse
-msse2 -msse3 -mssse3 -msse4.1)
```

```
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -Werror'
CCompilerOpt.cc_test_flags[999] : testing flags (-mavx)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-mavx'
CCompilerOpt.feature_test[1444] : testing feature 'AVX' with flags (-msse -msse2
-msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx
-Werror'
CCompilerOpt.cc_test_flags[999] : testing flags (-mf16c)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```

-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-mf16c'
CCompilerOpt.feature_test[1444] : testing feature 'F16C' with flags (-msse
-msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx
-mf16c -Werror'
CCompilerOpt.cc_test_flags[999] : testing flags (-mfma)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-mfma'
CCompilerOpt.cc_test_flags[999] : testing flags (-mavx2)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-mavx2'
CCompilerOpt.cc_test_flags[999] : testing flags (-mavx512f)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-mavx512f'
CCompilerOpt.cc_test_flags[999] : testing flags (-mavx512cd)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-mavx512cd'
CCompilerOpt.feature_test[1444] : testing feature 'AVX512CD' with flags (-msse
-msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c -mfma -mavx2

```

```

-mavx512f -mavx512cd)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx
-mf16c -mfma -mavx2 -mavx512f -mavx512cd -Werror'
CCompilerOpt.cc_test_flags[999] : testing flags (-mavx512vl -mavx512bw
-mavx512dq)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-mavx512vl -mavx512bw -mavx512dq'
CCompilerOpt.feature_test[1444] : testing feature 'AVX512_SKX' with flags (-msse
-msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c -mfma -mavx2
-mavx512f -mavx512cd -mavx512vl -mavx512bw -mavx512dq)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx
-mf16c -mfma -mavx2 -mavx512f -mavx512cd -mavx512vl -mavx512bw -mavx512dq
-Werror'
CCompilerOpt.feature_test[1444] : testing feature 'FMA3' with flags (-msse
-msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c -mfma)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx
-mf16c -mfma -Werror'
CCompilerOpt.feature_test[1444] : testing feature 'AVX2' with flags (-msse
-msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c -mavx2)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'

```

```

extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx
-mf16c -mavx2 -Werror'
CCompilerOpt.feature_test[1444] : testing feature 'AVX512F' with flags (-msse
-msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c -mfma -mavx2
-mavx512f)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx
-mf16c -mfma -mavx2 -mavx512f -Werror'
CCompilerOpt.cc_test_flags[999] : testing flags (-mavx512vnni)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-mavx512vnni'
CCompilerOpt.feature_test[1444] : testing feature 'AVX512_CLX' with flags (-msse
-msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c -mfma -mavx2
-mavx512f -mavx512cd -mavx512vl -mavx512bw -mavx512dq -mavx512vnni)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx
-mf16c -mfma -mavx2 -mavx512f -mavx512cd -mavx512vl -mavx512bw -mavx512dq
-mavx512vnni -Werror'
CCompilerOpt.cc_test_flags[999] : testing flags (-mavx512ifma -mavx512vbmi)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-mavx512ifma -mavx512vbmi'
CCompilerOpt.feature_test[1444] : testing feature 'AVX512_CNL' with flags (-msse
-msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c -mfma -mavx2
-mavx512f -mavx512cd -mavx512vl -mavx512bw -mavx512dq -mavx512ifma -mavx512vbmi)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

```

```
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx
-mf16c -mfma -mavx2 -mavx512f -mavx512cd -mavx512vl -mavx512bw -mavx512dq
-mavx512ifma -mavx512vbmi -Werror'
CCompilerOpt.cc_test_flags[999] : testing flags (-mavx512vbmi2 -mavx512bitalg
-mavx512vpopcntdq)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-mavx512vbmi2 -mavx512bitalg -mavx512vpopcntdq'
CCompilerOpt.feature_test[1444] : testing feature 'AVX512_ICL' with flags (-msse
-msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c -mfma -mavx2
-mavx512f -mavx512cd -mavx512vl -mavx512bw -mavx512dq -mavx512vnni -mavx512ifma
-mavx512vbmi -mavx512vbmi2 -mavx512bitalg -mavx512vpopcntdq)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx
-mf16c -mfma -mavx2 -mavx512f -mavx512cd -mavx512vl -mavx512bw -mavx512dq
-mavx512vnni -mavx512ifma -mavx512vbmi -mavx512vbmi2 -mavx512bitalg
-mavx512vpopcntdq -Werror'
CCompilerOpt.cc_test_flags[999] : testing flags (-mavx512er -mavx512pf)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-mavx512er -mavx512pf'
CCompilerOpt.feature_test[1444] : testing feature 'AVX512_KNL' with flags (-msse
-msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c -mfma -mavx2
-mavx512f -mavx512cd -mavx512er -mavx512pf)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx
-mf16c -mfma -mavx2 -mavx512f -mavx512cd -mavx512er -mavx512pf -Werror'
CCompilerOpt.cc_test_flags[999] : testing flags (-mavx5124fmaps -mavx5124vnniw
```



```
-mavx512vpopcntdq)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-mavx512fmaps -mavx512vnniw -mavx512vpopcntdq'
CCompilerOpt.dist_test[576] : CCompilerOpt._dist_test_spawn[711] : Command (gcc
-Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g -fwrapv -O3
-Wall -Wstrict-prototypes -I/Users/penguinaugustus/opt/anaconda3/include -arch
x86_64 -I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c
/Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/distutils/checks/test_flags.c -o /var/folders/bg/39vt9f9n0q91qvvx
fx8t52r40000gn/T/tmpc015dkz5/Users/penguinaugustus/opt/anaconda3/lib/python3.8/s
ite-packages/numpy/distutils/checks/test_flags.o -MMD -MF /var/folders/bg/39vt9f
9n0q91qvvxfx8t52r40000gn/T/tmpc015dkz5/Users/penguinaugustus/opt/anaconda3/lib/p
ython3.8/site-packages/numpy/distutils/checks/test_flags.o.d -mavx512fmaps
-mavx512vnniw -mavx512vpopcntdq) failed with exit status 1 output ->
clang: error: unknown argument: '-mavx512fmaps'
clang: error: unknown argument: '-mavx512vnniw'
```

```
CCompilerOpt.cc_test_flags[1003] : testing failed
CCompilerOpt.feature_test[1444] : testing feature 'AVX512_KNM' with flags (-msse
-msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c -mfma -mavx2
-mavx512f -mavx512cd -mavx512er -mavx512pf)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g
-fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
```

```
compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx
-mf16c -mfma -mavx2 -mavx512f -mavx512cd -mavx512er -mavx512pf -Werror'
CCompilerOpt.dist_test[576] : CCompilerOpt._dist_test_spawn[711] : Command (gcc
-Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g -fwrapv -O3
-Wall -Wstrict-prototypes -I/Users/penguinaugustus/opt/anaconda3/include -arch
x86_64 -I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c
/Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/distutils/checks/cpu_avx512_knm.c -o /var/folders/bg/39vt9f9n0q91
qvvxfx8t52r40000gn/T/tmpc015dkz5/Users/penguinaugustus/opt/anaconda3/lib/python3
.8/site-packages/numpy/distutils/checks/cpu_avx512_knm.o -MMD -MF /var/folders/b
g/39vt9f9n0q91qvvxfx8t52r40000gn/T/tmpc015dkz5/Users/penguinaugustus/opt/anacond
a3/lib/python3.8/site-packages/numpy/distutils/checks/cpu_avx512_knm.o.d -msse
-msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c -mfma -mavx2
-mavx512f -mavx512cd -mavx512er -mavx512pf -Werror) failed with exit status 1
```

```

output ->
/Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/distutils/checks/cpu_avx512_knm.c:9:9: error: implicit
declaration of function '_mm512_4fmadd_ps' is invalid in C99
[-Werror,-Wimplicit-function-declaration]
    b = _mm512_4fmadd_ps(b, b, b, b, b, NULL);
        ^

/Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/distutils/checks/cpu_avx512_knm.c:9:9: note: did you mean
'_mm512_fmadd_ps'?
/Applications/Xcode.app/Contents/Developer/Toolchains/XcodeDefault.xctoolchain/u
sr/lib/clang/12.0.0/include/avx512fintrin.h:2716:1: note: '_mm512_fmadd_ps'
declared here
_mm512_fmadd_ps(__m512 __A, __m512 __B, __m512 __C)
^

/Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/distutils/checks/cpu_avx512_knm.c:9:7: error: assigning to
'_m512' (vector of 16 'float' values) from incompatible type 'int'
    b = _mm512_4fmadd_ps(b, b, b, b, b, NULL);
        ^ ~~~~~
/Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/distutils/checks/cpu_avx512_knm.c:11:9: error: implicit
declaration of function '_mm512_4dpwssd_epi32' is invalid in C99
[-Werror,-Wimplicit-function-declaration]
    a = _mm512_4dpwssd_epi32(a, a, a, a, a, NULL);
        ^

/Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/distutils/checks/cpu_avx512_knm.c:11:9: note: did you mean
'_mm512_dpwssd_epi32'?
/Applications/Xcode.app/Contents/Developer/Toolchains/XcodeDefault.xctoolchain/u
sr/lib/clang/12.0.0/include/avx512vnniintrin.h:68:1: note: '_mm512_dpwssd_epi32'
declared here
_mm512_dpwssd_epi32(__m512i __S, __m512i __A, __m512i __B)
^

/Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/distutils/checks/cpu_avx512_knm.c:11:7: error: assigning to
'_m512i' (vector of 8 'long long' values) from incompatible type 'int'
    a = _mm512_4dpwssd_epi32(a, a, a, a, a, NULL);
        ^ ~~~~~
4 errors generated.

```

```

CCompilerOpt.feature_test[1458] : testing failed
CCompilerOpt.__init__[1695] : skip features (SSE SSE2 SSE3) since its part of
baseline
CCompilerOpt.__init__[1699] : initialize targets groups
CCompilerOpt.__init__[1701] : parse target group simd_test
CCompilerOpt._parse_target_tokens[1910] : skip targets (ASIMD FMA4 VSX NEON VSX2
XOP VSX3) not part of baseline or dispatch-able features

```

```

CCompilerOpt._parse_policy_not_keepbase[2022] : skip baseline features (SSE2)
CCompilerOpt.generate_dispatch_header[2236] : generate CPU dispatch header: (build/src.macosx-10.9-x86_64-3.8/numpy/distutils/include/np_cpu_dispatch_config.h)
CCompilerOpt.generate_dispatch_header[2245] : dispatch header dir build/src.macosx-10.9-x86_64-3.8/numpy/distutils/include does not exist, creating it
CCompilerOpt.feature_extra_checks[1519] : Testing extra checks for feature 'AVX512F' (AVX512F_REDUCE)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g -fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c -mfma -mavx2 -mavx512f -Werror'
CCompilerOpt.feature_extra_checks[1519] : Testing extra checks for feature 'AVX512_SKX' (AVX512BW_MASK AVX512DQ_MASK)
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g -fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c -mfma -mavx2 -mavx512f -mavx512cd -mavx512vl -mavx512bw -mavx512dq -Werror'
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g -fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

compile options: '-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3 -mssse3 -msse4.1 -mpopcnt -msse4.2 -mavx -mf16c -mfma -mavx2 -mavx512f -mavx512cd -mavx512vl -mavx512bw -mavx512dq -Werror'
Detected changes on compiler optimizations, force rebuilding building
'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9021052_2624776861_96023' extension
compiling C sources
C compiler: gcc -Wno-unused-result -Wsign-compare -Wunreachable-code -DNDEBUG -g -fwrapv -O3 -Wall -Wstrict-prototypes
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64
-I/Users/penguinaugustus/opt/anaconda3/include -arch x86_64

creating build/temp.macosx-10.9-x86_64-3.8/Users
creating build/temp.macosx-10.9-x86_64-3.8/Users/penguinaugustus

```

```

creating build/temp.macosx-10.9-x86_64-3.8/Users/penguinaugustus/SloppyCell
creating
build/temp.macosx-10.9-x86_64-3.8/Users/penguinaugustus/SloppyCell/SloppyCell
creating build/temp.macosx-10.9-x86_64-3.8/Users/penguinaugustus/SloppyCell/Slop
pyCell/ReactionNetworks
creating build/temp.macosx-10.9-x86_64-3.8/build
creating build/temp.macosx-10.9-x86_64-3.8/build/src.macosx-10.9-x86_64-3.8
compile options:
'-I/Users/penguinaugustus/SloppyCell/SloppyCell/ReactionNetworks
-Ibuild/src.macosx-10.9-x86_64-3.8/
-I/Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/core/include
-Ibuild/src.macosx-10.9-x86_64-3.8/numpy/distutils/include
-I/Users/penguinaugustus/opt/anaconda3/include/python3.8 -c'
extra options: '-msse -msse2 -msse3'
gcc: CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9021052_2624776861_9602
3.cgcc: CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9021052_2624776861_9
6023module.c

gcc: build/src.macosx-10.9-x86_64-3.8/./fortranobject.cgcc:
/Users/penguinaugustus/SloppyCell/SloppyCell/ReactionNetworks/mtrand.c

gcc -bundle -undefined dynamic_lookup -L/Users/penguinaugustus/opt/anaconda3/lib
-arch x86_64 -L/Users/penguinaugustus/opt/anaconda3/lib -arch x86_64 -arch
x86_64 build/temp.macosx-10.9-x86_64-3.8/CTSN_0_wirelessprv_10_194_237_143_near_
illinois_edu_9021052_2624776861_96023.o build/temp.macosx-10.9-x86_64-3.8/CTSN_0
_wirelessprv_10_194_237_143_near_illinois_edu_9021052_2624776861_96023module.o b
uild/temp.macosx-10.9-x86_64-3.8/Users/penguinaugustus/SloppyCell/SloppyCell/Rea
ctionNetworks/mtrand.o build/temp.macosx-10.9-x86_64-3.8/build/src.macosx-10.9-x
86_64-3.8/fortranobject.o -o CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu
_9021052_2624776861_96023.cpython-38-darwin.so
SloppyCellFittingModel.fitToData: generating ensemble for these parameters:
['wself_2', 'log_tau_2', 'w_2_0', 'w_2_1', 'm_init', 'wself_3', 'log_tau_3',
'w_3_0', 'w_3_1', 'x_init']
generateEnsemble_parallel: Generating parameter ensemble with 20 total members,
using 4 processors.
SloppyCellFittingModel.fitToData: Cost = 3908923.993518464 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.993518464 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.993518464 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.993518464 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.993518464 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.9934525727 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.993518464 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.993518464 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.993518464 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.993518464 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.993518464 ( 1 )
SloppyCellFittingModel.fitToData: Best-fit cost = 3908923.9934525727
fittingProblem.fitAll: L = -1955008.4532626744

```

```

running build_ext
running build_src
build_src
building extension
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9690905_6334776861_96023"
sources
f2py options: []
f2py:
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9690905_6334776861_96023.pyf
Reading fortran codes...
    Reading file 'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_969090
5_6334776861_96023.pyf' (format:free)
Post-processing...
    Block:
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9690905_6334776861_96023
    Block: res_function
    Block: ddaskr_jac
    Block: root_func
    Block: alg_deriv_func
    Block: alg_res_func
    Block: dres_dc_function
    Block: dres_dcdot_function
    Block: dres_dwself_2
    Block: dres_dtheta_2
    Block: dres_dlog_tau_2
    Block: dres_dw_2_0
    Block: dres_dw_2_1
    Block: dres_dw_2_3
    Block: dres_dm_init
    Block: dres_dwself_3
    Block: dres_dlog_tau_3
    Block: dres_dw_3_0
    Block: dres_dw_3_1
    Block: dres_dw_3_2
    Block: dres_dx_init
    Block: sens_rhs
    Block: res_function_logdv
    Block: root_func_logdv
    Block: sens_rhs_logdv
    Block: integrate_stochastic_tidbit
Post-processing (stage 2)...
Building modules...
    Building module "CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_969
0905_6334776861_96023"...
        Constructing wrapper function "res_function"...
            residual = res_function(time,dynamicVars,yprime,constants)
        Constructing wrapper function "ddaskr_jac"...
            pd = ddaskr_jac(t,y,yprime,cj,rpar)

```

```

Constructing wrapper function "root_func"...
    root_devs = root_func(t,y,yp,constants)
Constructing wrapper function "alg_deriv_func"...
    alg_derivs_res =
alg_deriv_func(alg_yp,dynamicVars,yp,time,constants)
Constructing wrapper function "alg_res_func"...
    residual = alg_res_func(alg_vals,dynamicVars,time,constants)
Constructing wrapper function "dres_dc_function"...
    pd = dres_dc_function(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dcdot_function"...
    pd = dres_dcdot_function(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_2"...
    pd = dres_dwself_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dtheta_2"...
    pd = dres_dtheta_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_2"...
    pd = dres_dlog_tau_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_0"...
    pd = dres_dw_2_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_1"...
    pd = dres_dw_2_1(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_3"...
    pd = dres_dw_2_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dm_init"...
    pd = dres_dm_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_3"...
    pd = dres_dwself_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_3"...
    pd = dres_dlog_tau_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_0"...
    pd = dres_dw_3_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_1"...

```

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

```

pd = dres_dw_3_1(time,dynamicVars,yprime,constants)

```

```

Constructing wrapper function "dres_dw_3_2"...
  pd = dres_dw_3_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dx_init"...
  pd = dres_dx_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "sens_rhs"...
  sens_res = sens_rhs(time,sens_y,sens_yp,constants)
Constructing wrapper function "res_function_logdv"...
  residual = res_function_logdv(time,log_dv,log_yp,constants)
Constructing wrapper function "root_func_logdv"...
  root_devs = root_func_logdv(t,log_dv,log_yp,constants)
Constructing wrapper function "sens_rhs_logdv"...
  sens_res =
sens_rhs_logdv(time,sens_y_log,sens_yp_log,constants)
  Constructing wrapper function "integrate_stochastic_tidbit"...
  time_ptr,dv,stop_time_ptr,trajectory = integrate_stochastic_t
dbit(seed_ptr,reseed,time_ptr,dv,cv,rmsd_ptr,stop_time_ptr)
  Wrote C/API module
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9690905_6334776861_96023"
to file "./CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9690905_633477686
1_96023module.c"
  adding 'build/src.macosx-10.9-x86_64-3.8/./fortranobject.c' to sources.
  adding 'build/src.macosx-10.9-x86_64-3.8/.' to include_dirs.
copying /Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/f2py/src/fortranobject.c -> build/src.macosx-10.9-x86_64-3.8/.

WARNING:ReactionNetworks.Components:Failed to import dynamically compiled C
module
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9690905_6334776861_96023 for
network CTSN.
WARNING:ReactionNetworks.Components:No module named
'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_9690905_6334776861_96023'

***STDOUT***
b''
***STDERR***
b''
SloppyCellFittingModel.fitToData: generating ensemble for these parameters:
['wself_2', 'theta_2', 'log_tau_2', 'w_2_0', 'w_2_1', 'w_2_3', 'm_init',
'wself_3', 'log_tau_3', 'w_3_0', 'w_3_1', 'w_3_2', 'x_init']
generateEnsemble_parallel: Generating parameter ensemble with 20 total members,
using 4 processors.
SloppyCellFittingModel.fitToData: Cost = 3908923.9934525727 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.9934525727 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.9934525727 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.9934525727 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.9934449266 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3908923.9934525727 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.9609647957 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.9934525727 ( 1 )

```

```

SloppyCellFittingModel.fitToData: Cost = 3908923.9934525727 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.9934525727 ( 1 )
SloppyCellFittingModel.fitToData: Best-fit cost = 3908923.9609647957
fittingProblem.fitAll: L = -1955182.6276994331
running build_ext
running build_src
build_src
building extension
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_462589_5964776861_96023"
sources
f2py options: []
f2py:
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_462589_5964776861_96023.pyf
Reading fortran codes...
    Reading file 'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_462589_5964776861_96023.pyf' (format:free)
Post-processing...
    Block:
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_462589_5964776861_96023
    Block: res_function
    Block: ddaskr_jac
    Block: root_func
    Block: alg_deriv_func
    Block: alg_res_func
    Block: dres_dc_function
    Block: dres_dcdot_function
    Block: dres_dwself_2
    Block: dres_dtheta_2
    Block: dres_dlog_tau_2
    Block: dres_dw_2_0
    Block: dres_dw_2_1
    Block: dres_dw_2_3
    Block: dres_dw_2_4
    Block: dres_dm_init
    Block: dres_dwself_3
    Block: dres_dtheta_3
    Block: dres_dlog_tau_3
    Block: dres_dw_3_0
    Block: dres_dw_3_1
    Block: dres_dw_3_2
    Block: dres_dw_3_4
    Block: dres_dx_init
    Block: dres_dX_4_init
    Block: sens_rhs
    Block: res_function_logdv
    Block: root_func_logdv
    Block: sens_rhs_logdv
    Block: integrate_stochastic_tidbit

```


Post-processing (stage 2)...

Building modules...

Building module

```
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_462589_5964776861_96023"...
```

- Constructing wrapper function "res_function"...
- residual = res_function(time,dynamicVars,yprime,constants)
- Constructing wrapper function "ddaskr_jac"...
- pd = ddaskr_jac(t,y,yprime,cj,rpar)
- Constructing wrapper function "root_func"...
- root_devs = root_func(t,y,yp,constants)
- Constructing wrapper function "alg_deriv_func"...
- alg_derivs_res =

```
alg_deriv_func(alg_yp,dynamicVars,yp,time,constants)
```

- Constructing wrapper function "alg_res_func"...
- residual = alg_res_func(alg_vals,dynamicVars,time,constants)
- Constructing wrapper function "dres_dc_function"...
- pd = dres_dc_function(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dcdot_function"...
- pd = dres_dcdot_function(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dwself_2"...
- pd = dres_dwself_2(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dtheta_2"...
- pd = dres_dtheta_2(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dlog_tau_2"...
- pd = dres_dlog_tau_2(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dw_2_0"...
- pd = dres_dw_2_0(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dw_2_1"...
- pd = dres_dw_2_1(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dw_2_3"...
- pd = dres_dw_2_3(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dw_2_4"...
- pd = dres_dw_2_4(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dm_init"...
- pd = dres_dm_init(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dwself_3"...
- pd = dres_dwself_3(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dtheta_3"...
- pd = dres_dtheta_3(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dlog_tau_3"...
- pd = dres_dlog_tau_3(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dw_3_0"...
- pd = dres_dw_3_0(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dw_3_1"...
- pd = dres_dw_3_1(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dw_3_2"...
- pd = dres_dw_3_2(time,dynamicVars,yprime,constants)
- Constructing wrapper function "dres_dw_3_4"...

```

pd = dres_dw_3_4(time,dynamicVars,yprime,constants)
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed
a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed
a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed
a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed
a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed
a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed
a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed
a comma?

Constructing wrapper function "dres_dx_init"...
pd = dres_dx_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dX_4_init"...
pd = dres_dX_4_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "sens_rhs"...
sens_res = sens_rhs(time,sens_y,sens_yp,constants)
Constructing wrapper function "res_function_logdv"...
residual = res_function_logdv(time,log_dv,log_yp,constants)
Constructing wrapper function "root_func_logdv"...
root_devs = root_func_logdv(t,log_dv,log_yp,constants)
Constructing wrapper function "sens_rhs_logdv"...
sens_res =
sens_rhs_logdv(time,sens_y_log,sens_yp_log,constants)
Constructing wrapper function "integrate_stochastic_tidbit"...
time_ptr,dv,stop_time_ptr,trajectory = integrate_stochastic_ti
dbit(seed_ptr,reseed,time_ptr,dv,cv,rmsd_ptr,stop_time_ptr)
Wrote C/API module
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_462589_5964776861_96023" to
file "./CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_462589_5964776861_96
023module.c"
adding 'build/src.macosx-10.9-x86_64-3.8/./fortranobject.c' to sources.
adding 'build/src.macosx-10.9-x86_64-3.8/.' to include_dirs.
copying /Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/f2py/src/fortranobject.c -> build/src.macosx-10.9-x86_64-3.8/.

WARNING:ReactionNetworks.Components:Failed to import dynamically compiled C
module
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_462589_5964776861_96023 for
network CTSN.
WARNING:ReactionNetworks.Components:No module named
'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_462589_5964776861_96023'
***STDOUT***

```

```

b''
***STDERR***
b''
SloppyCellFittingModel.fitToData: generating ensemble for these parameters:
['wself_2', 'theta_2', 'log_tau_2', 'w_2_0', 'w_2_1', 'w_2_3', 'w_2_4',
'm_init', 'wself_3', 'theta_3', 'log_tau_3', 'w_3_0', 'w_3_1', 'w_3_2', 'w_3_4',
'x_init', 'X_4_init']
generateEnsemble_parallel: Generating parameter ensemble with 20 total members,
using 4 processors.
SloppyCellFittingModel.fitToData: Cost = 3908923.95748303 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.95748303 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.95748303 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908810.042085209 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908917.690202304 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908921.837136284 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.9574830285 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.9574830285 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908903.2641839474 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3908923.9574830285 ( 1 )
SloppyCellFittingModel.fitToData: Best-fit cost = 3908810.042085209
fittingProblem.fitAll: L = -1955561.9131879574
running build_ext
running build_src
build_src
building extension
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_684090_6984776861_96023"
sources
f2py options: []
f2py:
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_684090_6984776861_96023.pyf
Reading fortran codes...
    Reading file 'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_684090
_6984776861_96023.pyf' (format:free)
Post-processing...
    Block:
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_684090_6984776861_96023
    Block: res_function
    Block: ddaskr_jac
    Block: root_func
    Block: alg_deriv_func
    Block: alg_res_func
    Block: dres_dc_function
    Block: dres_dcdot_function
    Block: dres_dwself_2
    Block: dres_dtheta_2
    Block: dres_dlog_tau_2
    Block: dres_dw_2_0
    Block: dres_dw_2_1

```

```

Block: dres_dw_2_3
Block: dres_dw_2_4
Block: dres_dm_init
Block: dres_dwself_3
Block: dres_dtheta_3
Block: dres_dlog_tau_3
Block: dres_dw_3_0
Block: dres_dw_3_1
Block: dres_dw_3_2
Block: dres_dw_3_4
Block: dres_dx_init
Block: dres_dw_4_2
Block: dres_dw_4_3
Block: dres_dw_4_0
Block: dres_dX_4_init
Block: sens_rhs
Block: res_function_logdv
Block: root_func_logdv
Block: sens_rhs_logdv
Block: integrate_stochastic_tidbit

```

Post-processing (stage 2)...

Building modules...

Building module

"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_684090_6984776861_96023"...

Constructing wrapper function "res_function"...

```
residual = res_function(time,dynamicVars,yprime,constants)
```

Constructing wrapper function "ddaskr_jac"...

```
pd = ddaskr_jac(t,y,yprime,cj,rpar)
```

Constructing wrapper function "root_func"...

```
root_devs = root_func(t,y,yp,constants)
```

Constructing wrapper function "alg_deriv_func"...

```
alg_derivs_res =
```

```
alg_deriv_func(alg_yp,dynamicVars,yp,time,constants)
```

Constructing wrapper function "alg_res_func"...

```
residual = alg_res_func(alg_vals,dynamicVars,time,constants)
```

Constructing wrapper function "dres_dc_function"...

```
pd = dres_dc_function(time,dynamicVars,yprime,constants)
```

Constructing wrapper function "dres_dcdot_function"...

```
pd = dres_dcdot_function(time,dynamicVars,yprime,constants)
```

Constructing wrapper function "dres_dwself_2"...

```
pd = dres_dwself_2(time,dynamicVars,yprime,constants)
```

Constructing wrapper function "dres_dtheta_2"...

```
pd = dres_dtheta_2(time,dynamicVars,yprime,constants)
```

Constructing wrapper function "dres_dlog_tau_2"...

```
pd = dres_dlog_tau_2(time,dynamicVars,yprime,constants)
```

Constructing wrapper function "dres_dw_2_0"...

```
pd = dres_dw_2_0(time,dynamicVars,yprime,constants)
```

Constructing wrapper function "dres_dw_2_1"...

```

    pd = dres_dw_2_1(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_3"...
    pd = dres_dw_2_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_4"...
    pd = dres_dw_2_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dm_init"...
    pd = dres_dm_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_3"...
    pd = dres_dwself_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dtheta_3"...
    pd = dres_dtheta_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_3"...
    pd = dres_dlog_tau_3(time,dynamicVars,yprime,constants)

```

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

```

Constructing wrapper function "dres_dw_3_0"...
    pd = dres_dw_3_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_1"...
    pd = dres_dw_3_1(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_2"...
    pd = dres_dw_3_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_4"...
    pd = dres_dw_3_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dx_init"...
    pd = dres_dx_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_2"...
    pd = dres_dw_4_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_3"...
    pd = dres_dw_4_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_0"...
    pd = dres_dw_4_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dX_4_init"...
    pd = dres_dX_4_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "sens_rhs"...
    sens_res = sens_rhs(time,sens_y,sens_yp,constants)

```

```

Constructing wrapper function "res_function_logdv"...
    residual = res_function_logdv(time,log_dv,log_yp,constants)
Constructing wrapper function "root_func_logdv"...
    root_devs = root_func_logdv(t,log_dv,log_yp,constants)
Constructing wrapper function "sens_rhs_logdv"...
    sens_res =
sens_rhs_logdv(time,sens_y_log,sens_yp_log,constants)
    Constructing wrapper function "integrate_stochastic_tidbit"...
    time_ptr,dv,stop_time_ptr,trajectory = integrate_stochastic_t
dbit(seed_ptr,reseed,time_ptr,dv,cv,rmsd_ptr,stop_time_ptr)
    Wrote C/API module
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_684090_6984776861_96023" to
file "./CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_684090_6984776861_96
023module.c"
    adding 'build/src.macosx-10.9-x86_64-3.8/./fortranobject.c' to sources.
    adding 'build/src.macosx-10.9-x86_64-3.8/.' to include_dirs.
copying /Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/f2py/src/fortranobject.c -> build/src.macosx-10.9-x86_64-3.8/.
WARNING:ReactionNetworks.Components:Failed to import dynamically compiled C
module
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_684090_6984776861_96023 for
network CTSN.
WARNING:ReactionNetworks.Components:No module named
'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_684090_6984776861_96023'
***STDOUT***
b''
***STDERR***
b''
SloppyCellFittingModel.fitToData: generating ensemble for these parameters:
['wself_2', 'theta_2', 'log_tau_2', 'w_2_0', 'w_2_1', 'w_2_3', 'w_2_4',
'm_init', 'wself_3', 'theta_3', 'log_tau_3', 'w_3_0', 'w_3_1', 'w_3_2', 'w_3_4',
'x_init', 'w_4_2', 'w_4_3', 'w_4_0', 'X_4_init']
generateEnsemble_parallel: Generating parameter ensemble with 20 total members,
using 4 processors.
SloppyCellFittingModel.fitToData: Cost = 3772300.394241037 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3908810.042085209 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3772300.394241037 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3772300.394241037 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3908810.042085209 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3772300.394241037 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3772300.394241037 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3908810.042085209 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3772300.394241037 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3772300.394241037 ( 0 )
SloppyCellFittingModel.fitToData: Best-fit cost = 3772300.394241037
fittingProblem.fitAll: L = -1886914.7706697239
running build_ext

```

```

running build_src
build_src
building extension
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_969027_3875776861_96023"
sources
f2py options: []
f2py:
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_969027_3875776861_96023.pyf
Reading fortran codes...
    Reading file 'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_969027
_3875776861_96023.pyf' (format:free)
Post-processing...
    Block:
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_969027_3875776861_96023
    Block: res_function
    Block: ddaskr_jac
    Block: root_func
    Block: alg_deriv_func
    Block: alg_res_func
    Block: dres_dc_function
    Block: dres_dcdot_function
    Block: dres_dwself_2
    Block: dres_dtheta_2
    Block: dres_dlog_tau_2
    Block: dres_dw_2_0
    Block: dres_dw_2_1
    Block: dres_dw_2_3
    Block: dres_dw_2_4
    Block: dres_dm_init
    Block: dres_dwself_3
    Block: dres_dtheta_3
    Block: dres_dlog_tau_3
    Block: dres_dw_3_0
    Block: dres_dw_3_1
    Block: dres_dw_3_2
    Block: dres_dw_3_4
    Block: dres_dx_init
    Block: dres_dwself_4
    Block: dres_dlog_tau_4
    Block: dres_dw_4_2
    Block: dres_dw_4_3
    Block: dres_dw_4_0
    Block: dres_dw_4_1
    Block: dres_dX_4_init
    Block: sens_rhs
    Block: res_function_logdv
    Block: root_func_logdv
    Block: sens_rhs_logdv

```

```

Block: integrate_stochastic_tidbit
Post-processing (stage 2)...
Building modules...
  Building module
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_969027_3875776861_96023"...
  Constructing wrapper function "res_function"...
    residual = res_function(time,dynamicVars,yprime,constants)
  Constructing wrapper function "ddaskr_jac"...
    pd = ddaskr_jac(t,y,yprime,cj,rpar)
  Constructing wrapper function "root_func"...
    root_devs = root_func(t,y,yp,constants)
  Constructing wrapper function "alg_deriv_func"...
    alg_derivs_res =
alg_deriv_func(alg_yp,dynamicVars,yp,time,constants)
  Constructing wrapper function "alg_res_func"...
    residual = alg_res_func(alg_vals,dynamicVars,time,constants)
  Constructing wrapper function "dres_dc_function"...
    pd = dres_dc_function(time,dynamicVars,yprime,constants)
  Constructing wrapper function "dres_dcdot_function"...
    pd = dres_dcdot_function(time,dynamicVars,yprime,constants)
  Constructing wrapper function "dres_dwself_2"...
    pd = dres_dwself_2(time,dynamicVars,yprime,constants)
  Constructing wrapper function "dres_dtheta_2"...
    pd = dres_dtheta_2(time,dynamicVars,yprime,constants)
  Constructing wrapper function "dres_dlog_tau_2"...
    pd = dres_dlog_tau_2(time,dynamicVars,yprime,constants)
  Constructing wrapper function "dres_dw_2_0"...
    pd = dres_dw_2_0(time,dynamicVars,yprime,constants)
  Constructing wrapper function "dres_dw_2_1"...
    pd = dres_dw_2_1(time,dynamicVars,yprime,constants)
  Constructing wrapper function "dres_dw_2_3"...
    pd = dres_dw_2_3(time,dynamicVars,yprime,constants)
  Constructing wrapper function "dres_dw_2_4"...
    pd = dres_dw_2_4(time,dynamicVars,yprime,constants)
  Constructing wrapper function "dres_dm_init"...
    pd = dres_dm_init(time,dynamicVars,yprime,constants)
  Constructing wrapper function "dres_dwself_3"...
    pd = dres_dwself_3(time,dynamicVars,yprime,constants)
  Constructing wrapper function "dres_dtheta_3"...

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed
a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed
a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed
a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed
a comma?

```


<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

```
    pd = dres_dtheta_3(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dlog_tau_3"...
    pd = dres_dlog_tau_3(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_3_0"...
    pd = dres_dw_3_0(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_3_1"...
    pd = dres_dw_3_1(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_3_2"...
    pd = dres_dw_3_2(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_3_4"...
    pd = dres_dw_3_4(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dx_init"...
    pd = dres_dx_init(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dwself_4"...
    pd = dres_dwself_4(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dlog_tau_4"...
    pd = dres_dlog_tau_4(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_4_2"...
    pd = dres_dw_4_2(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_4_3"...
    pd = dres_dw_4_3(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_4_0"...
    pd = dres_dw_4_0(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_4_1"...
    pd = dres_dw_4_1(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dX_4_init"...
    pd = dres_dX_4_init(time,dynamicVars,yprime,constants)
    Constructing wrapper function "sens_rhs"...
    sens_res = sens_rhs(time,sens_y,sens_yp,constants)
    Constructing wrapper function "res_function_logdv"...
    residual = res_function_logdv(time,log_dv,log_yp,constants)
    Constructing wrapper function "root_func_logdv"...
    root_devs = root_func_logdv(t,log_dv,log_yp,constants)
    Constructing wrapper function "sens_rhs_logdv"...
    sens_res =
sens_rhs_logdv(time,sens_y_log,sens_yp_log,constants)
    Constructing wrapper function "integrate_stochastic_tidbit"...
    time_ptr,dv,stop_time_ptr,trajectory = integrate_stochastic_t
dbit(seed_ptr,reseed,time_ptr,dv,cv,rmsd_ptr,stop_time_ptr)
```

Wrote C/API module

"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_969027_3875776861_96023" to

```

file "./CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_969027_3875776861_96
023module.c"
  adding 'build/src.macosx-10.9-x86_64-3.8/./fortranobject.c' to sources.
  adding 'build/src.macosx-10.9-x86_64-3.8/.' to include_dirs.
copying /Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/f2py/src/fortranobject.c -> build/src.macosx-10.9-x86_64-3.8/.

WARNING:ReactionNetworks.Components:Failed to import dynamically compiled C
module
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_969027_3875776861_96023 for
network CTSN.
WARNING:ReactionNetworks.Components:No module named
'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_969027_3875776861_96023'

***STDOUT***
b''
***STDERR***
b''
SloppyCellFittingModel.fitToData: generating ensemble for these parameters:
['wself_2', 'theta_2', 'log_tau_2', 'w_2_0', 'w_2_1', 'w_2_3', 'w_2_4',
'm_init', 'wself_3', 'theta_3', 'log_tau_3', 'w_3_0', 'w_3_1', 'w_3_2', 'w_3_4',
'x_init', 'wself_4', 'log_tau_4', 'w_4_2', 'w_4_3', 'w_4_0', 'w_4_1',
'X_4_init']
generateEnsemble_parallel: Generating parameter ensemble with 20 total members,
using 4 processors.
SloppyCellFittingModel.fitToData: Cost = 3772300.3671541386 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3767946.5724199964 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3713248.0762155135 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3772300.3859446887 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3772300.329318051 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3772298.557612499 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3772300.3881448023 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3772300.3941274807 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3723995.4985524667 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3772300.1691806195 ( 1 )
SloppyCellFittingModel.fitToData: Best-fit cost = 3713248.0762155135
fittingProblem.fitAll: L = -1857548.2337902656
running build_ext
running build_src
build_src
building extension
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_705959_1256776861_96023"
sources
f2py options: []
f2py:
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_705959_1256776861_96023.pyf
Reading fortran codes...
  Reading file 'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_705959
_1256776861_96023.pyf' (format:free)

```

Post-processing...

Block:

CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_705959_1256776861_96023

Block: res_function
Block: ddaskr_jac
Block: root_func
Block: alg_deriv_func
Block: alg_res_func
Block: dres_dc_function
Block: dres_dcdot_function
Block: dres_dwself_2
Block: dres_dtheta_2
Block: dres_dlog_tau_2
Block: dres_dw_2_0
Block: dres_dw_2_1
Block: dres_dw_2_3
Block: dres_dw_2_4
Block: dres_dw_2_5
Block: dres_dm_init
Block: dres_dwself_3
Block: dres_dtheta_3
Block: dres_dlog_tau_3
Block: dres_dw_3_0
Block: dres_dw_3_1
Block: dres_dw_3_2
Block: dres_dw_3_4
Block: dres_dw_3_5
Block: dres_dx_init
Block: dres_dwself_4
Block: dres_dtheta_4
Block: dres_dlog_tau_4
Block: dres_dw_4_2
Block: dres_dw_4_3
Block: dres_dw_4_0
Block: dres_dw_4_1
Block: dres_dX_4_init
Block: dres_dX_5_init
Block: sens_rhs
Block: res_function_logdv
Block: root_func_logdv
Block: sens_rhs_logdv
Block: integrate_stochastic_tidbit

Post-processing (stage 2)...

Building modules...

Building module

"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_705959_1256776861_96023"...

Constructing wrapper function "res_function"...

residual = res_function(time,dynamicVars,yprime,constants)

```

Constructing wrapper function "ddaskr_jac"...
    pd = ddaskr_jac(t,y,yprime,cj,rpar)
Constructing wrapper function "root_func"...
    root_devs = root_func(t,y,yp,constants)
Constructing wrapper function "alg_deriv_func"...
    alg_derivs_res =
alg_deriv_func(alg_yp,dynamicVars,yp,time,constants)
Constructing wrapper function "alg_res_func"...
    residual = alg_res_func(alg_vals,dynamicVars,time,constants)
Constructing wrapper function "dres_dc_function"...
    pd = dres_dc_function(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dcdot_function"...
    pd = dres_dcdot_function(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_2"...
    pd = dres_dwself_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dtheta_2"...
    pd = dres_dtheta_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_2"...
    pd = dres_dlog_tau_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_0"...
    pd = dres_dw_2_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_1"...
    pd = dres_dw_2_1(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_3"...
    pd = dres_dw_2_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_4"...
    pd = dres_dw_2_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_5"...
    pd = dres_dw_2_5(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dm_init"...
    pd = dres_dm_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_3"...
    pd = dres_dwself_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dtheta_3"...
    pd = dres_dtheta_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_3"...
    pd = dres_dlog_tau_3(time,dynamicVars,yprime,constants)

```

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

```
Constructing wrapper function "dres_dw_3_0"...
    pd = dres_dw_3_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_1"...
    pd = dres_dw_3_1(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_2"...
    pd = dres_dw_3_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_4"...
    pd = dres_dw_3_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_5"...
    pd = dres_dw_3_5(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dx_init"...
    pd = dres_dx_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_4"...
    pd = dres_dwself_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dtheta_4"...
    pd = dres_dtheta_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_4"...
    pd = dres_dlog_tau_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_2"...
    pd = dres_dw_4_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_3"...
    pd = dres_dw_4_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_0"...
    pd = dres_dw_4_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_1"...
    pd = dres_dw_4_1(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dX_4_init"...
    pd = dres_dX_4_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dX_5_init"...
    pd = dres_dX_5_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "sens_rhs"...
    sens_res = sens_rhs(time,sens_y,sens_yp,constants)
Constructing wrapper function "res_function_logdv"...
    residual = res_function_logdv(time,log_dv,log_yp,constants)
Constructing wrapper function "root_func_logdv"...
    root_devs = root_func_logdv(t,log_dv,log_yp,constants)
Constructing wrapper function "sens_rhs_logdv"...
    sens_res =
sens_rhs_logdv(time,sens_y_log,sens_yp_log,constants)
Constructing wrapper function "integrate_stochastic_tidbit"...
    time_ptr,dv,stop_time_ptr,trajectory = integrate_stochastic_tidbit(seed_ptr,reseed,time_ptr,dv,cv,rmsd_ptr,stop_time_ptr)
Wrote C/API module
```

```
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_705959_1256776861_96023" to
file "./CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_705959_1256776861_96
023module.c"
```

```
adding 'build/src.macosx-10.9-x86_64-3.8/./fortranobject.c' to sources.
```

```
adding 'build/src.macosx-10.9-x86_64-3.8/.' to include_dirs.
```

```
copying /Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/f2py/src/fortranobject.c -> build/src.macosx-10.9-x86_64-3.8/.
```

```
WARNING:ReactionNetworks.Components:Failed to import dynamically compiled C
module
```

```
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_705959_1256776861_96023 for
network CTSN.
```

```
WARNING:ReactionNetworks.Components:No module named
```

```
'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_705959_1256776861_96023'
```

```
***STDOUT***
```

```
b''
```

```
***STDERR***
```

```
b''
```

```
SloppyCellFittingModel.fitToData: generating ensemble for these parameters:
```

```
['wself_2', 'theta_2', 'log_tau_2', 'w_2_0', 'w_2_1', 'w_2_3', 'w_2_4', 'w_2_5',
'm_init', 'wself_3', 'theta_3', 'log_tau_3', 'w_3_0', 'w_3_1', 'w_3_2', 'w_3_4',
'w_3_5', 'x_init', 'wself_4', 'theta_4', 'log_tau_4', 'w_4_2', 'w_4_3', 'w_4_0',
'w_4_1', 'X_4_init', 'X_5_init']
```

```
generateEnsemble_parallel: Generating parameter ensemble with 20 total members,
using 4 processors.
```

```
SloppyCellFittingModel.fitToData: Cost = 3686939.713578345 ( 0 )
```

```
SloppyCellFittingModel.fitToData: Cost = 3680215.461430851 ( 0 )
```

```
SloppyCellFittingModel.fitToData: Cost = 3682651.0401458195 ( 0 )
```

```
SloppyCellFittingModel.fitToData: Cost = 3686172.013511375 ( 1 )
```

```
SloppyCellFittingModel.fitToData: Cost = 3678857.520273804 ( 1 )
```

```
SloppyCellFittingModel.fitToData: Cost = 3679648.214382566 ( 1 )
```

```
SloppyCellFittingModel.fitToData: Cost = 3687202.8363644243 ( 1 )
```

```
SloppyCellFittingModel.fitToData: Cost = 3684598.3960182224 ( 0 )
```

```
SloppyCellFittingModel.fitToData: Cost = 3681127.4289729106 ( 0 )
```

```
SloppyCellFittingModel.fitToData: Cost = 3686209.475630322 ( 1 )
```

```
SloppyCellFittingModel.fitToData: Best-fit cost = 3678857.520273804
```

```
fittingProblem.fitAll: L = -1840795.8655799674
```

```
running build_ext
```

```
running build_src
```

```
build_src
```

```
building extension
```

```
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_944285_9831876861_96023"
```

```
sources
```

```
f2py options: []
```

```
f2py:
```

```
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_944285_9831876861_96023.pyf
```

```
Reading fortran codes...
```

```
Reading file 'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_944285
```

_9831876861_96023.pyf' (format:free)

Post-processing...

Block:

CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_944285_9831876861_96023

Block: res_function
Block: ddaskr_jac
Block: root_func
Block: alg_deriv_func
Block: alg_res_func
Block: dres_dc_function
Block: dres_dcdot_function
Block: dres_dwself_2
Block: dres_dtheta_2
Block: dres_dlog_tau_2
Block: dres_dw_2_0
Block: dres_dw_2_1
Block: dres_dw_2_3
Block: dres_dw_2_4
Block: dres_dw_2_5
Block: dres_dm_init
Block: dres_dwself_3
Block: dres_dtheta_3
Block: dres_dlog_tau_3
Block: dres_dw_3_0
Block: dres_dw_3_1
Block: dres_dw_3_2
Block: dres_dw_3_4
Block: dres_dw_3_5
Block: dres_dx_init
Block: dres_dwself_4
Block: dres_dtheta_4
Block: dres_dlog_tau_4
Block: dres_dw_4_2
Block: dres_dw_4_3
Block: dres_dw_4_0
Block: dres_dw_4_1
Block: dres_dX_4_init
Block: dres_dw_5_2
Block: dres_dw_5_3
Block: dres_dw_5_0
Block: dres_dX_5_init
Block: sens_rhs
Block: res_function_logdv
Block: root_func_logdv
Block: sens_rhs_logdv
Block: integrate_stochastic_tidbit

Post-processing (stage 2)...

Building modules...

```

Building module
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_944285_9831876861_96023"...
    Constructing wrapper function "res_function"...
        residual = res_function(time,dynamicVars,yprime,constants)
    Constructing wrapper function "ddaskr_jac"...
        pd = ddaskr_jac(t,y,yprime,cj,rpar)
    Constructing wrapper function "root_func"...
        root_devs = root_func(t,y,yp,constants)
    Constructing wrapper function "alg_deriv_func"...
        alg_derivs_res =
alg_deriv_func(alg_yp,dynamicVars,yp,time,constants)
    Constructing wrapper function "alg_res_func"...
        residual = alg_res_func(alg_vals,dynamicVars,time,constants)
    Constructing wrapper function "dres_dc_function"...
        pd = dres_dc_function(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dcdot_function"...
        pd = dres_dcdot_function(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dwself_2"...
        pd = dres_dwself_2(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dtheta_2"...
        pd = dres_dtheta_2(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dlog_tau_2"...
        pd = dres_dlog_tau_2(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_2_0"...
        pd = dres_dw_2_0(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_2_1"...
        pd = dres_dw_2_1(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_2_3"...
        pd = dres_dw_2_3(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_2_4"...
        pd = dres_dw_2_4(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_2_5"...
        pd = dres_dw_2_5(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dm_init"...
        pd = dres_dm_init(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dwself_3"...
        pd = dres_dwself_3(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dtheta_3"...
        pd = dres_dtheta_3(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dlog_tau_3"...
        pd = dres_dlog_tau_3(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_3_0"...
        pd = dres_dw_3_0(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_3_1"...
        pd = dres_dw_3_1(time,dynamicVars,yprime,constants)
    Constructing wrapper function "dres_dw_3_2"...
        pd = dres_dw_3_2(time,dynamicVars,yprime,constants)

```



```
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?
<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?
```

```
Constructing wrapper function "dres_dw_3_4"...
    pd = dres_dw_3_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_5"...
    pd = dres_dw_3_5(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dx_init"...
    pd = dres_dx_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_4"...
    pd = dres_dwself_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dtheta_4"...
    pd = dres_dtheta_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_4"...
    pd = dres_dlog_tau_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_2"...
    pd = dres_dw_4_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_3"...
    pd = dres_dw_4_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_0"...
    pd = dres_dw_4_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_1"...
    pd = dres_dw_4_1(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dX_4_init"...
    pd = dres_dX_4_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_5_2"...
    pd = dres_dw_5_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_5_3"...
    pd = dres_dw_5_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_5_0"...
    pd = dres_dw_5_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dX_5_init"...
    pd = dres_dX_5_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "sens_rhs"...
    sens_res = sens_rhs(time,sens_y,sens_yp,constants)
Constructing wrapper function "res_function_logdv"...
```

```

        residual = res_function_logdv(time,log_dv,log_yp,constants)
    Constructing wrapper function "root_func_logdv"...
        root_devs = root_func_logdv(t,log_dv,log_yp,constants)
    Constructing wrapper function "sens_rhs_logdv"...
        sens_res =
sens_rhs_logdv(time,sens_y_log,sens_yp_log,constants)
        Constructing wrapper function "integrate_stochastic_tidbit"...
            time_ptr,dv,stop_time_ptr,trajectory = integrate_stochastic_t
            dbit(seed_ptr,reseed,time_ptr,dv,cv,rmsd_ptr,stop_time_ptr)
        Wrote C/API module
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_944285_9831876861_96023" to
file "./CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_944285_9831876861_96
023module.c"
    adding 'build/src.macosx-10.9-x86_64-3.8/./fortranobject.c' to sources.
    adding 'build/src.macosx-10.9-x86_64-3.8/.' to include_dirs.
copying /Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/f2py/src/fortranobject.c -> build/src.macosx-10.9-x86_64-3.8/.

WARNING:ReactionNetworks.Components:Failed to import dynamically compiled C
module
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_944285_9831876861_96023 for
network CTSN.
WARNING:ReactionNetworks.Components:No module named
'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_944285_9831876861_96023'

***STDOUT***
b''
***STDERR***
b''
SloppyCellFittingModel.fitToData: generating ensemble for these parameters:
['wself_2', 'theta_2', 'log_tau_2', 'w_2_0', 'w_2_1', 'w_2_3', 'w_2_4', 'w_2_5',
'm_init', 'wself_3', 'theta_3', 'log_tau_3', 'w_3_0', 'w_3_1', 'w_3_2', 'w_3_4',
'w_3_5', 'x_init', 'wself_4', 'theta_4', 'log_tau_4', 'w_4_2', 'w_4_3', 'w_4_0',
'w_4_1', 'X_4_init', 'w_5_2', 'w_5_3', 'w_5_0', 'X_5_init']
generateEnsemble_parallel: Generating parameter ensemble with 20 total members,
using 4 processors.
SloppyCellFittingModel.fitToData: Cost = 3654249.4894429804 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3655676.301220628 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3655996.985278049 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3654759.738137479 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3656174.1980356355 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3657551.5831798096 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3657107.206553129 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3656871.9789874195 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3655976.583828337 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3657551.5831798096 ( 0 )
SloppyCellFittingModel.fitToData: Best-fit cost = 3654249.4894429804
fittingProblem.fitAll: L = -1828644.8733810731
running build_ext

```

```

running build_src
build_src
building extension
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_298775_1807876861_96023"
sources
f2py options: []
f2py:
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_298775_1807876861_96023.pyf
Reading fortran codes...
    Reading file 'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_298775
_1807876861_96023.pyf' (format:free)
Post-processing...
    Block:
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_298775_1807876861_96023
    Block: res_function
    Block: ddaskr_jac
    Block: root_func
    Block: alg_deriv_func
    Block: alg_res_func
    Block: dres_dc_function
    Block: dres_dcdot_function
    Block: dres_dwself_2
    Block: dres_dtheta_2
    Block: dres_dlog_tau_2
    Block: dres_dw_2_0
    Block: dres_dw_2_1
    Block: dres_dw_2_3
    Block: dres_dw_2_4
    Block: dres_dw_2_5
    Block: dres_dm_init
    Block: dres_dwself_3
    Block: dres_dtheta_3
    Block: dres_dlog_tau_3
    Block: dres_dw_3_0
    Block: dres_dw_3_1
    Block: dres_dw_3_2
    Block: dres_dw_3_4
    Block: dres_dw_3_5
    Block: dres_dx_init
    Block: dres_dwself_4
    Block: dres_dtheta_4
    Block: dres_dlog_tau_4
    Block: dres_dw_4_2
    Block: dres_dw_4_3
    Block: dres_dw_4_0
    Block: dres_dw_4_1
    Block: dres_dw_4_5
    Block: dres_dX_4_init

```

```

Block: dres_dw_5_2
Block: dres_dw_5_3
Block: dres_dw_5_0
Block: dres_dw_5_1
Block: dres_dw_5_4
Block: dres_dX_5_init
Block: sens_rhs
Block: res_function_logdv
Block: root_func_logdv
Block: sens_rhs_logdv
Block: integrate_stochastic_tidbit

```

Post-processing (stage 2)...

Building modules...

Building module

"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_298775_1807876861_96023"...

```

Constructing wrapper function "res_function"...
  residual = res_function(time,dynamicVars,yprime,constants)
Constructing wrapper function "ddaskr_jac"...
  pd = ddaskr_jac(t,y,yprime,cj,rpar)
Constructing wrapper function "root_func"...
  root_devs = root_func(t,y,yp,constants)
Constructing wrapper function "alg_deriv_func"...
  alg_derivs_res =

```

alg_deriv_func(alg_yp,dynamicVars,yp,time,constants)

```

Constructing wrapper function "alg_res_func"...
  residual = alg_res_func(alg_vals,dynamicVars,time,constants)
Constructing wrapper function "dres_dc_function"...
  pd = dres_dc_function(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dcdot_function"...
  pd = dres_dcdot_function(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_2"...
  pd = dres_dwself_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dtheta_2"...
  pd = dres_dtheta_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_2"...
  pd = dres_dlog_tau_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_0"...
  pd = dres_dw_2_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_1"...
  pd = dres_dw_2_1(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_3"...
  pd = dres_dw_2_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_4"...
  pd = dres_dw_2_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_5"...
  pd = dres_dw_2_5(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dm_init"...
  pd = dres_dm_init(time,dynamicVars,yprime,constants)

```

```

Constructing wrapper function "dres_dwself_3"...
  pd = dres_dwself_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dtheta_3"...
  pd = dres_dtheta_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_3"...
  pd = dres_dlog_tau_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_0"...
  pd = dres_dw_3_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_1"...
  pd = dres_dw_3_1(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_2"...
  pd = dres_dw_3_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_4"...
  pd = dres_dw_3_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_5"...
  pd = dres_dw_3_5(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dx_init"...
  pd = dres_dx_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_4"...
  pd = dres_dwself_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dtheta_4"...
  pd = dres_dtheta_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_4"...
  pd = dres_dlog_tau_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_2"...
  pd = dres_dw_4_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_3"...
  pd = dres_dw_4_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_0"...
  pd = dres_dw_4_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_1"...
  pd = dres_dw_4_1(time,dynamicVars,yprime,constants)

```

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

```

Constructing wrapper function "dres_dw_4_5"...

```

```

    pd = dres_dw_4_5(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dX_4_init"...
    pd = dres_dX_4_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_5_2"...
    pd = dres_dw_5_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_5_3"...
    pd = dres_dw_5_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_5_0"...
    pd = dres_dw_5_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_5_1"...
    pd = dres_dw_5_1(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_5_4"...
    pd = dres_dw_5_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dX_5_init"...
    pd = dres_dX_5_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "sens_rhs"...
    sens_res = sens_rhs(time,sens_y,sens_yp,constants)
Constructing wrapper function "res_function_logdv"...
    residual = res_function_logdv(time,log_dv,log_yp,constants)
Constructing wrapper function "root_func_logdv"...
    root_devs = root_func_logdv(t,log_dv,log_yp,constants)
Constructing wrapper function "sens_rhs_logdv"...
    sens_res =
sens_rhs_logdv(time,sens_y_log,sens_yp_log,constants)
    Constructing wrapper function "integrate_stochastic_tidbit"...
    time_ptr,dv,stop_time_ptr,trajectory = integrate_stochastic_t
dbit(seed_ptr,reseed,time_ptr,dv,cv,rmsd_ptr,stop_time_ptr)
    Wrote C/API module
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_298775_1807876861_96023" to
file "./CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_298775_1807876861_96
023module.c"
    adding 'build/src.macosx-10.9-x86_64-3.8/./fortranobject.c' to sources.
    adding 'build/src.macosx-10.9-x86_64-3.8/.' to include_dirs.
copying /Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/f2py/src/fortranobject.c -> build/src.macosx-10.9-x86_64-3.8/.

WARNING:ReactionNetworks.Components:Failed to import dynamically compiled C
module
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_298775_1807876861_96023 for
network CTSN.
WARNING:ReactionNetworks.Components:No module named
'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_298775_1807876861_96023'

***STDOUT***
b''
***STDERR***
b''
SloppyCellFittingModel.fitToData: generating ensemble for these parameters:
['wself_2', 'theta_2', 'log_tau_2', 'w_2_0', 'w_2_1', 'w_2_3', 'w_2_4', 'w_2_5',

```

```
'm_init', 'wself_3', 'theta_3', 'log_tau_3', 'w_3_0', 'w_3_1', 'w_3_2', 'w_3_4',  
'w_3_5', 'x_init', 'wself_4', 'theta_4', 'log_tau_4', 'w_4_2', 'w_4_3', 'w_4_0',  
'w_4_1', 'w_4_5', 'X_4_init', 'w_5_2', 'w_5_3', 'w_5_0', 'w_5_1', 'w_5_4',  
'X_5_init']
```

```
generateEnsemble_parallel: Generating parameter ensemble with 20 total members,  
using 4 processors.
```

```
SloppyCellFittingModel.fitToData: Cost = 3622613.5377191603 ( 0 )  
SloppyCellFittingModel.fitToData: Cost = 3630605.3859811774 ( 0 )  
SloppyCellFittingModel.fitToData: Cost = 3630001.64490756 ( 0 )  
SloppyCellFittingModel.fitToData: Cost = 3631997.8147979276 ( 0 )  
SloppyCellFittingModel.fitToData: Cost = 3629493.204122583 ( 0 )  
SloppyCellFittingModel.fitToData: Cost = 3627218.351343738 ( 1 )  
SloppyCellFittingModel.fitToData: Cost = 3631389.510549964 ( 0 )  
SloppyCellFittingModel.fitToData: Cost = 3633203.579892534 ( 0 )  
SloppyCellFittingModel.fitToData: Cost = 3633031.562792548 ( 0 )  
SloppyCellFittingModel.fitToData: Cost = 3632634.78598853 ( 1 )  
SloppyCellFittingModel.fitToData: Best-fit cost = 3622613.5377191603
```

```
fittingProblem.fitAll: L = -1812982.3203574626
```

```
running build_ext
```

```
running build_src
```

```
build_src
```

```
building extension
```

```
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_885828_1015976861_96023"
```

```
sources
```

```
f2py options: []
```

```
f2py:
```

```
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_885828_1015976861_96023.pyf
```

```
Reading fortran codes...
```

```
    Reading file 'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_885828  
_1015976861_96023.pyf' (format:free)
```

```
Post-processing...
```

```
Block:
```

```
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_885828_1015976861_96023
```

```
Block: res_function
```

```
Block: ddaskr_jac
```

```
Block: root_func
```

```
Block: alg_deriv_func
```

```
Block: alg_res_func
```

```
Block: dres_dc_function
```

```
Block: dres_dcdot_function
```

```
Block: dres_dwself_2
```

```
Block: dres_dtheta_2
```

```
Block: dres_dlog_tau_2
```

```
Block: dres_dw_2_0
```

```
Block: dres_dw_2_1
```

```
Block: dres_dw_2_3
```

```
Block: dres_dw_2_4
```

```
Block: dres_dw_2_5
```

```

Block: dres_dm_init
Block: dres_dwself_3
Block: dres_dtheta_3
Block: dres_dlog_tau_3
Block: dres_dw_3_0
Block: dres_dw_3_1
Block: dres_dw_3_2
Block: dres_dw_3_4
Block: dres_dw_3_5
Block: dres_dx_init
Block: dres_dwself_4
Block: dres_dtheta_4
Block: dres_dlog_tau_4
Block: dres_dw_4_2
Block: dres_dw_4_3
Block: dres_dw_4_0
Block: dres_dw_4_1
Block: dres_dw_4_5
Block: dres_dX_4_init
Block: dres_dwself_5
Block: dres_dtheta_5
Block: dres_dlog_tau_5
Block: dres_dw_5_2
Block: dres_dw_5_3
Block: dres_dw_5_0
Block: dres_dw_5_1
Block: dres_dw_5_4
Block: dres_dX_5_init
Block: sens_rhs
Block: res_function_logdv
Block: root_func_logdv
Block: sens_rhs_logdv
Block: integrate_stochastic_tidbit

```

Post-processing (stage 2)...

Building modules...

Building module

```

"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_885828_1015976861_96023"...
  Constructing wrapper function "res_function"...
    residual = res_function(time,dynamicVars,yprime,constants)
  Constructing wrapper function "ddaskr_jac"...
    pd = ddaskr_jac(t,y,yprime,cj,rpar)
  Constructing wrapper function "root_func"...
    root_devs = root_func(t,y,yp,constants)
  Constructing wrapper function "alg_deriv_func"...
    alg_derivs_res =
alg_deriv_func(alg_yp,dynamicVars,yp,time,constants)
  Constructing wrapper function "alg_res_func"...
    residual = alg_res_func(alg_vals,dynamicVars,time,constants)

```



```

Constructing wrapper function "dres_dc_function"...
  pd = dres_dc_function(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dcdot_function"...
  pd = dres_dcdot_function(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_2"...
  pd = dres_dwself_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dtheta_2"...
  pd = dres_dtheta_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_2"...
  pd = dres_dlog_tau_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_0"...
  pd = dres_dw_2_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_1"...
  pd = dres_dw_2_1(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_3"...
  pd = dres_dw_2_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_4"...
  pd = dres_dw_2_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_2_5"...
  pd = dres_dw_2_5(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dm_init"...
  pd = dres_dm_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_3"...
  pd = dres_dwself_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dtheta_3"...
  pd = dres_dtheta_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_3"...
  pd = dres_dlog_tau_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_0"...
  pd = dres_dw_3_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_1"...
  pd = dres_dw_3_1(time,dynamicVars,yprime,constants)

```

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

<string>:1: SyntaxWarning: 'int' object is not subscriptable; perhaps you missed a comma?

```

Constructing wrapper function "dres_dw_3_2"...

```

```

    pd = dres_dw_3_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_4"...
    pd = dres_dw_3_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_3_5"...
    pd = dres_dw_3_5(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dx_init"...
    pd = dres_dx_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_4"...
    pd = dres_dwself_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dtheta_4"...
    pd = dres_dtheta_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_4"...
    pd = dres_dlog_tau_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_2"...
    pd = dres_dw_4_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_3"...
    pd = dres_dw_4_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_0"...
    pd = dres_dw_4_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_1"...
    pd = dres_dw_4_1(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_4_5"...
    pd = dres_dw_4_5(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dX_4_init"...
    pd = dres_dX_4_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dwself_5"...
    pd = dres_dwself_5(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dtheta_5"...
    pd = dres_dtheta_5(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dlog_tau_5"...
    pd = dres_dlog_tau_5(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_5_2"...
    pd = dres_dw_5_2(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_5_3"...
    pd = dres_dw_5_3(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_5_0"...
    pd = dres_dw_5_0(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_5_1"...
    pd = dres_dw_5_1(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dw_5_4"...
    pd = dres_dw_5_4(time,dynamicVars,yprime,constants)
Constructing wrapper function "dres_dX_5_init"...
    pd = dres_dX_5_init(time,dynamicVars,yprime,constants)
Constructing wrapper function "sens_rhs"...
    sens_res = sens_rhs(time,sens_y,sens_yp,constants)
Constructing wrapper function "res_function_logdv"...
    residual = res_function_logdv(time,log_dv,log_yp,constants)
Constructing wrapper function "root_func_logdv"...

```

```

    root_devs = root_func_logdv(t,log_dv,log_yp,constants)
Constructing wrapper function "sens_rhs_logdv"...
    sens_res =
sens_rhs_logdv(time,sens_y_log,sens_yp_log,constants)
    Constructing wrapper function "integrate_stochastic_tidbit"...
    time_ptr,dv,stop_time_ptr,trajectory = integrate_stochastic_ti
dbit(seed_ptr,reseed,time_ptr,dv,cv,rmsd_ptr,stop_time_ptr)
    Wrote C/API module
"CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_885828_1015976861_96023" to
file "./CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_885828_1015976861_96
023module.c"
    adding 'build/src.macosx-10.9-x86_64-3.8/./fortranobject.c' to sources.
    adding 'build/src.macosx-10.9-x86_64-3.8/.' to include_dirs.
copying /Users/penguinaugustus/opt/anaconda3/lib/python3.8/site-
packages/numpy/f2py/src/fortranobject.c -> build/src.macosx-10.9-x86_64-3.8/.

WARNING:ReactionNetworks.Components:Failed to import dynamically compiled C
module
CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_885828_1015976861_96023 for
network CTSN.
WARNING:ReactionNetworks.Components:No module named
'CTSN_0_wirelessprv_10_194_237_143_near_illinois_edu_885828_1015976861_96023'

***STDOUT***
b''
***STDERR***
b''
SloppyCellFittingModel.fitToData: generating ensemble for these parameters:
['wself_2', 'theta_2', 'log_tau_2', 'w_2_0', 'w_2_1', 'w_2_3', 'w_2_4', 'w_2_5',
'm_init', 'wself_3', 'theta_3', 'log_tau_3', 'w_3_0', 'w_3_1', 'w_3_2', 'w_3_4',
'w_3_5', 'x_init', 'wself_4', 'theta_4', 'log_tau_4', 'w_4_2', 'w_4_3', 'w_4_0',
'w_4_1', 'w_4_5', 'X_4_init', 'wself_5', 'theta_5', 'log_tau_5', 'w_5_2',
'w_5_3', 'w_5_0', 'w_5_1', 'w_5_4', 'X_5_init']
generateEnsemble_parallel: Generating parameter ensemble with 20 total members,
using 4 processors.
SloppyCellFittingModel.fitToData: Cost = 3604850.583832398 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3596353.1582957665 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3600740.268017934 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3605196.460037235 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3599593.772232744 ( 1 )
SloppyCellFittingModel.fitToData: Cost = 3602473.30454755 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3601274.916024085 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3601593.6328081237 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3603431.5466928994 ( 0 )
SloppyCellFittingModel.fitToData: Cost = 3602783.59824033 ( 0 )
SloppyCellFittingModel.fitToData: Best-fit cost = 3596353.1582957665
fittingProblem.fitAll: L = -1800004.796306189

```

4 Analyze the selected model

Here we plot predicted timecourses from the selected model for the first 10 in-sample initial conditions, using `plotBestModelResults`:

```
[14]: plt.figure(figsize=(20,2))
a = p.plotBestModelResults(plotInitialConditions=True,indices=range(10));

for i in range(len(a[0])):
    a[0][i].plot(RNAtheoreticalData[0], RNAtheoreticalData[1+i],linewidth=1)
    a[1][i].plot(ktheoreticaldata[0], ktheoreticaldata[1+i],linewidth=1)
plt.show()
```

maxLogLikelihoodName: Warning: Only 9 of 9 fits have been performed.

maxLogLikelihoodName: bestIndex > maxIndex. Returning None.

```
-----
AttributeError                                Traceback (most recent call last)
<ipython-input-14-204fc9c0e868> in <module>
      1 plt.figure(figsize=(20,2))
----> 2 a = p.plotBestModelResults(plotInitialConditions=True,indices=range(10) ;
      3
      4 for i in range(len(a[0])):
      5     a[0][i].plot(RNAtheoreticalData[0],
↳RNAtheoreticalData[1+i],linewidth=1)

~/SirIsaac/SirIsaac/fittingProblem.py in plotBestModelResults(self, modelName,
↳maxIndex, verbose, **kwargs)
      750     m = self.getBestModel(modelName=modelName,maxIndex=maxIndex,
      751                           verbose=verbose)
--> 752     return self.plotModelResults(m,**kwargs)
      753
      754

~/SirIsaac/SirIsaac/fittingProblem.py in plotModelResults(self, model, filename
↳indices, plotFittingData, outOfSampleData, **kwargs)
      711
      712     # plot model results
--> 713     plots = m.plotResults(fittingData,indepParamsList,
      714                           plotFittingData=plotFittingData,
      715                           outOfSampleData=outData,**kwargs)

AttributeError: 'NoneType' object has no attribute 'plotResults'
```

<Figure size 1440x144 with 0 Axes>

4.1 comment: error bar is too large!!

And now for out-of-sample data:

```
[15]: plt.figure(figsize=(20,2))
m = p.getBestModel()
b=m.plotResults(sirIsaacData[20:30],indepParamsList[20:30],
                plotInitialConditions=True,plotFittingData=True);
for i in range(len(a[0])):
    b[0][i].plot(RNAtheoreticalData[0], RNAtheoreticalData[1+i],linewidth=1)
    b[1][i].plot(ktheoreticaldata[0], ktheoreticaldata[1+i],linewidth=1)
plt.show()
```

maxLogLikelihoodName: Warning: Only 9 of 9 fits have been performed.

maxLogLikelihoodName: bestIndex > maxIndex. Returning None.

```
-----
AttributeError                                Traceback (most recent call last)
<ipython-input-15-86f969c63866> in <module>
      1 plt.figure(figsize=(20,2))
      2 m = p.getBestModel()
----> 3 b=m.plotResults(sirIsaacData[20:30],indepParamsList[20:30],
      4                 plotInitialConditions=True,plotFittingData=True);
      5 for i in range(len(a[0])):

AttributeError: 'NoneType' object has no attribute 'plotResults'
```

<Figure size 1440x144 with 0 Axes>

We can look at the selected model's parameters:

```
[ ]: m = p.getBestModel()
print(m.getParameters())
```

The following will use SloppyCell to output a latex file with the ODEs describing the selected model:

```
[ ]: m = p.getBestModel()
fittingProblem.IO.eqns_TeX_file(m.net,filename='mRNAconcentrationS2.tex')
```

```
[ ]: import os
print(os.getcwd())
```

$$k_0 = k_{tx}$$

$$\delta_m = k_{md}$$

$$k_1 = k_{tr}$$

$$\delta_p = k_{pd}$$

```

[ ]: import numpy as np
import matplotlib.pyplot as plt

def mRNA(m0, k0, delta_m, t):
    m_t = np.exp(-t * delta_m) * ((-1 + np.exp(t * delta_m)) * k0 + m0 *
    ↪delta_m) / delta_m
    return m_t

def Protein(m0, p0, k0, k1, delta_m, delta_p, t):
    p_t = (1 / (delta_m * (delta_m - delta_p) * delta_p)) * np.exp(-t *
    ↪(delta_m + delta_p)) * (
        np.exp(t * (delta_m + delta_p)) * k0 * k1 * (delta_m - delta_p)
    ↪+
        np.exp(t * delta_p) * k1 * (k0 - m0 * delta_m) * delta_p +
        np.exp(t * delta_m) * delta_m * (-k0 * k1 + k1 * m0 * delta_p +
    ↪p0 * (delta_m - delta_p) * delta_p
    )
    return p_t

# Define the parameter values
m0 = 0
p0 = 0
k0 = 1.91
k1 = 33.3
delta_m = 0.279
delta_p = 0.0448

# Generate an array of t values
t = np.linspace(0, 60, 300)

# Calculate the mRNA and protein values
mRNA_values = mRNA(m0, k0, delta_m, t)
protein_values = Protein(m0, p0, k0, k1, delta_m, delta_p, t)

# Create the figure and the first axis
fig, ax1 = plt.subplots()

# Plot the mRNA function
ax1.plot(t, mRNA_values, color='tab:red', label='mRNA')
ax1.set_ylabel('mRNA', color='tab:red')

# Create the second axis sharing the x-axis with the first axis
ax2 = ax1.twinx()

# Plot the protein function
ax2.plot(t, protein_values, color='tab:blue', label='Protein')
ax2.set_ylabel('Protein', color='tab:blue')

```

```
# Set y-axis limits for each axis
ax1.set_ylim(0, 7)
ax2.set_ylim(0, 5000)

# Set labels and title
plt.xlabel('t')
plt.title('mRNA and Protein')

# Add legends
ax1.legend(loc='upper left')
ax2.legend(loc='upper right')

# Display the plot
plt.show()
```

```
[ ]: import os
      os.getcwd()
```