

Summary of example:

The input data file ("131117-C2_short.dat") contains one voltage trace obtained from a hippocampal CA1 pyramidal cell by using current clamp.

The cell was excited by a short 500pA and by a long 10pA pulse injected into the soma, so you have to use the provided stimuli file (for this, select the "Custom Waveform" option from the dropdown menu on the stimuli layer and then load the file: "cell2_stim.dat").

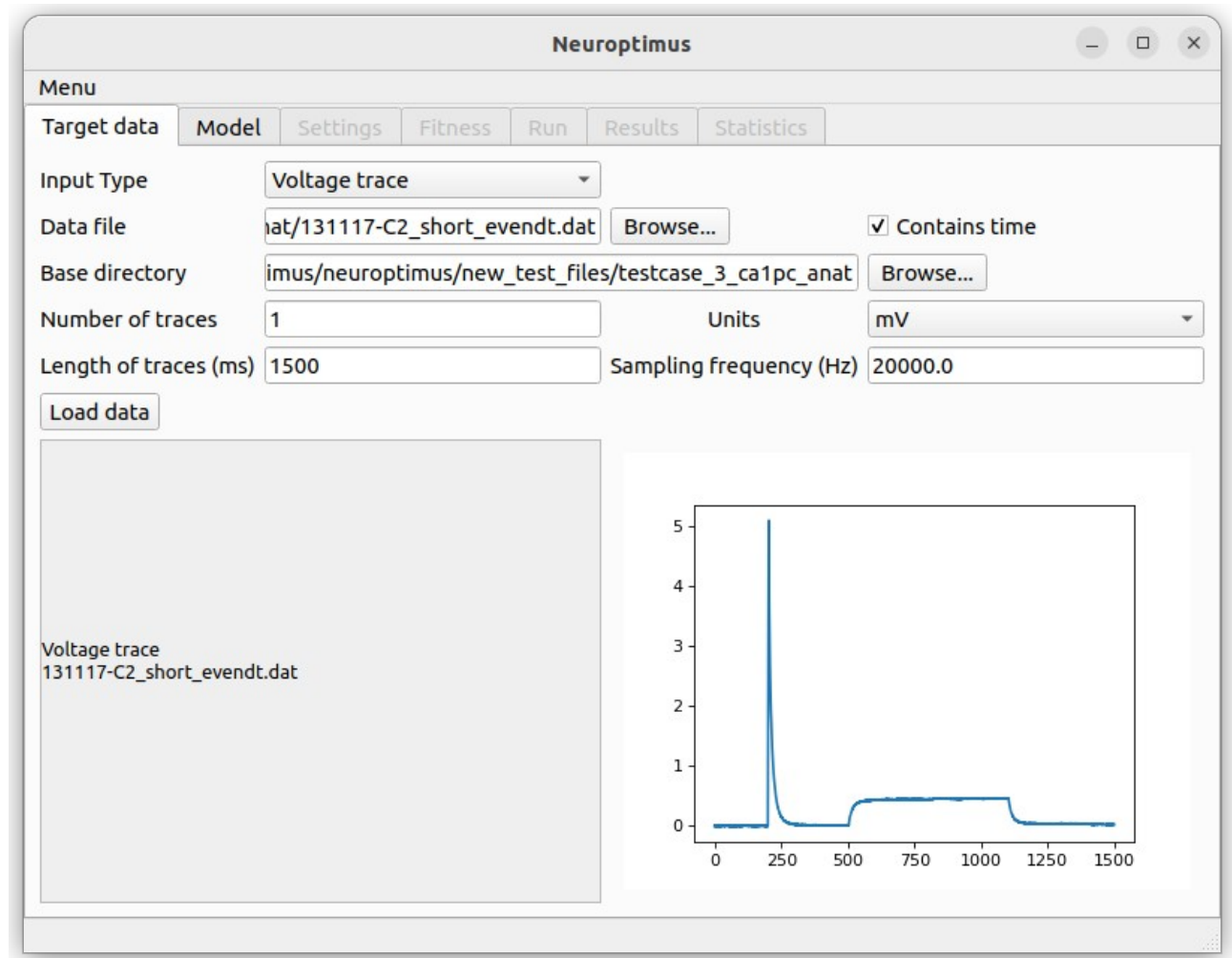
The data trace is 1500ms long and the sampling frequency was 20kHz.

The provided model is a passive one and it's based on a precise reconstruction, and we are interested in the cm , R_a , g_{pas} parameters.

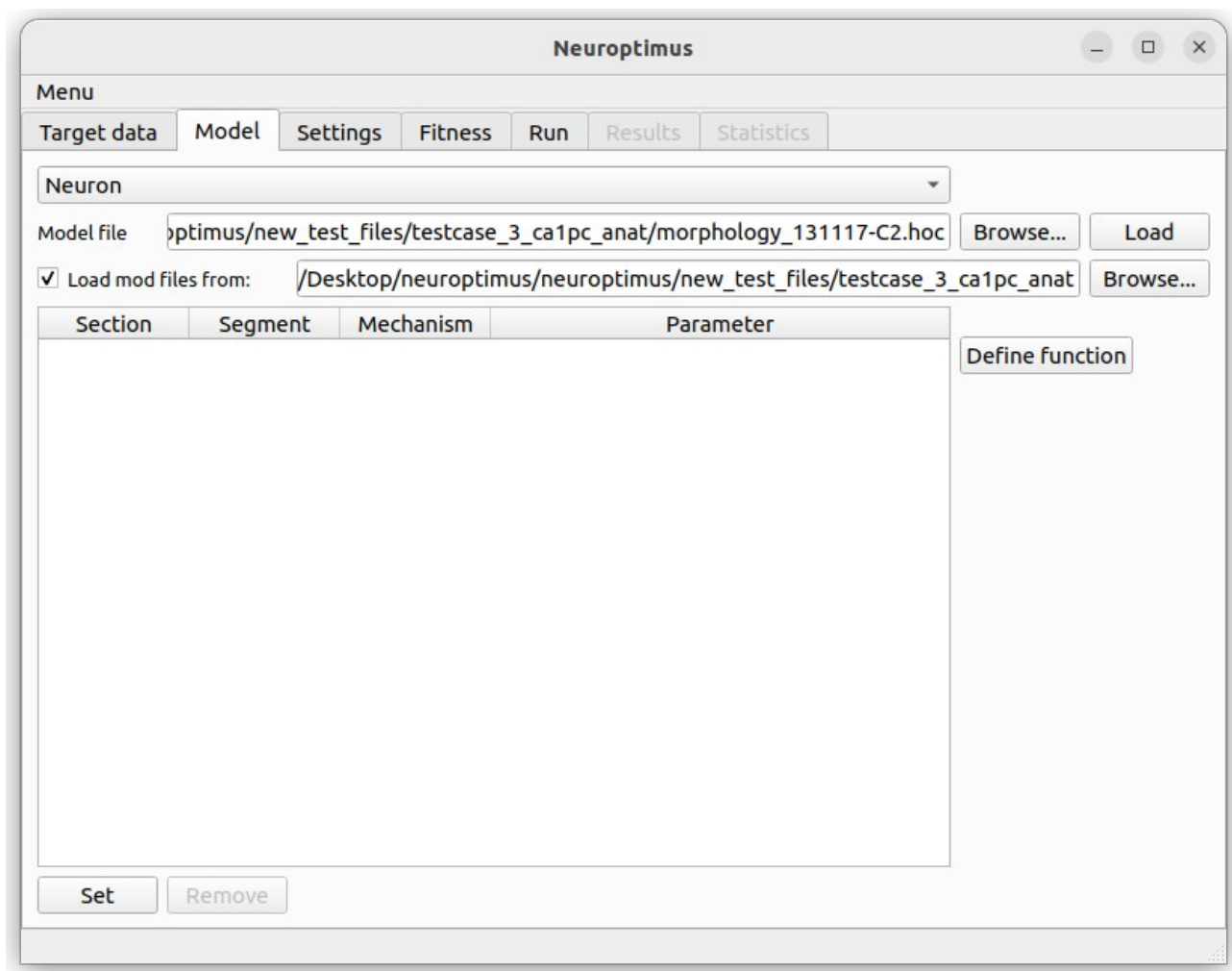
Because we had to set the e_{pas} parameter to 0 and we wanted to optimize the previous parameters in every section, we created a function to do this for us (see "udeffun_pyr_3param.txt"), you can load this on the model selection layer.

Step-by-step instructions to run the example from the Neuroptimus GUI:

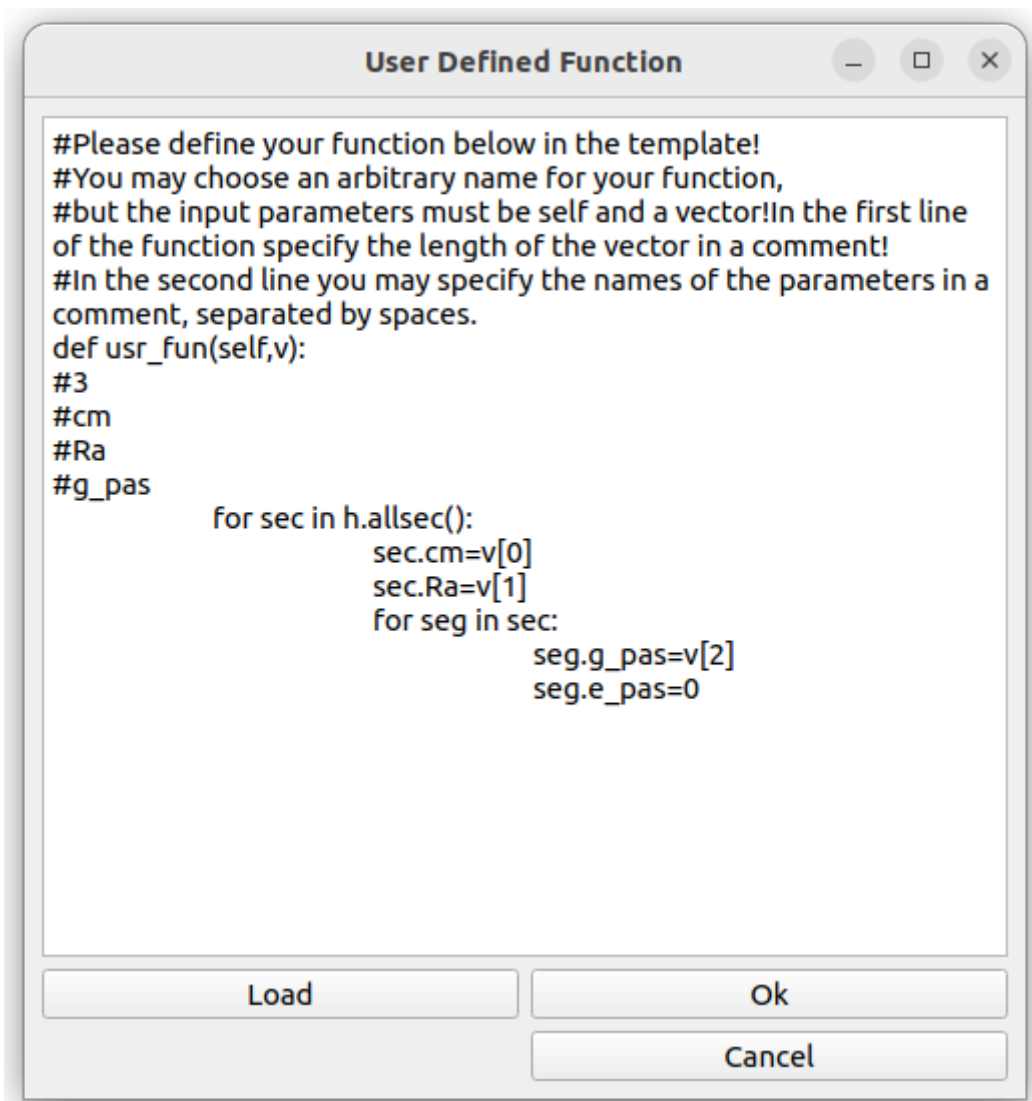
Run „python3 neuroptimus.py -g” to start the GUI



At 'Data File' load the target data, at 'Base Directory' choose the directory where you want to save the results. Fill out all the cells and press 'Load data'. Go on by pressing the Model Tab.



Browse to the model file and press 'Load'.



Press the 'Define Function' button to load the user defined function (the text file 'udeffun_pyr_3param.txt' in the folder of the model):
Press 'Ok', then go on by pressing the Settings tab.

Neuroptimus

Menu

Target data
Model
Settings
Fitness
Run
Results
Statistics

Stimulus Mode

Stimulation protocol
IClamp

Stimulus Type
Custom Waveform

Load Waveform

Stimulation Time Settings

Delay (ms)
0

Duration (ms)
1e9

Stimulus Position Configuration

Section
soma

Position inside section
0.5

Recording Settings

Parameter to record
v

Section
soma

Position inside section
0.5

Simulation Settings

Initial voltage (mV)
-65

tstop (ms)
1500.0

Time step
0.05

Choose 'Custom Waveform' as 'Stimulus Type', then press 'Load Waveform' to load the file: cell2_stim.dat
Go on by pressing the Fitness Tab.

Neuroptimus

Menu

Target dataModelSettingsFitnessRunResultsStatistics

Normalize

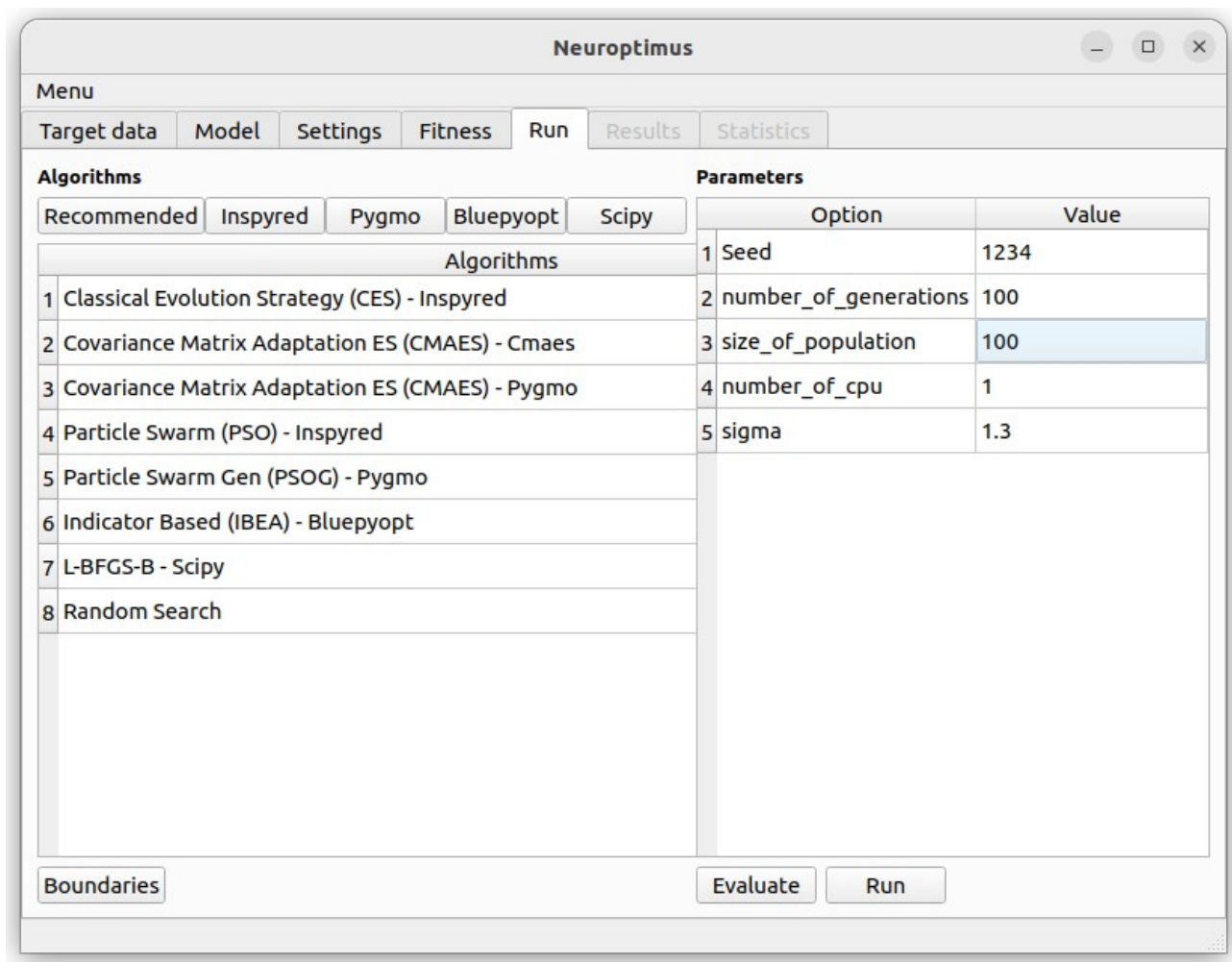
	Fitness functions	Weights
1	MSE	1.0
2	MSE (excl. spikes)	0
3	Spike count	0
4	Spike count (stim.)	0
5	ISI differences	0
6	Latency to 1st spike	0
7	AP amplitude	0
8	AHP depth	0
9	AP width	0
10	Derivative difference	0

Spike Detection Parameters

Spike detection tresh. (mV)
0.0

Spike window (ms)
1.0

Choose the 'MSE' fitness function, and set its weight to 1. Go on by pressing the Run Tab.

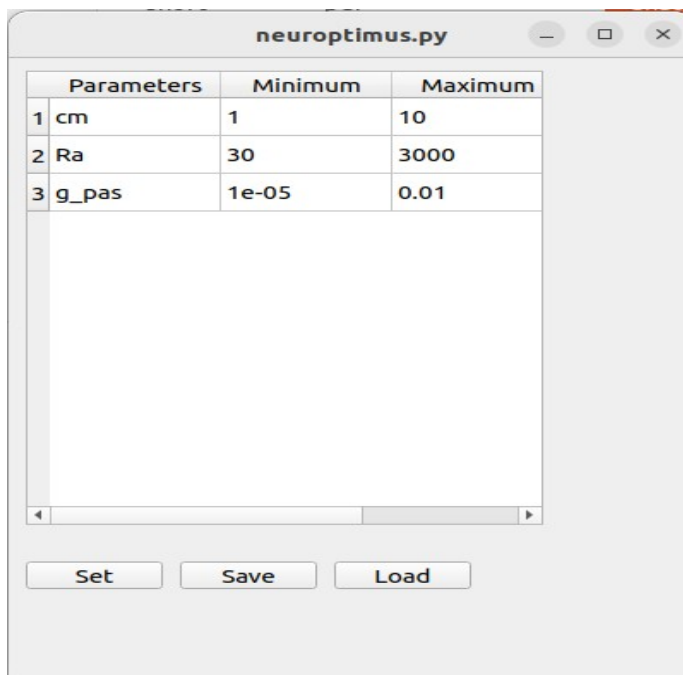


Select an algorithm, and set its parameters.

Press the 'Boundaries' button to define the boundaries of the parameters to be optimized:

Press 'Set'.

Boundaries can also be loaded from a file.



Start the optimization pressing the 'Run' button.