MNPoolWithRenshawCells

Julius C. F. Schulz

January 30, 2017

Input #1

```
import sys
sys.path.insert(0, '..')
import time
import matplotlib.pyplot as plt
%matplotlib inline
from IPython.display import set_matplotlib_formats
set_matplotlib_formats('pdf', 'png')
plt.rcParams['savefig.dpi'] = 75

plt.rcParams['figure.autolayout'] = False
plt.rcParams['figure.figsize'] = 10, 6
plt.rcParams['axes.labelsize'] = 18
plt.rcParams['axes.titlesize'] = 20
plt.rcParams['font.size'] = 16
plt.rcParams['lines.linewidth'] = 2.0
plt.rcParams['lines.markersize'] = 8
plt.rcParams['legend.fontsize'] = 14

plt.rcParams['text.usetex'] = True
plt.rcParams['font.family'] = "serif"
plt.rcParams['font.serif'] = "cm"
plt.rcParams['text.latex.preamble'] = "\usepackage{subdepth}, \usepackage{type1cm}"

import numpy as np

from Configuration import Configuration
from MotorUnitPool import MotorUnitPool
from InterneuronPool import InterneuronPool
from NeuralTract import NeuralTract
from SynapsesFactory import SynapsesFactory
```

Input #2

```
conf = Configuration('confMNPoolWithRenshawCells.rmto')
conf.simDuration_ms = 5000 # Here I change simulation duration without changing the Configu
```

Input #3

```
# Time vector for the simulation
t = np.arange(0.0, conf.simDuration_ms, conf.timeStep_ms)

membPotential = np.zeros_like(t, dtype = 'd')
```

Input #4

```
pools = dict()
pools[0] = MotorUnitPool(conf, 'SOL')
pools[1] = NeuralTract(conf, 'CMExt')
pools[2] = InterneuronPool(conf, 'RC')

Syn = SynapsesFactory(conf, pools)
```

Output #4

```
Motor Unit Pool SOL built
Descending Command CMExt built
Interneuron Pool of RC built
Synaptic Noise on RC built
All the 124633 synapses were built
```

Input #5

```
tic = time.clock()
for i in xrange(0, len(t)-1):
    pools[1].atualizePool(t[i]) # NeuralTract
    pools[0].atualizeMotorUnitPool(t[i]) # MN pool
    pools[3].atualizePool(t[i]) # RC synaptic Noise
    pools[2].atualizeInterneuronPool(t[i]) # RC pool
toc = time.clock()
print str(toc - tic) + ' seconds'
```

Output #5

```
13950.211544 seconds
```

Input #6

```
pools[0].listSpikes()
pools[1].listSpikes()
pools[2].listSpikes()
```

Input #7

```
plt.figure()
plt.plot(pools[1].poolTerminalSpikes[:, 0],
         pools[1].poolTerminalSpikes[:, 1]+1, '.')
plt.xlabel('t (ms)')
plt.ylabel('Descending Command index')
```

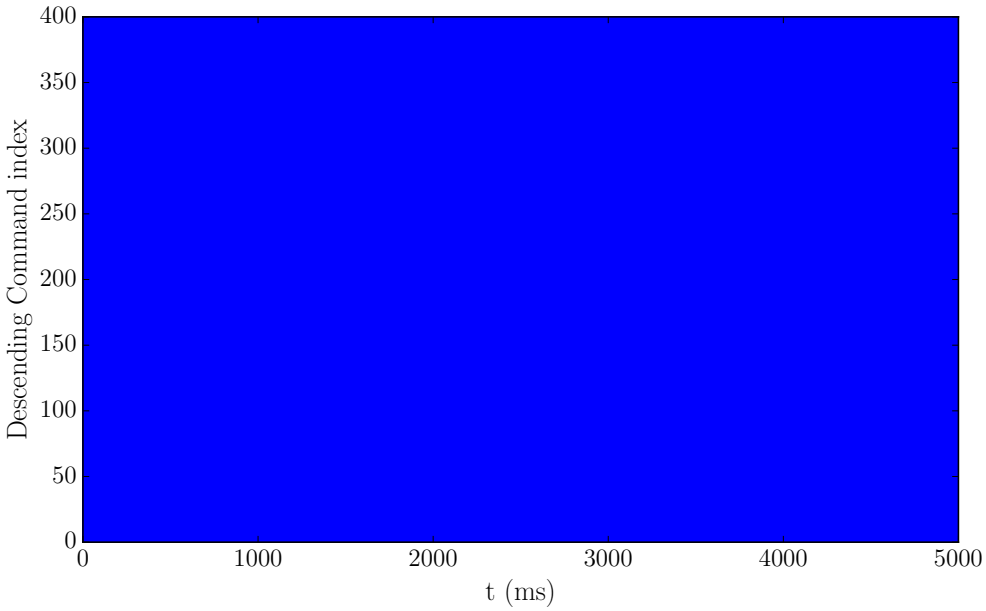
Output #7

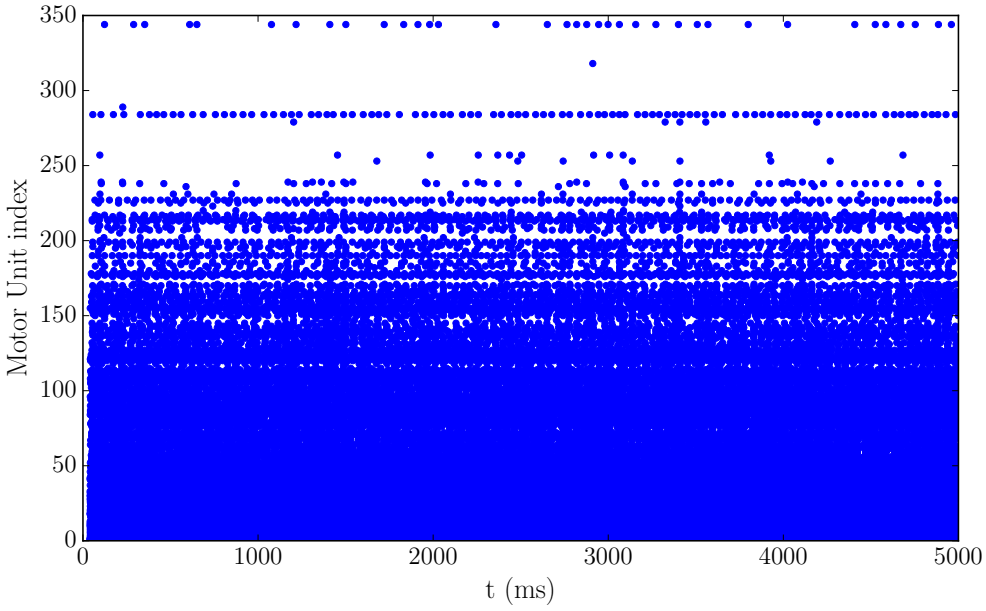
```
Out[7]: <matplotlib.text.Text at 0x7f8acffe98d0>
```

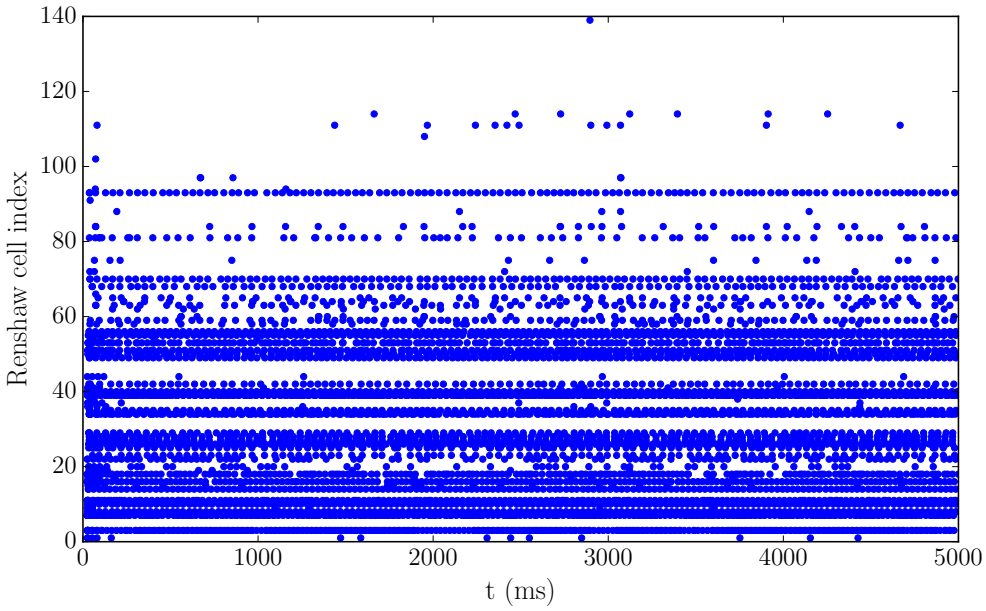
Input #8

```
plt.figure()
plt.plot(pools[0].poolTerminalSpikes[:, 0],
         pools[0].poolTerminalSpikes[:, 1]+1, '.')
plt.xlabel('t (ms)')
plt.ylabel('Motor Unit index')
```

Output #8


Descending Command index
0
50
100
150
200
250
300
350
400
0
1000
2000
3000
4000
5000
t (ms)


Motor Unit index
0
50
100
150
200
250
300
350
0
1000
2000
3000
4000
5000
t (ms)




```
Out[8]: <matplotlib.text.Text at 0x7f8ac7405e50>
```

Input #9

```
plt.figure()
plt.plot(pools[2].poolSomaSpikes[:, 0],
         pools[2].poolSomaSpikes[:, 1]+1, '.')
plt.xlabel('t (ms)')
plt.ylabel('Renshaw cell index')
```

Output #9

```
Out[9]: <matplotlib.text.Text at 0x7f8acd423e50>
```

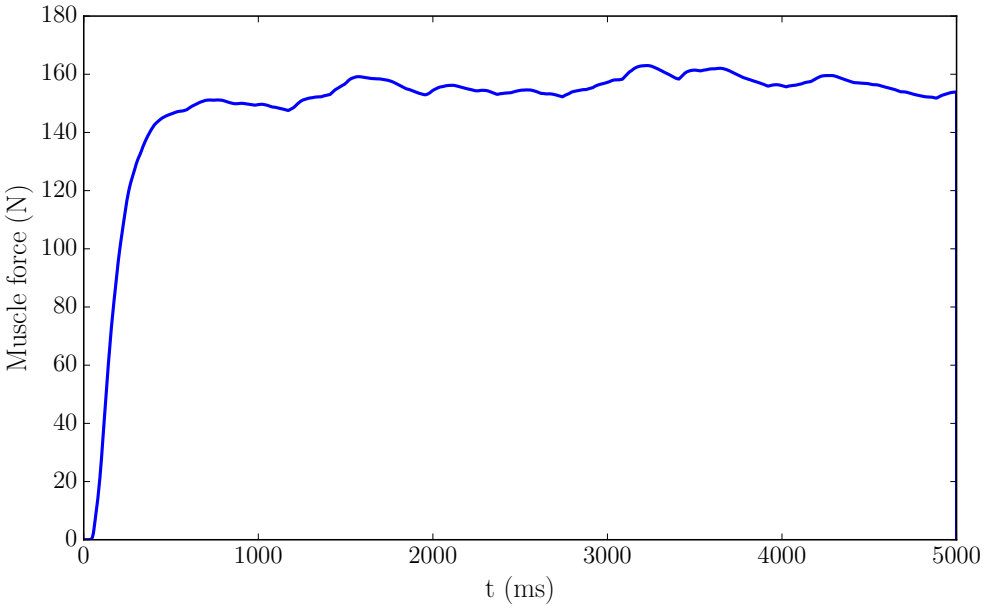
Input #10

```
plt.figure()
plt.plot(t, pools[0].Muscle.force, '-')
plt.xlabel('t (ms)')
plt.ylabel('Muscle force (N)')
```

Output #10

```
Out[10]: <matplotlib.text.Text at 0x7f8aba60ba50>
```

Input #None


180
160
140
120
100
80
60
40
20
0
Muscle force (N)
0
1000
2000
3000
4000
5000
t (ms)