Cardiomyocyte Emulator Training Data

The data presented in this repository is the training data (data set #1) used in our work *Neural network emulation of the human ventricular cardiomyocyte action potential: A tool for more efficient computation in pharmacological studies*, available at https://doi.org/10.7554/eLife.91911. The data set was generated by computing 40,000 cardiomyocyte simulations using the ToR-ORd ionic model by Tomek et al. (*ToR-ORd-dynCl: an update of the ToR-ORd model of human ventricular cardiomyocyte with dynamic intracellular chloride*). It contains both the used maximum conductances and corresponding action potentials (APs).

Usage

The data was created to be easily read into python or matlab based scripts. The file `aps.npz` and `aps.mat` contain the two arrays `t` of shape `[T]` and `aps` of shape `[N, T]`. Usage examples of reading the data and plotting a random AP are shown below.

Python

```python
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

#Loading the data
max_conds_df = pd.read_csv("max_conds.csv").drop("db_index", axis=1) #Ignore the db index
with np.load("aps.npz") as f:
    t, aps = f["t"], f["aps"]

#Selecting a random AP
nr_aps = max_conds_df.shape[0]
ap_i = np.random.choice(nr_aps)

#Plotting/printing the random AP and its maximum conductances
print("Visualizing the simulated AP for the maximum conductances:")
print(max_conds_df.iloc[ap_i])
plt.figure()
plt.plot(t, aps[ap_i])
plt.show()
```

Matlab

```matlab
%Loading the data
max_conds = csvread("max_conds.csv");
max_conds = max_conds(2:end, 1:end-1); %Ignore the header line and db index
load("aps.mat");

%Selecting a random AP
nr_aps = size(max_conds)(1);
ap_i = randi([1, nr_aps]);

%Plotting/printing the random AP and its maximum conductances
disp("Visualizing the simulated AP for the maximum conductances:");
```

```
disp(max_conds(ap_i, :));
figure;
plot(t, aps(ap_i, :));
```

Citation

If you use these data in your research, please cite the publication from which the data originated:

Grandits, T., Augustin, C. M., Haase, G., Jost, N., Mirams, G. R., Niederer, S. A., Plank, G., Varró, A., Virág, L., & Jung, A. (2023). Neural network emulation of the human ventricular cardiomyocyte action potential: A tool for more efficient computation in pharmacological studies. eLife, 12. https://doi.org/10.7554/eLife.91911

```
@article{grandits_neural_2023,
    title = {Neural network emulation of the human ventricular cardiomyocyte action
    potential: a tool for more efficient computation in pharmacological studies},
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