Contents

This script classifies the triggered waveforms acquired on 16.12.2021

1 - Load the trained CNN (model_run_GitHub)

```
CNN = importTensorFlowNetwork('model_run_GitHub');
```

```
Importing the saved model...
Warning: The SavedModel 'model_run_GitHub' was saved in TensorFlow version
'2.8.0'. Import of SavedModel versions newer than '2.6.0' is not supported. The
imported model may not exactly match the model saved in the SavedModel.
Translating the model, this may take a few minutes...
Finished translation. Assembling network...
Warning: Saved Keras networks do not include classes. Classes will be set to
categorical(1:N), where N is the number of classes in the classification output
layer of the network.  To specify classes, use the 'Classes' argument.
Warning: Network issues detected.

Caused by:
    Layer 'ClassificationLayer_dense': Empty Classes property. Classes will be
    set to categorical(1:N), where N is the number of classes.

Import finished.
```

2 - Load a sample .cdf file containing all triggered snapshot waveforms

```
file = dir('solo_L2_rpw-tds-surv-tswf-e_20211004_V01.cdf');
```

3 - Classify the triggered snapshots in file using the loaded CNN

```
% 3.1 Define path to load file from
datapath = '/Users/akv020/Projects/ML classification of dust/GitHub/MatLab_code_cdf_classificaiton';

% 3.2 Use the function "classify_file.m" to classify the snapshoths in file
[labels_CNN,~,~,~,max_amplitude] = classify_file(file.name,datapath,CNN);

% 3.3 Get number of dust impacts and the impact index from the results
number_of_dust = sum(labels_CNN);
index_of_dust = find(labels_CNN==1);
signal_preprocessed = preprocess_cdf(file.name,4,datapath);
signals = [signal_preprocessed{1}; signal_preprocessed{2}];
time_steps = linspace(0,62.5,size(signals,2));
```
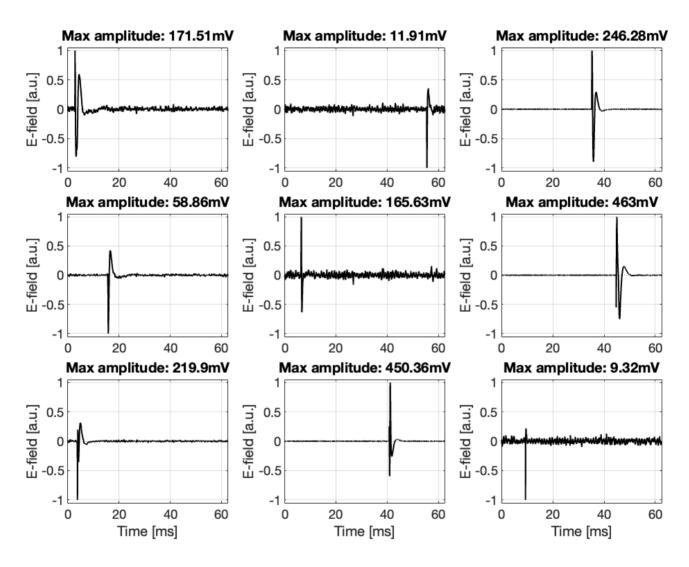
4 - Plot the signals classified as "dust" by the CNN

```
FIG = figure('units','centimeters','position',[1,1,36.0,36.0]);
sx = 0.08;
sy = 0.08;
fz = 18;
lw = 3;

rows = floor(number_of_dust/3);
for i = 1:number_of_dust
    dust_idx = index_of_dust(i);
    signal = squeeze(signals(dust_idx,:,:));

    subplot_tight(rows,3,i,[sx,sy])
```

```
    plot(time_steps,signal(:,2),'k')
    if i > number_of_dust - 3
        xlabel('Time [ms]')
    end
    ylabel('E-field [a.u.]')
    title(['Max amplitude: ',num2str(round(max_amplitude(dust_idx)*1000,2)),'mV']);
    ylim([-1.05 1.05])
    grid on
end
```