
MyoMexExample_DataContinuity

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In this script, we log samples from countMyos devices and then inspect the data to detect cases in which data may have been lost. Since missing data is interpolated by zero order hold, we can only say for sure if no samples have been missed.

Log Data

Configure TIME_DURATION (10 seconds is a good choice) and countMyos before running this script.

```
TIME_DURATION = 20; % seconds
countMyos = 2;

fprintf('Collecting data from %d Myos for roughly %5.2f[s] ... ',...
    countMyos,TIME_DURATION);
mm = MyoMex(countMyos);
tic;
m = mm.myoData;
pause(TIME_DURATION-toc);
mm.delete();
fprintf('Done!\n\n');
```

Collecting data from 2 Myos for roughly 20.00[s] ... Done!

Test Data for Missed Samples

Anonymous function returns logical scalar representing the validity of samples. It returns true if no two consecutive rows have the same values in all columns. Otherwise it returns false.

```
hasDataContinuity = @(x)~any(all((~diff(x))'));

flags = [];
for ii = 1:countMyos
    flags = [flags,hasDataContinuity(m(ii).quat_log)];
    flags = [flags,hasDataContinuity(m(ii).gyro_log)];
    flags = [flags,hasDataContinuity(m(ii).accel_log)];
    if countMyos == 1
        flags = [flags,hasDataContinuity(m(ii).emg_log)];
    end
    fprintf('Estimated sample rate (Myo %d):\n\tIMU: %5.2f[Hz]\tEMG: %5.2f[Hz]\n',...
        ii,length(m(ii).timeIMU_log)/TIME_DURATION,length(m(ii).timeEMG_log)/TIME_DURA
    end
    fprintf('\n');
```

```
fprintf('Data continuity test result:\n\t');
if all(flags)
    fprintf('PASS: No samples were missed\n\n');
else
    fprintf('FAIL: At least one sample was missed\n\n');
end
```

```
Estimated sample rate (Myo 1):
IMU: 49.95[Hz] EMG: 0.00[Hz]
Estimated sample rate (Myo 2):
IMU: 49.85[Hz] EMG: 0.00[Hz]
```

```
Data continuity test result:
PASS: No samples were missed
```

Plot Duplicate Samples

Usually we find that the duplicates are in up to about 15% of the quaternion samples. It may be that the quaternion estimate is actually updated less frequently than it is sampled. Over many 60 second trials, I seldom witness lost data in gyro, accel, or emg. This leads me to believe that we're not actually missing quaternion data.

```
idDuplicates = @(x)all((~diff(x))');

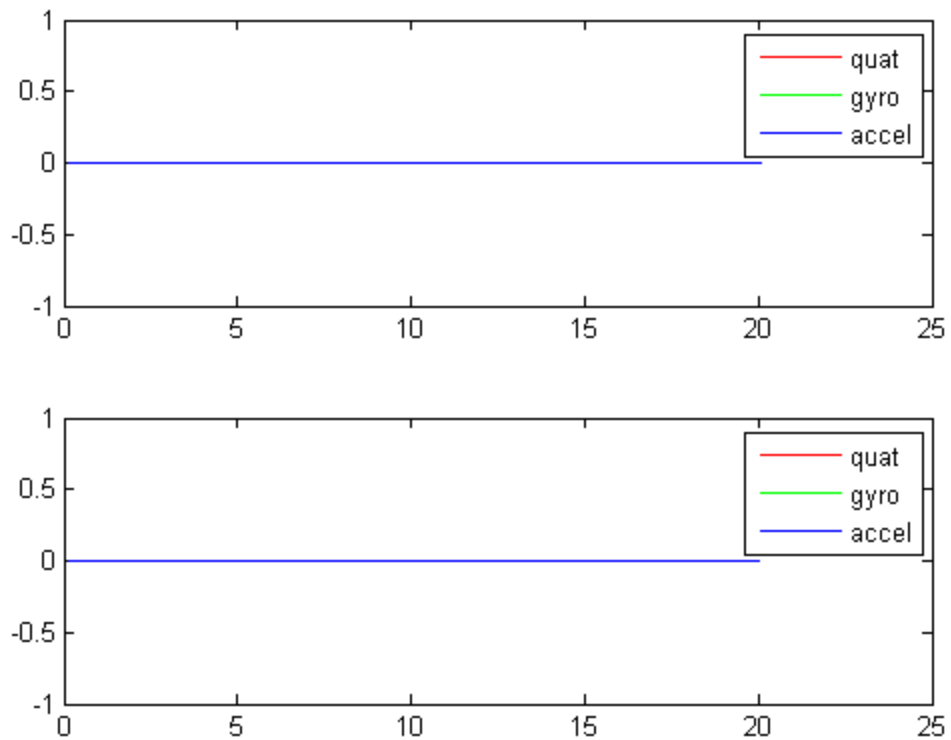
tIMU1 = m(1).timeIMU_log(2:end);
qd1 = idDuplicates(m(1).quat_log);
gd1 = idDuplicates(m(1).gyro_log);
ad1 = idDuplicates(m(1).accel_log);
tIMU2 = m(2).timeIMU_log(2:end);
qd2 = idDuplicates(m(2).quat_log);
gd2 = idDuplicates(m(2).gyro_log);
ad2 = idDuplicates(m(2).accel_log);

if countMyos==1
    tEMG1 = m(1).timeEMG_log(2:end);
    ed1 = idDuplicates(m(1).emg_log);
    tEMG2 = m(2).timeEMG_log(2:end);
    ed2 = idDuplicates(m(2).emg_log);
end

figure;

subplot(2,1,1);
plot(tIMU1,1*qd1,'r',tIMU1,2*gd1,'g',tIMU1,3*ad1,'b'); legCell = {'quat','gyro','a';
if countMyos == 1, hold on; plot(tEMG1,4*ed1,'k'); legCell{4} = 'emg'; end
legend(legCell);

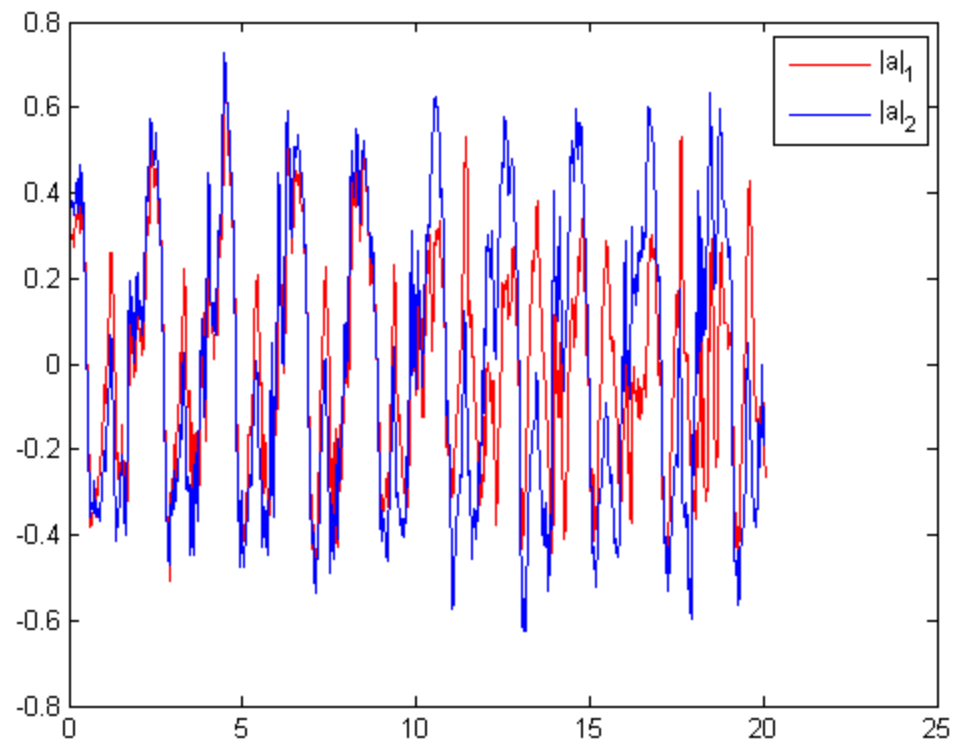
subplot(2,1,2);
plot(tIMU2,1*qd2,'r',tIMU2,2*gd2,'g',tIMU2,3*ad2,'b'); legCell = {'quat','gyro','a';
if countMyos == 1, hold on; plot(tEMG1,4*ed1,'k'); legCell{4} = 'emg'; end
legend(legCell);
```



Plot Acceleration Magnitude

If logging from two Myos, plot the 2 norm of kinematic acceleration to inspect the time-synchronization of signals. You may choose to perform similar motions on the two Myos to visualize the results.

```
if countMyos == 2
    figure;
    an1 = sqrt(sum((m(1).accel_log.^2))-1);
    an2 = sqrt(sum((m(2).accel_log.^2))-1);
    plot(...
        m(1).timeIMU_log,...
        an1-mean(an1), 'r',...
        m(2).timeIMU_log,...
        an2-mean(an2), 'b');
    legend(' |a|_1', ' |a|_2');
end
```



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