Contents

Jumping analysis

```
close all
clearvars
clc
```

load the grfJump.mat

```
load("grfJump.mat");
```

create a function version of the zybook lab, Coding: Jumping analyses

[h_impulse, h_t_air] = do_jump_analyses(jumpdata) this will be a separate .m file

get heights for all trials using the do_jump_analyses you wrote

```
%%CM Jump
%Subjet 1
[S1_CM_Imp_h_trial1, S1_CM_Tair_h_trail1] = do_jump_analyses(S1_CMJump1);
[S1_CM_Imp_h_trial2, S1_CM_Tair_h_trail2] = do_jump_analyses(S1_CMJump2);
[S1_CM_Imp_h_trial3, S1_CM_Tair_h_trail3] = do_jump_analyses(S1_CMJump3);
[S1_CM_Imp_h_trial4, S1_CM_Tair_h_trail4] = do_jump_analyses(S1_CMJump4);
[S1_CM_Imp_h_trial5, S1_CM_Tair_h_trail5] = do_jump_analyses(S1_CMJump5);
%Subject 4
[S4_CM_Imp_h_trial1, S4_CM_Tair_h_trail1] = do_jump_analyses(S4_CMJump1);
[S4_CM_Imp_h_trial2, S4_CM_Tair_h_trail2] = do_jump_analyses(S4_CMJump2);
[S4_CM_Imp_h_trial3, S4_CM_Tair_h_trail3] = do_jump_analyses(S4_CMJump3);
[S4_CM_Imp_h_trial4, S4_CM_Tair_h_trail4] = do_jump_analyses(S4_CMJump4);
[S4_CM_Imp_h_trial5, S4_CM_Tair_h_trail5] = do_jump_analyses(S4_CMJump5);
%Subject 5
[S5_CM_Imp_h_trial1, S5_CM_Tair_h_trail1] = do_jump_analyses(S5_CMJump1);
[S5_CM_Imp_h_trial2, S5_CM_Tair_h_trail2] = do_jump_analyses(S5_CMJump2);
[S5_CM_Imp_h_trial3, S5_CM_Tair_h_trail3] = do_jump_analyses(S5_CMJump3);
[S5_CM_Imp_h_trial4, S5_CM_Tair_h_trail4] = do_jump_analyses(S5_CMJump4);
[S5_CM_Imp_h_trial5, S5_CM_Tair_h_trail5] = do_jump_analyses(S5_CMJump5);

%%Squat Jump
%Subjet 1
[S1_SJ_Imp_h_trial1, S1_SJ_Tair_h_trail1] = do_jump_analyses(S1_squatJump1);
[S1_SJ_Imp_h_trial2, S1_SJ_Tair_h_trail2] = do_jump_analyses(S1_squatJump2);
[S1_SJ_Imp_h_trial3, S1_SJ_Tair_h_trail3] = do_jump_analyses(S1_squatJump3);
[S1_SJ_Imp_h_trial4, S1_SJ_Tair_h_trail4] = do_jump_analyses(S1_squatJump4);
[S1_SJ_Imp_h_trial5, S1_SJ_Tair_h_trail5] = do_jump_analyses(S1_squatJump5);
%Subject 4
[S4_SJ_Imp_h_trial1, S4_SJ_Tair_h_trail1] = do_jump_analyses(S4_squatJump1);
[S4_SJ_Imp_h_trial2, S4_SJ_Tair_h_trail2] = do_jump_analyses(S4_squatJump2);
[S4_SJ_Imp_h_trial3, S4_SJ_Tair_h_trail3] = do_jump_analyses(S4_squatJump3);
[S4_SJ_Imp_h_trial4, S4_SJ_Tair_h_trail4] = do_jump_analyses(S4_squatJump4);
[S4_SJ_Imp_h_trial5, S4_SJ_Tair_h_trail5] = do_jump_analyses(S4_squatJump5);
%Subject 5
[S5_SJ_Imp_h_trial1, S5_SJ_Tair_h_trail1] = do_jump_analyses(S5_squatJump1);
[S5_SJ_Imp_h_trial2, S5_SJ_Tair_h_trail2] = do_jump_analyses(S5_squatJump2);
[S5_SJ_Imp_h_trial3, S5_SJ_Tair_h_trail3] = do_jump_analyses(S5_squatJump3);
[S5_SJ_Imp_h_trial4, S5_SJ_Tair_h_trail4] = do_jump_analyses(S5_squatJump4);
[S5_SJ_Imp_h_trial5, S5_SJ_Tair_h_trail5] = do_jump_analyses(S5_squatJump5);
```

```
Height (Impulse-Momentum): 0.24173 m
Height (Time in Air): 0.2374 m
Height (Impulse-Momentum): 0.26751 m
Height (Time in Air): 0.25164 m
Height (Impulse-Momentum): 0.27348 m
Height (Time in Air): 0.24283 m
Height (Impulse-Momentum): 0.23298 m
Height (Time in Air): 0.23632 m
Height (Impulse-Momentum): 0.26207 m
Height (Time in Air): 0.24392 m
Height (Impulse-Momentum): 0.21029 m
Height (Time in Air): 0.20815 m
Height (Impulse-Momentum): 0.20871 m
Height (Time in Air): 0.21221 m
Height (Impulse-Momentum): 0.19963 m
Height (Time in Air): 0.19327 m
Height (Impulse-Momentum): 0.20404 m
Height (Time in Air): 0.20513 m
Height (Impulse-Momentum): 0.20858 m
Height (Time in Air): 0.19718 m
Height (Impulse-Momentum): 0.27615 m
Height (Time in Air): 0.25835 m
Height (Impulse-Momentum): 0.26448 m
Height (Time in Air): 0.25386 m
Height (Impulse-Momentum): 0.25157 m
Height (Time in Air): 0.23632 m
Height (Impulse-Momentum): 0.26913 m
Height (Time in Air): 0.25386 m
Height (Impulse-Momentum): 0.26583 m
Height (Time in Air): 0.25498 m
Height (Impulse-Momentum): 0.21193 m
Height (Time in Air): 0.21528 m
Height (Impulse-Momentum): 0.20071 m
Height (Time in Air): 0.20413 m
Height (Impulse-Momentum): 0.20797 m
Height (Time in Air): 0.20916 m
Height (Impulse-Momentum): 0.21284 m
Height (Time in Air): 0.21528 m
Height (Impulse-Momentum): 0.18591 m
Height (Time in Air): 0.1846 m
Height (Impulse-Momentum): 0.17248 m
Height (Time in Air): 0.178 m
Height (Impulse-Momentum): 0.19464 m
Height (Time in Air): 0.19036 m
Height (Impulse-Momentum): 0.18855 m
Height (Time in Air): 0.18651 m
Height (Impulse-Momentum): 0.17731 m
Height (Time in Air): 0.16697 m
Height (Impulse-Momentum): 0.18308 m
Height (Time in Air): 0.178 m
Height (Impulse-Momentum): 0.19214 m
Height (Time in Air): 0.17894 m
Height (Impulse-Momentum): 0.21073 m
Height (Time in Air): 0.20213 m
Height (Impulse-Momentum): 0.21531 m
Height (Time in Air): 0.20014 m
Height (Impulse-Momentum): 0.2162 m
Height (Time in Air): 0.21221 m
Height (Impulse-Momentum): 0.19961 m
Height (Time in Air): 0.19522 m
```

Create a figure to help compare which jump type produced a higher jump

Use 6 subplots arranged in 3 rows for each subject (S1, S4, S5) and 2 columns for the 2 methods (impulse, time in air)

In each subplot, plot a bar graph of the average of the jump heights with error bars of the standard deviation of the jump heights.

One bar is for the CMJump and the other bar is for the squatjump

Remember to label everything so it's clear what the figure is showing

Create a figure to help compare differences in approach

Use 6 subplots arranged in 3 rows for each subject and 2 columns for the 2 jump types

In each subplot, plot a bar graph of the average jump height with error bars of the standard deviation.
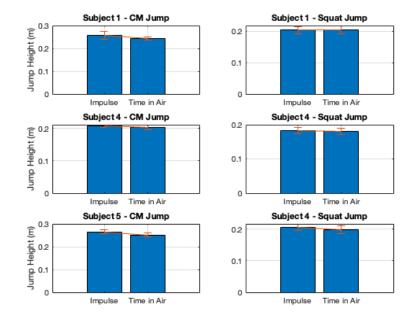
One bar is for the impulse and the other bar is for the time in air

Remember to label everything so it's clear what the figure is showing

Mean and Standard Deviation Calculations

```matlab
% Subject 1 - CM Jump
S1_CM_Imp_heights = [S1_CM_Imp_h_trial1, S1_CM_Imp_h_trial2, S1_CM_Imp_h_trial3, S1_CM_Imp_h_trial4, S1_CM_Imp_h_trial5];
S1_CM_Tair_heights = [S1_CM_Tair_h_trail1, S1_CM_Tair_h_trail2, S1_CM_Tair_h_trail3, S1_CM_Tair_h_trail4, S1_CM_Tair_h_trail5];
S1_CM_Imp_mean = mean(S1_CM_Imp_heights);
S1_CM_Imp_std = std(S1_CM_Imp_heights);
S1_CM_Tair_mean = mean(S1_CM_Tair_heights);
S1_CM_Tair_std = std(S1_CM_Tair_heights);

% Subject 1 - Squat Jump
S1_SJ_Imp_heights = [S1_SJ_Imp_h_trial1, S1_SJ_Imp_h_trial2, S1_SJ_Imp_h_trial3, S1_SJ_Imp_h_trial4, S1_SJ_Imp_h_trial5];
S1_SJ_Tair_heights = [S1_SJ_Tair_h_trail1, S1_SJ_Tair_h_trail2, S1_SJ_Tair_h_trail3, S1_SJ_Tair_h_trail4, S1_SJ_Tair_h_trail5];
S1_SJ_Imp_mean = mean(S1_SJ_Imp_heights);
S1_SJ_Imp_std = std(S1_SJ_Imp_heights);
S1_SJ_Tair_mean = mean(S1_SJ_Tair_heights);
S1_SJ_Tair_std = std(S1_SJ_Tair_heights);

% Subject 4 - CM Jump
S4_CM_Imp_heights = [S4_CM_Imp_h_trial1, S4_CM_Imp_h_trial2, S4_CM_Imp_h_trial3, S4_CM_Imp_h_trial4, S4_CM_Imp_h_trial5];
S4_CM_Tair_heights = [S4_CM_Tair_h_trail1, S4_CM_Tair_h_trail2, S4_CM_Tair_h_trail3, S4_CM_Tair_h_trail4, S4_CM_Tair_h_trail5];
S4_CM_Imp_mean = mean(S4_CM_Imp_heights);
S4_CM_Imp_std = std(S4_CM_Imp_heights);
S4_CM_Tair_mean = mean(S4_CM_Tair_heights);
S4_CM_Tair_std = std(S4_CM_Tair_heights);

% Subject 4 - Squat Jump
S4_SJ_Imp_heights = [S4_SJ_Imp_h_trial1, S4_SJ_Imp_h_trial2, S4_SJ_Imp_h_trial3, S4_SJ_Imp_h_trial4, S4_SJ_Imp_h_trial5];
S4_SJ_Tair_heights = [S4_SJ_Tair_h_trail1, S4_SJ_Tair_h_trail2, S4_SJ_Tair_h_trail3, S4_SJ_Tair_h_trail4, S4_SJ_Tair_h_trail5];
S4_SJ_Imp_mean = mean(S4_SJ_Imp_heights);
S4_SJ_Imp_std = std(S4_SJ_Imp_heights);
S4_SJ_Tair_mean = mean(S4_SJ_Tair_heights);
S4_SJ_Tair_std = std(S4_SJ_Tair_heights);

% Subject 5 - CM Jump
S5_CM_Imp_heights = [S5_CM_Imp_h_trial1, S5_CM_Imp_h_trial2, S5_CM_Imp_h_trial3, S5_CM_Imp_h_trial4, S5_CM_Imp_h_trial5];
S5_CM_Tair_heights = [S5_CM_Tair_h_trail1, S5_CM_Tair_h_trail2, S5_CM_Tair_h_trail3, S5_CM_Tair_h_trail4, S5_CM_Tair_h_trail5];
S5_CM_Imp_mean = mean(S5_CM_Imp_heights);
S5_CM_Imp_std = std(S5_CM_Imp_heights);
S5_CM_Tair_mean = mean(S5_CM_Tair_heights);
S5_CM_Tair_std = std(S5_CM_Tair_heights);

% Subject 5 - Squat Jump
S5_SJ_Imp_heights = [S5_SJ_Imp_h_trial1, S5_SJ_Imp_h_trial2, S5_SJ_Imp_h_trial3, S5_SJ_Imp_h_trial4, S5_SJ_Imp_h_trial5];
S5_SJ_Tair_heights = [S5_SJ_Tair_h_trail1, S5_SJ_Tair_h_trail2, S5_SJ_Tair_h_trail3, S5_SJ_Tair_h_trail4, S5_SJ_Tair_h_trail5];
S5_SJ_Imp_mean = mean(S5_SJ_Imp_heights);
S5_SJ_Imp_std = std(S5_SJ_Imp_heights);
S5_SJ_Tair_mean = mean(S5_SJ_Tair_heights);
S5_SJ_Tair_std = std(S5_SJ_Tair_heights);


% Subject 1
subplot(3, 2, 1);
bar([S1_CM_Imp_mean, S1_CM_Tair_mean]);
hold on;
errorbar([1, 2], [S1_CM_Imp_mean, S1_CM_Tair_mean], [S1_CM_Imp_std, S1_CM_Tair_std]);
xticks([1, 2]);
xticklabels({'Impulse', 'Time in Air'});
ylabel('Jump Height (m)');
title('Subject 1 - CM Jump');
grid on;

subplot(3, 2, 2);
bar([S1_SJ_Imp_mean, S1_SJ_Tair_mean]);
```

```matlab
hold on;
errorbar([1, 2], [S1_SJ_Imp_mean, S1_SJ_Tair_mean], [S1_SJ_Imp_std, S1_SJ_Tair_std]);
xticks([1, 2]);
xticklabels({'Impulse', 'Time in Air'});
title('Subject 1 - Squat Jump');
grid on;

% Subject 4
subplot(3, 2, 3);
bar([S4_CM_Imp_mean, S4_CM_Tair_mean]);
hold on;
errorbar([1, 2], [S4_CM_Imp_mean, S4_CM_Tair_mean], [S4_CM_Imp_std, S4_CM_Tair_std]);
xticks([1, 2]);
xticklabels({'Impulse', 'Time in Air'});
ylabel('Jump Height (m)');
title('Subject 4 - CM Jump');
grid on;

subplot(3, 2, 4);
bar([S4_SJ_Imp_mean, S4_SJ_Tair_mean]);
hold on;
errorbar([1, 2], [S4_SJ_Imp_mean, S4_SJ_Tair_mean], [S4_SJ_Imp_std, S4_SJ_Tair_std]);
xticks([1, 2]);
xticklabels({'Impulse', 'Time in Air'});
title('Subject 4 - Squat Jump');
grid on;

% Subject 5
subplot(3, 2, 5);
bar([S5_CM_Imp_mean, S5_CM_Tair_mean]);
hold on;
errorbar([1, 2], [S5_CM_Imp_mean, S5_CM_Tair_mean], [S5_CM_Imp_std, S5_CM_Tair_std]);
xticks([1, 2]);
xticklabels({'Impulse', 'Time in Air'});
ylabel('Jump Height (m)');
title('Subject 5 - CM Jump');
grid on;

subplot(3, 2, 6);
bar([S5_SJ_Imp_mean, S5_SJ_Tair_mean]);
hold on;
errorbar([1, 2], [S5_SJ_Imp_mean, S5_SJ_Tair_mean], [S5_SJ_Imp_std, S5_SJ_Tair_std]);
xticks([1, 2]);
xticklabels({'Impulse', 'Time in Air'});
title('Subject 4 - Squat Jump');
grid on;
```

Subject 1 - CM Jump, Subject 1 - Squat Jump, Subject 4 - CM Jump, Subject 4 - Squat Jump, Subject 5 - CM Jump, Subject 4 - Squat Jump. Bar charts of Jump Height (m) comparing Impulse and Time in Air.