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%% Initialize
close all
clearvars -except XLfile
imtool close all
%% check and open Excel file
if exist ('XLfile', 'var') ==0
    FileOpener
else
    allRes=readmatrix(XLfile);
end
%% Determine baseplate
postcalibrationBaseplate
%% Determine cement and quadrants
postcalibration3DIMtool
satis=0;
while satis==0
    close all
    tool = imtool3D(driedCement)
    pos=get(gcf, 'Position');
    pos(2)=pos(2)-0.2;
    set(gcf, 'Position', pos)
    selectROI

    happy = questdlg('Are you satisfied with these quadrants?',...
        'Check',...
        'Yes', 'No', 'Yes');

    switch happy
        case 'No'
            satis = 0;
        case 'Yes'
            satis = 1;
    end
end
%% Geef zijde aan
side = questdlg('Of which side is this scan?',...
    'Choose side',...
    'Left', 'Right', 'Right');
switch side
    case 'Left'
        zijde = 0;
    case 'Right'
        zijde = 1;
end
%% Find cement per quadrant
%Find start horizontal line
for i=1:length(forUse)
    if isempty(find(horMask(:,i)==1))==0
        startHor=i;
        break
    end
end
cemArea=[];
totArea=[];
exCemArea=[];
for l=1:3
    left=1; %1=true 2=false
    top=1; %1=true 2=false
    cem=zeros(2,2);
    tot=zeros(2,2);

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exCem=zeros(2,2);
for i=1:length(forUse)      %% Loop over rows of pixels
    left=1;
    if i<find(horMask(:,startHor)) %%If row starts under or above horizontal line
        top=1;
    else
        top=2;
    end

    for j=1:length(forUse) %% Loop per pixel
        vox=forUse(i,j,1);
        if vox==1
            tot(top,left)=tot(top,left)+1;      %% add pixel to total
        end
        if vox==2
            tot(top,left)=tot(top,left)+1;      %% add pixel to total
            cem(top,left)=cem(top,left)+1;      %% add pixel to cement total
        end
        if vox==3
            exCem(top,left)=exCem(top,left)+1;  %%add pixel to excess cement
        end
        if verMask(i,j)==1 && left==1          %% change quadrant from left to right
            left=2;
        end
        if horMask(i,j)==1                    %% change quadrant from top to bottom
            or bottom to top
            if top==1
                top=2;
            else
                top=1;
            end
        end
    end
end
cemArea(:, :,1)=cem;
totArea(:, :,1)=tot;
exCemArea(:, :,1)=exCem;
%% Quadranten wegschrijven
if zijde==1
    AM.Cement=cemArea(1,1,:);
    AM.Total=totArea(1,1,:);
    AM.exCem=exCemArea(1,1,:);

    AL.Cement=cemArea(1,2,:);
    AL.Total=totArea(1,2,:);
    AL.exCem=exCemArea(1,2,:);

    PM.Cement=cemArea(2,1,:);
    PM.Total=totArea(2,1,:);
    PM.exCem=exCemArea(2,1,:);

    PL.Cement=cemArea(2,2,:);
    PL.Total=totArea(2,2,:);
    PL.exCem=exCemArea(2,2,:);
else
    AM.Cement=cemArea(1,2,:);
    AM.Total=totArea(1,2,:);
    AM.exCem=exCemArea(1,2,:);

    AL.Cement=cemArea(1,1,:);
    AL.Total=totArea(1,1,:);
    AL.exCem=exCemArea(1,1,:);
end

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        PM.Cement=cemArea(2,2,:);
        PM.Total=totArea(2,2,:);
        PM.exCem=exCemArea(2,2,:);

        PL.Cement=cemArea(2,1,:);
        PL.Total=totArea(2,1,:);
        PL.exCem=exCemArea(1,2,:);
    end
%% Percentages berekenen
if ~isempty(allRes)
    ind=find(allRes(:,1)==patNum);
else
    ind=[];
end
Percentage.AM = (AM.Cement./AM.Total)*100;
Percentage.AL = (AL.Cement./AL.Total)*100;
Percentage.PM = (PM.Cement./PM.Total)*100;
Percentage.PL = (PL.Cement./PL.Total)*100;
Percentage.exAM=(AM.exCem./(AM.exCem+AM.Cement))*100;
Percentage.exAL=(AL.exCem./(AL.exCem+AL.Cement))*100;
Percentage.exPM=(PM.exCem./(PM.exCem+PM.Cement))*100;
Percentage.exPL=(PL.exCem./(PL.exCem+PL.Cement))*100;
if isempty(ind)
    allRes=[allRes;nan(1,size(allRes,2))];
    allRes(end,[1 1+1 1+4 1+7 1+10 1+13 1+16 1+19 1+22])=[patNum Percentage.AM
Percentage.AL Percentage.PM Percentage.PL Percentage.exAM Percentage.exAL
Percentage.exPM Percentage.exPL];
else
    allRes(ind,[1 1+1 1+4 1+7 1+10 1+13 1+16 1+19 1+22])=[patNum Percentage.AM
Percentage.AL Percentage.PM Percentage.PL Percentage.exAM Percentage.exAL
Percentage.exPM Percentage.exPL];
end
sortrows(allRes);
end
%% Plot
figure
plot(allRes(ind,2:4),'r*-')
hold on
plot(allRes(ind,5:7),'b*-')
hold on
plot(allRes(ind,8:10),'g*-')
hold on
plot(allRes(ind,11:13),'k*-')
ylim([0 100])
legend('Percentage cementpenetratie AM','Percentage cementpenetratie AL','Percentage
cementpenetratie PM','Percentage cementpenetratie PL')
%% Write to excel
varNames={'patNum' ; 'AM_1' ; 'AM_2' ; 'AM_3' ; 'AL_1' ; 'AL_2' ; 'AL_3' ; 'PM_1' ; 'PM_2'
; 'PM_3' ; 'PL_1' ; 'PL_2'
; 'PL_3' ; 'exAM_1' ; 'exAM_2' ; 'exAM_3' ; 'exAL_1' ; 'exAL_2' ; 'exAL_3' ; 'exPM_1' ; 'exPM_2' ; 'exPM_
3' ; 'exPL_1' ; 'exPL_2' ; 'exPL_3'};
table=array2table(allRes,'VariableNames',varNames);
writetable(table,XLfile);

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