

Nearest Neighbor Distance Matlab script:

```
function out = SocialDistanceForCells(in)
%Input matrix format has to be columns with x, y and cell number.
[r,c]=size(in);
%Check if right number of columns
if c~= 3
    fprintf('Incorrect Formatting!!! What a n00b\n')
    return
end
% working out how many cells and their label
temp = sortrows(in,3);
j=1;

%Works out number of unique cells and their labels from ordered list
for i=1:r
    if i == 1
        cellnos(j) = temp(i,3);
    elseif temp(i,3)~= cellnos(j)
        j=j+1;
        cellnos(j) = temp(i,3);
    end
end

cells = length(cellnos);%defines number of cells
k=1;
for i=1:cells %for each cell, define a matrix of cells
    for j=1:r
        if cellnos(i)==temp(j,3)
            temp2(k,1,i)= temp(j,1);
            temp2(k,2,i)=temp(j,2);
            k=k+1;
        end
    end
    k=1;
end

%Loop through each cell and calculate the social distance
for i=1:cells
    temp3(:, :,i) = SocialDistance(temp2(:, :,i));
end
%Data reformatting and output
k=1;
for i = 1:cells
    [r, ~] = size(temp3(:, :,i));
    for j = 1:r
        if isnan(temp3(j,1,i))~= 1
            out(k,1)= temp2(j,1,i);
            out(k,2)= temp2(j,2,i);
            out(k,3)= cellnos(i);
            out(k,4)= temp2(temp3(j,2,i),1,i);
        end
    end
    k=k+1;
end
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        out(k,5)= temp2(temp3(j,2,i),2,i);
        out(k,6)= temp3(j,1,i);
        k=k+1;
    end
end
end
%format of output, is original coordinate, original cell number, nearest
%neighbour coordinate, nearest neighbor distance

end

function out = SocialDistance(in)
%takes a list of coordinates and works out the array of nearest neighbors
[r, ~] = size(in);
temp = zeros (r,2);
for i=1:r
    if in(i,1) ~= 0 && in(i,1) ~= 0
        for j=1:r
            distance = ((in(i,1)-in(j,1)).^2 + (in(i,2)-in(j,2)).^2).^0.5;
            if i==j %checks if it is the same element

            elseif in(j,1) == 0 && in(j,2) == 0 && j==2 %checks if more than one point in cell
                temp(i,1)=NaN;
                temp(i,2)=NaN;
            elseif in(j,1) == 0 && in(j,2) == 0 %checks if zero valued

            elseif temp(i,1)==0
                temp(i,1)=distance;
                temp(i,2)=j;
            elseif distance<temp(i,1)
                temp(i,1)=distance;
                temp(i,2)=j;
            end
        end
    end
    else
        temp(i,1)=NaN;
        temp(i,2)=NaN;
    end
end
out=temp;
end

```