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%
%The files contain code and data associated with the paper titled
%"A Deep Learning Approach to Estimate Stress Distribution: A Fast and
%Accurate Surrogate of Finite Element Analysis".
%
%The paper is authored by Liang Liang, Minliang Liu, Caitlin Martin,
%and Wei Sun, and published at Journal of The Royal Society Interface, 2018.
%
%The file list: ShapeData.mat, StressData.mat, DLStress.py, im2patch.m,
%UnsupervisedLearning.m, ReadMeshFromVTKFile.m, ReadPolygonMeshFromVTKFile.m,
%WritePolygonMeshAsVTKFile.m, Visualization.m, TemplateMesh3D.vtk, TemplateMesh2D.vtk.
%Note: *.m and *.py files were converted to pdf files for documentation purpose.
%
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%INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS
%FOR A PARTICULAR PURPOSE.
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%%
function patch = im2patch(I, patchSize, stride)
% 2D I(x,y) : Patch(x,y,index)
% 2D+channel I(x,y,c) : Patch(x,y,c,index)
patch = [];
if length(patchSize) == 1
    patchSize(2) = patchSize(1);
end
if length(stride) == 1
    stride(2) = stride(1);
end
L1 = patchSize(1);
L2 = patchSize(2);
S1 = stride(1);
S2 = stride(2);
if ndims(I) == 2
    [L1max, L2max] = size(I);
    counter = 0;
    for i = 1:S1:L1max
        for j = 1:S2:L2max
            idx_1 = i+L1-1;
            idx_2 = j+L2-1;
            if idx_1 >= 1 && idx_1 <= L1max && idx_2 >= 1 && idx_2 <= L2max
                counter = counter + 1;
                patch(:, :, counter) = I(i:idx_1, j:idx_2);
            end
        end
    end
elseif ndims(I) == 3
    [L1max, L2max, L3max] = size(I);
    counter = 0;
    for i = 1:S1:L1max
        for j = 1:S2:L2max

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.....idx_1=i+L1-1;
.....idx_2=j+L2-1;
.....if idx_1>=1 && idx_1<= L1max && idx_2>=1 && idx_2<= L2max
.....    counter=counter+1;
.....    patch(:,:,:,counter) = I(i:idx_1,j:idx_2,:);
.....end
.....end
.....end
else
.....error
end
```