
Get XY from UV according to 2D Homography of a projective geometry transform

- Author: WANG Lei,USTB
- Link: <https://github.com/shidafu/ViewConeCalibration.git>
- Date:2016/3/3
- Algorithm:

Get [XY] By solving:

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} u \cdot h_{31} - h_{11} & u \cdot h_{32} - h_{12} \\ v \cdot h_{31} - h_{21} & v \cdot h_{32} - h_{22} \end{bmatrix} \begin{bmatrix} h_{13} - u \\ h_{23} - v \end{bmatrix}$$

- Inputs:

```
H----3 by 3 matrix: [h11 h12 h13;
                    h21 h22 h23;
                    h31 h32 1]
UV----cordNum by pointNum matrix,
cordNum==2,pointNum>=4,
[u1,u2,...;
 v1,v2,...]
```

- Outputs:

```
XY----cordNum by pointNum matrix,
cordNum==2,pointNum>=4,
[x1,x2,...;
 y1,y2,...]
```

```
function XY = GetXYFromUV(H,UV)
% Initial
[cordNum, pointNum]=size(UV);
if ~(cordNum==2 || cordNum==3)
    error('Input matrix size error!');
end
[hH, wH]=size(H);
if hH~=3 || ~(wH==3 || wH==4)
    error('Input matrix size error!');
end
if wH==4
    H=[H(:,1:2) H(:,4)];
end
XY=ones(2,pointNum,'double');
UV=UV(1:2,:);
% Algorithm
for i=1:pointNum
    G=[UV(1,i)*H(3,1)-H(1,1),UV(1,i)*H(3,2)-H(1,2);
```

```
        UV(2,i)*H(3,1)-H(2,1),UV(2,i)*H(3,2)-H(2,2)];  
    XY(:,i)=inv(G)*[H(1,3)-UV(1,i);H(2,3)-UV(2,i)];  
end
```

*Error using GetXYFromUV (line 36)
Not enough input arguments.*

Published with MATLAB® R2015a