

Exercises: Image Registration

AUVSI Foundation: Computer Vision Training



Transform Images

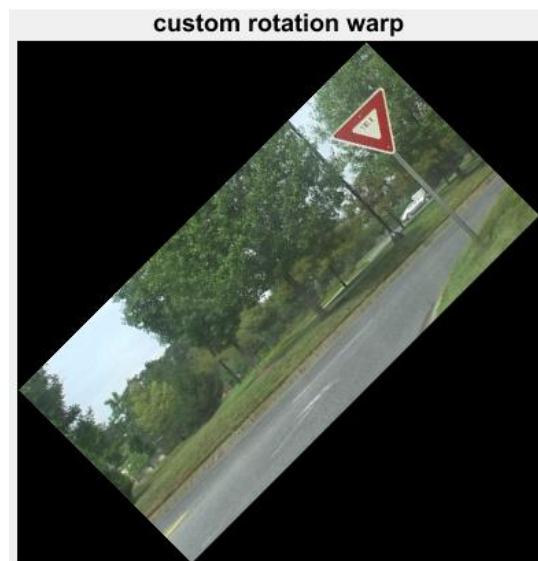
In this exercise, you will rotate and transform an image using 2-D geometric transform object.

Rotate Image:

1. Load an image

```
>> load yield
```
2. Create a rotation matrix of the form:

$$R = \begin{bmatrix} \cos(\theta) & -\sin(\theta) & 0 \\ \sin(\theta) & \cos(\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix}$$
3. Create an `affine2d` transformation object with this rotation matrix.
4. Use `imwarp` to rotate the image.



Solution

```
>> transformImages
```

Translate Image:

1. Load an image

```
>> load yield
```
2. Create a translation matrix of the form:

$$T = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ T_x & T_y & 1 \end{bmatrix}$$
3. Create an `affine2d` transformation matrix with this translation matrix.
4. Find the output limits of the transformation with the `outputLimits` function.
5. Create an `imref2d` object with these output limits.
6. Warp the image with the `affine2d` transformation matrix and output view set to the created `imref2d` object.



Map Stitching

In this exercise, you will create one large image from a series of partially overlapping images of a map. The eight map images (map01.png through map08.png) are located in the `panorama` folder.

1. Open the file `panoramaMapStart.m`. It contains a starting version for the map stitching. Look at all comments starting with `TODO` and implement the missing code.
2. Try different feature detection algorithms such as Harris, minimum eigenvalue, or Maximally Stable Extremal Regions (MSER).

The map data is from www.openstreetmap.org.

Solution

```
>> panoramaMap
```

