

## Homework 6

Due **in my mailbox, April 11, 2003, before 3PM**

a. Use tclSADIE (or your own code) to remove the distortion from “baboonwarp.ipt” using “baboon.ipt” as the reference image. Use 6 control points (the maximum for tclSADIE) and determine the required polynomial to correct the image with minimum error at the control points. Validate your results by subtracting the processed image from the original image to visualize the residual error.

size of “baboonwarp.ipt”: 512 byte header + 427 lines x 447 pixels/line x 8 bits/pixel  
It should File>Open directly in tclSADIE, but you never know!

**DO NOT USE 6 TERMS IN THE POLYNOMIAL - tclSADIE HAS A BUG FOR THAT SETTING.**

b. Show that the sequence of three 2 x 2 matrix transforms,

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 & -\tan(\theta/2) \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ \sin\theta & 1 \end{bmatrix} \begin{bmatrix} 1 & -\tan(\theta/2) \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x_{ref} \\ y_{ref} \end{bmatrix}$$

is equivalent to a 2-D rotation.

c. Demonstrate part (b) using tclSADIE in a simulated example. Show the two intermediate and the final images.

Produce a 1-2 page text report documenting your work with tclSADIE, plus relevant samples from the tclSADIE session log output and your output images. The goal is to DESCRIBE what you did with text and to DOCUMENT what you did with numbers and pictures.

As before, you’re encouraged to team with another student on this homework and turn in one report, which will be scored for both of you.

**NOTE: Many useful analysis tools exist in tclSADIE. e.g.,**

<b>Geometry&gt;Window and Subsample</b>	<b>extracts a specified region from an image</b>
<b>Tools&gt;RMS Difference</b>	<b>calculates the RMS difference between two images</b>
<b>Multi&gt;Combine</b>	<b>arithmetic operations between two images</b>
<b>Multi&gt;Compare</b>	<b>logical operations between two images</b>

**It is well worth your time to spend a few minutes getting familiar with the functionality in tclSADIE - play with an image and the menu items - many of the things you need are there.**