



< Previous



Next >

3. Rotating an image

🔖 Bookmark this page



Calculator



Hide Notes

Recitation due Sep 15, 2021 20:30 IST

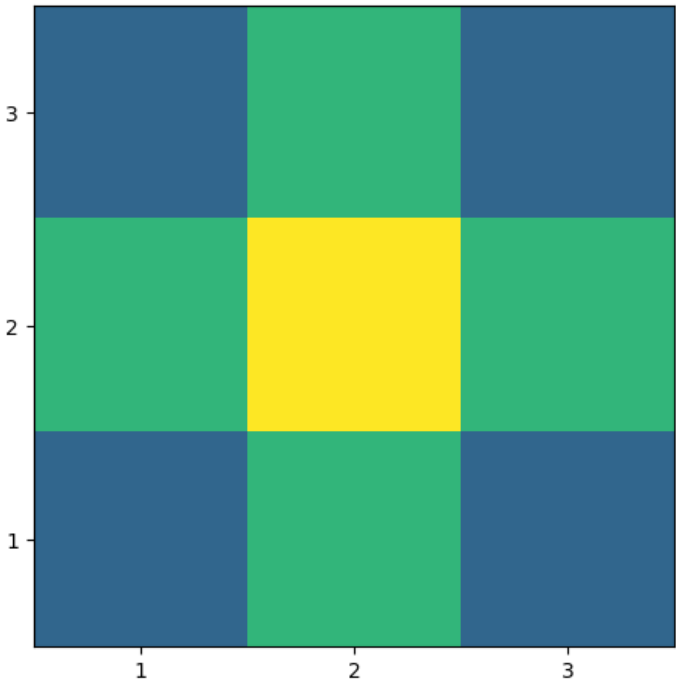


Explore

Computer Graphics

A computer screen is made up of tiny squares called pixels. To draw an image on the computer screen, programmers have to tell the display where to turn on the pixels, and with what color. This is done via a series of instructions, such as "make the pixel in position (320,240) color purple." An "image file" can be thought of as a long list of these instructions, which tell the display what color each pixel should be.

Here is a simple 3×3 image.



The instructions for this image look like: make the pixel in position (1,1) color blue, make the pixel in position (2,2) color yellow, etc.

Transforming an image

Matrices are useful for transforming images in computer graphics. In the applet below, you can try inputting a matrix to change the image. The applet works by replacing instructions of the form "make the pixel in position \vec{v} color C " by "make the pixel in position $M\vec{v}$ color C ".

► Apple Matrix

$$M = \begin{pmatrix} 0.72 & 0.74 \\ -0.07 & 1.18 \end{pmatrix}$$

Reset sliders



Calculator



Hide Notes

Noto Emoji from Github by User: Behdad ([Apache License 2.0](#))

PLEASE RATE THIS APPLET
(Use a one star to five star rating scale.)

RESULTS

☆

0%

☆ ☆

0%

☆ ☆ ☆

3%

☆ ☆ ☆ ☆

20%

☆ ☆ ☆ ☆ ☆

77%

Submit

Results gathered from 35 respondents.

FEEDBACK
Your response has been recorded

Rotating an image

1/1 point (graded)
For what value of M will the transformation rotate the image by 90 degrees counter-clockwise?

(Enter a matrix using notation such as `[[a,b],[c,d]]` .)

$M =$ ✓ Answer: [[0,-1],[1,0]]

? INPUT HELP

Solution:

$M = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$. This is $R_{\pi/2}$.

Submit

You have used 1 of 5 attempts

ⓘ Answers are displayed within the problem

Flip an image

1/1 point (graded)
For what value of M will the transformation reflect the image across the x-axis?

(Enter a matrix using notation such as `[[a,b],[c,d]]` .)

$M =$ ✓ Answer: [[1,0],[0,-1]]

? INPUT HELP

Solution:

$M = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$. This maps $\begin{pmatrix} x \\ y \end{pmatrix}$ to $\begin{pmatrix} x \\ -y \end{pmatrix}$.

Submit

You have used 1 of 5 attempts

i Answers are displayed within the problem

Reflecting an image

1/1 point (graded)
For what value of M will the transformation reflect the image across the line $y = x$?

(Enter a matrix using notation such as `[[a,b],[c,d]]`.)

$M =$

✓ Answer: `[[0,1],[1,0]]`

? INPUT HELP

Solution:

The desired matrix interchanges x and y . This is done by $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$.

Submit

You have used 2 of 5 attempts

i Answers are displayed within the problem

3. Rotating an image

Hide Discussion

Topic: Unit 4: Matrices and Linearization / 3. Rotating an image

Add a Post

Show all posts ▼by recent activity ▼

There are no posts in this topic yet.

x



edX

- About
- Affiliates
- edX for Business
- Open edX
- Careers
- News

Legal

- Terms of Service & Honor Code
- Privacy Policy
- Accessibility Policy
- Trademark Policy
- Sitemap

Connect

- Blog
- Contact Us
- Help Center
- Media Kit
- Donate



© 2021 edX Inc. All rights reserved.
深圳市恒宇博科技有限公司 [粤ICP备17044299号-2](#)