Kathmandu University

Department of Computer Science and Engineering

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COMP 342 (Computer Graphics)

Lab 4 Report

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**Implementation of 2D Transformations using Homogenous Coordinates**

**Implementing 2D Translation**

*Algorithm:*

Input: Coordinates of a triangle, translation factor

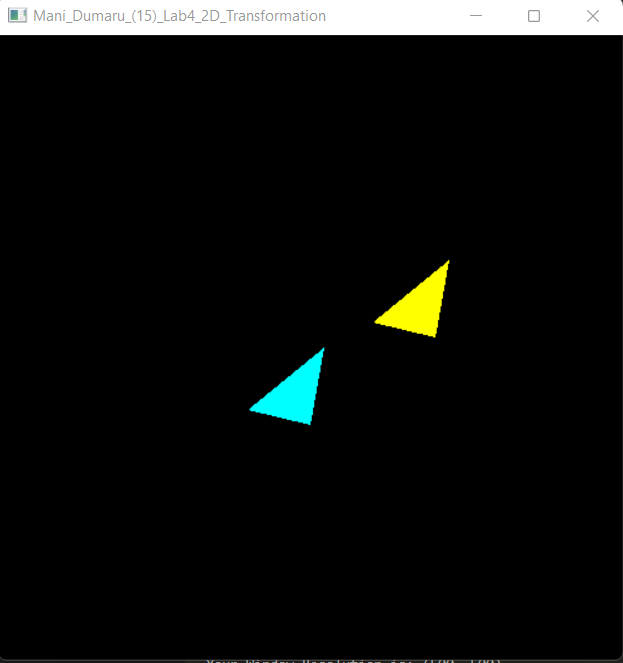
Output: Translated triangle

1. Given coordinates are plotted to form a triangle
2. Use the translation matrix on each coordinate to get its translated coordinate.

Translation Matrix: .

1. Use the coordinates obtained from the above product to plot a new translated triangle

*Output:*

**

Implementing 2D scaling

*Algorithm:*

Input: Coordinates of a triangle, scaling factor

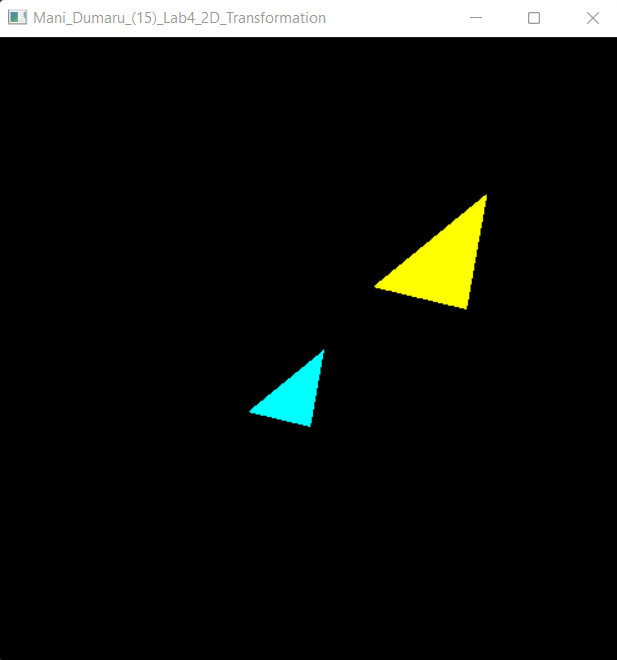
Output: Translated triangle

1. Given coordinates are plotted to form a triangle
2. Use the scaling matrix on each coordinate to get its scaled coordinate.

Scaling Matrix: .

1. Use the coordinates obtained from the above product to plot a new scaled triangle

*Output:*



Implementing 2D rotation

*Algorithm:*

Input: Coordinates of a triangle, angle of rotation θ

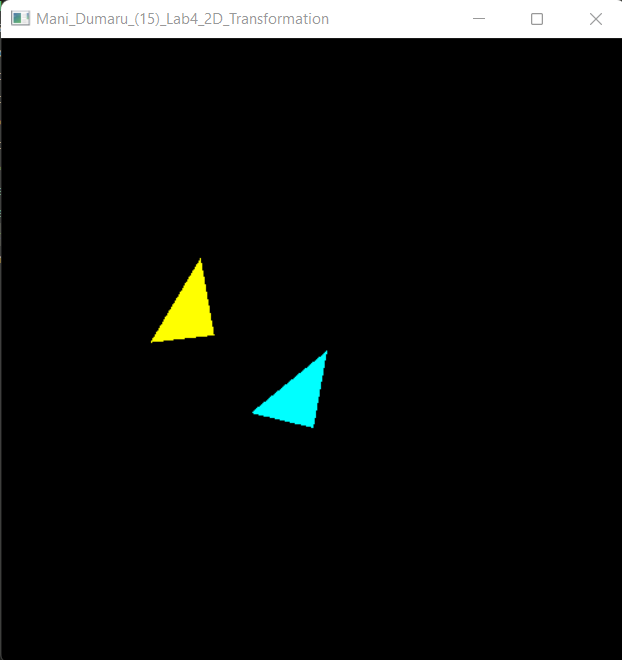
Output: Translated triangle

1. Given coordinates are plotted to form a triangle
2. Use the rotation matrix on each coordinate to get its rotated coordinate.

Rotation Matrix: .

1. Use the coordinates obtained from the above product to plot a new rotated triangle

*Output:*

**

Implementing 2D shearing:

*Algorithm:*

Input: Coordinates of a triangle, angle of rotation θ

Output: Translated triangle

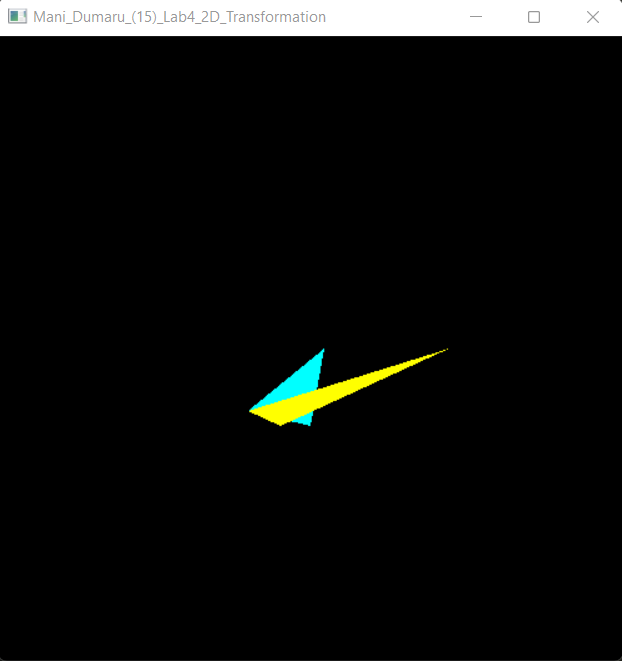
1. Given coordinates are plotted to form a triangle
2. Use the shearing matrix on each coordinate to get its sheared coordinate.

Shearing Matrix: . (X shear with reference to y-axis)

Shearing Matrix: . (Y shear with reference to x-axis)

1. Use the coordinates obtained from the above product to plot a new sheared triangle

*Output:*

**

*X shear with reference to y-axis Y shear with respect to x-axis*

*Source Code for Translation, Scaling, Rotation and Shear: transformations.py*

Implementing 2D reflection:

*Algorithm:*

Input: Coordinates of a triangle, angle of rotation θ

Output: Translated triangle

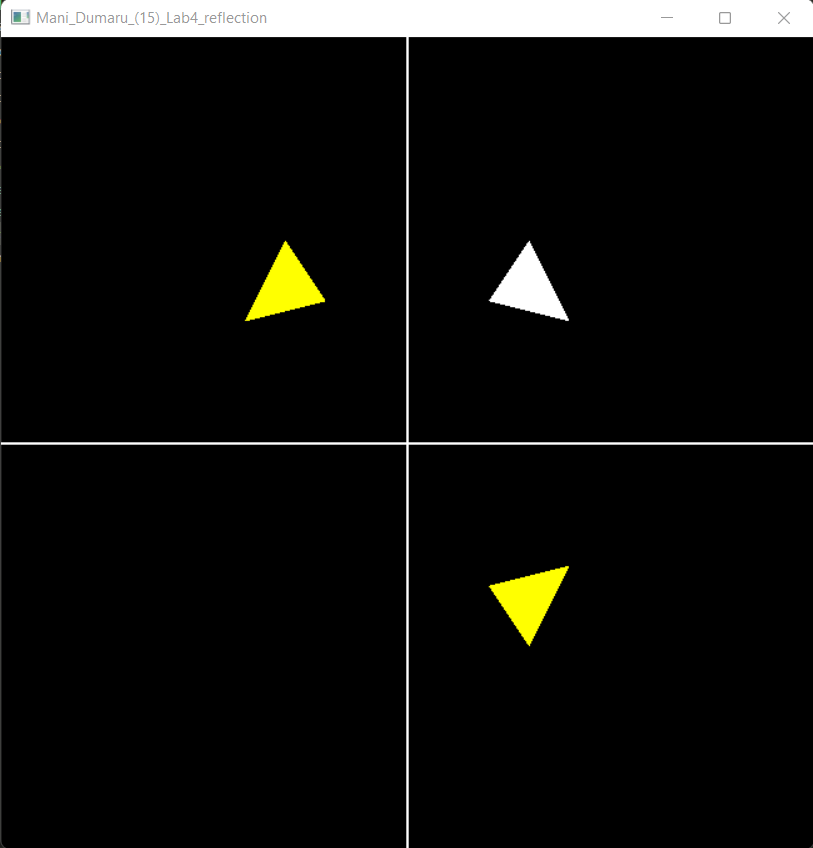
1. Given coordinates are plotted to form a triangle
2. Use the reflection matrix on each coordinate to get its reflected coordinate.

Reflection about the line Y=0 (x-axis): .

Reflection about the line X=0 (Y-axis): .

1. Use the coordinates obtained from the above product to plot a new reflected triangle

*Output*

**

Source Code for reflection: reflection.py

Conclusion:

Hence, implementation of various basic 2D transformations were done using PyOpenGL library.