ABSTRACT

An application is made to detect and analyze the convex and concave polygons on 2-dimensional geometry object using Radon transformation on this thesis. Previous researches have been able to know the number of an N side of the geometry object, but they have not been able to distinguish between convex and concave polygon. Geometric pattern recognition is very important to recognize object using digital image, for example in sensing robotic applications.

To detect and analyze convex and concave polygon in a digital image, first the object is acquired by two methods: by generating images from a computer and by capturing from the webcam. Geometry object is preprocessed to get its edge. Then, edge object is transformed in Radon domain become dots to be analyzed in dots amount, location and formation. The number of dots defines the number of sides of geometry object in original image. Dots in shadow of Radon transform from other lines defines concave polygon.

The algorithm is implemented in the software. It has been tested in 216 images consist of 4, 5, and 6 sides convex and concave polygon with different colors. Based on results, this application can distinguish between convex and concave polygon object with 99.07% accuracy and can identify the number of geometry sides with 85.65% accuracy. Average computation time is about 3.83 seconds.

Keywords: Geometry, *Convex* and *Concave Polygon*, Radon transform.