

# Calculation of a Polygon's Area with a Generalized Delta Technique

Komur, Oguz

Derin, Mehmet Bahri

The aim of the project is to calculate the area of any polygon which has  $n$  convex or concave sides and whose corner coordinates are given. Additionally, it aims to calculate the approximate surface area of any area which is located on a coordinate plane. When the previous methods used for calculating the surface area are examined, it is observed that Gauss' Method is widely used. Moreover, the surface area of the triangles can be calculated using the Delta Technique. In this study, a generalized formula that can calculate the area of a polygon with given corner coordinates was developed. This formula was developed by using an inductive method to prove that the area of any polygon having  $n$  sides can be calculated by generalizing the Delta Technique. With the help of the formula, we have developed, when compared to Gauss' method, a simpler and more understandable way of calculating the surface area of the polygons whose corner coordinates are given. This method enabled us to calculate an approximate surface area of a place on a map easily as the method does not have the limitation of  $n$  sides number or the requirement of being convex and concave. We have also designed a surface area program that calculates the area with the help of the formula we have generalized. With the help of the program, the surface area of any zone selected on the Google Maps can be calculated and exact results can be found out for any city or village, regardless of its size. As a result, a generalized formula to calculate the surface area of any polygon whose corner coordinates are given was put forward. While developing this method, the Delta Technique was generalized by using an inductive method as a proof so that the area of any polygon with  $n$  sides can be calculated.