PROJECT PROPOSAL TO IMPLEMENT AND TEST “AN OPTIMAL ALGORITHM FOR FINDING THE KERNEL OF A POLYGON” [1]

The kernel of a simple polygon P is a location inside of P that each vertex of P can be connected to this location without intersection any edge (See figure 1). The kernel can be only one point or a polygon region. A star shaped polygon is a polygon that has kernel. This implies that if a polygon has kernel, the polygon is star shaped. Thus, after finding kernel, if exists, the kernel can be used for detecting whether the polygon is convex or not.

![Figure 1: Kernel](image)

The aim of this project is to implement and test the algorithm developed by Lee & Preparata that finds the kernel of a polygon in linear time complexity. [1] The algorithm will take a polygon represented by sequence of vertices as input. After processing of the polygon, the algorithm will return the kernel, if exists, as a polygon represented by sequence of vertices or a single vertex, or no kernel. In order to test the algorithm, randomly generated simple polygons will be used. The shape of the polygon will be random and the number of vertices
will be controlled variable. The algorithm will be tested with different number of vertices range between 4 and 100,000. Furthermore, after successfully implement and test the algorithm, an algorithm that tests whether a polygon is convex or not in $O(n)$ time complexity can be derived.

References
