COSC262

Assignment 2

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# Algorithm Implementation:

Gift-Wrap Algorithm:

The gift-wrap algorithm is very simply structured. Most of the work done by this algorithm is from the Theta function as described in lectures, a for loop iterates through all points in the search space calculating Theta for each value. The smallest angle greater than the previous smallest angle is then found and that point appended to the hull.

Graham’s Scan:

Graham’s Scan uses the Theta function to find the angle between the starting point, found at the right-most minimum Y value, and every other point in the set. The start point and the right most point in the set, given by the smallest angle from the starting point, must be on the hull. A stack with these two values is then created.

Quick Hull:

Quick Hull is a divide and conquer implementation of a convex hull algorithm. For this implementation the maximum (point A) and minimum (point B) y values were found, as they must be on the hull, and a line drawn between them. The data is then split into two sets and the function, quick\_hull is then called in each set of points. A point, point C, was then found such that it was the furthest point from the line, as such it must be on the hull, this was found by noting that the function, line\_fn as provided in lectures, absolute value gives the distance between the segment and point C. A triangle was then created between these three points and any point inside this triangle cannot be on the hull and is discarded. The function quick\_hull is then called twice recursively, with the data split on by the points to the right of the line AC and the points to the right of the line CB. This process ends when the empty list is passed to the quick hull function.

# Algorithm Analysis:

# References:

COSC262 Lecture notes

Pseudo code implementation for quick accessed on 16/05/2017:

<http://www.cse.yorku.ca/~aaw/Hang/quick_hull/Algorithm.html>

Distance from line segment function accessed on 17/05/2017:

http://www.geeksforgeeks.org/quickhull-algorithm-convex-hull/