Greedy Algorithms for Some Problems

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Approach: Greedy-Constructing Simple Polygons

> **Problem:** Given a set of n points in the plane, connect them in a simple closed path.

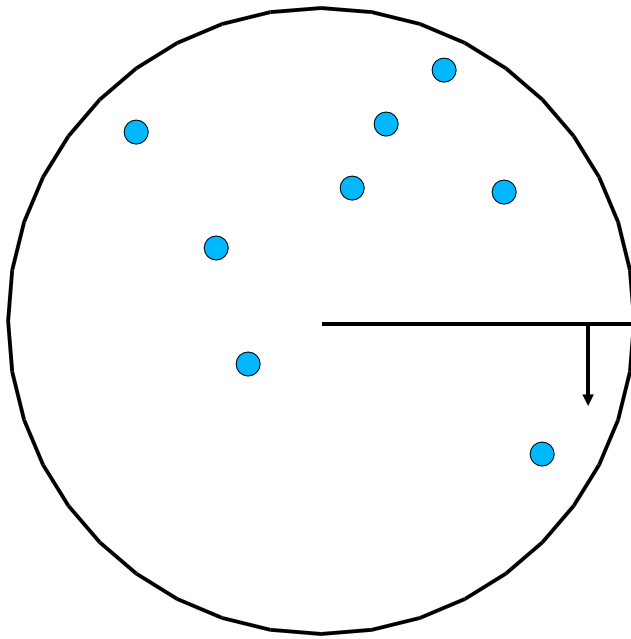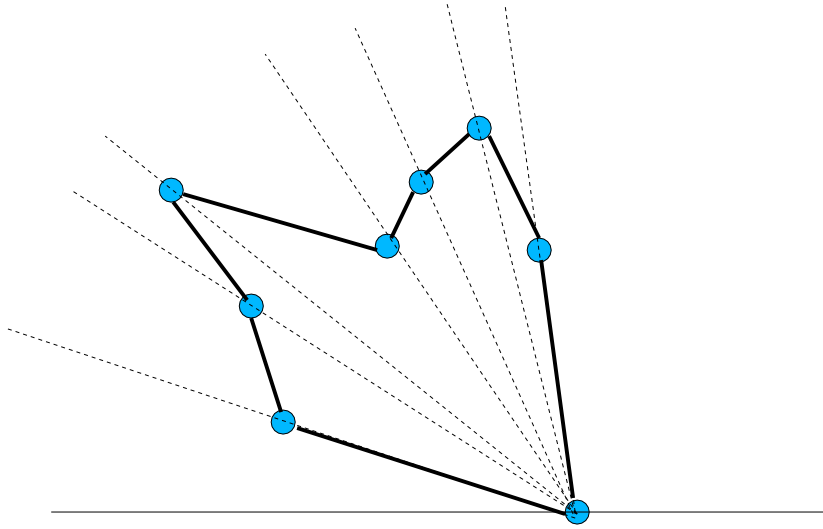Reference Udi Manber page 271

Scanning the points

Constructiung a simple polygon

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Algorithm Simple_Polygon$(p_1, p_2, \ldots, p_n)$
Input: $p_1, p_2, \ldots, p_n$(points in the plane)
Output: P (A simple polygon
whose vertices are $p_1, p_2, \ldots, p_n$ in some order)

begin
    for $i = 2$ to n **do**
        compute the angle α_i between the line
        (p_1, p_i) and the x axis;
                {comment-pick an extreme po
        Sort the points according to the angles
                $\alpha_2, \alpha_3, \ldots, \alpha_n$
        The polygon P is defined by the list of
                in the sorted order
end.

Reference Udi Manber page 272

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Approach: Greedy-

Application: File Compression

> **Problem: Huffman Coding** Given a text (a sequence of characters), find an encoding for the characters that satisfies the prefix constraint and that minimizes the total number of bits needed to encode the text

Reference clrs Chapter-16, page 385

Algorithm Huffman_Encoding(S, f)
Input: S(a string of characters (the text to be encoded))
f and array of frequencies of the characters.
Output: T (The huffman tree for S)

begin

      insertall characters into a heap H according to their frequencies

      while H is not empty **do**

          if H contains only one character X

               then make X the root of T

          else

               pick two characters from H with lowest frequencies
                  and delete them from H

               replace X and Y with a new character Z whose frequency is the sum of the frequencies of X and Y

               insert Z into H

               make X and Y children of Z

end.

Reference Udi Manber page 146
Reference clrs page 385