Let \( P \) be a set of \( n \) points in the plane. Assume \( k \geq 3 \). The problem considered is to find a convex polygon \( C \) with vertices from \( P \) of minimum area that satisfies one of the following conditions:
1. \( C \) is a convex \( k \)-gon,
2. \( C \) is an empty convex \( k \)-gon (i.e., \( P \cap \text{int}C = \emptyset \)),
3. \( C \) is the convex hull of exactly \( k \) points of \( P \).

It is shown here that each of these problems can be solved by an algorithm of time complexity \( O(kn^3) \) and space complexity \( O(kn^2) \) (for \( k = 4 \) this is only \( O(n) \)). The algorithms are based on dynamic programming. The method extends to several similar extremum problems.

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MSC:
- 68Q25 Analysis of algorithms and problem complexity
- 52A10 Convex sets in 2 dimensions (including convex curves)
- 90C39 Dynamic programming

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References:
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