

Convex Hull: Incremental Algorithm

CHull(P,n)
/* P is a set of n points in R^3 */
1. $C \leftarrow \text{CHull}(p_1, p_2, p_3, p_4);$
2. for $i \leftarrow 5$ to n do
 /* $C = \text{CHull}(p_1, \dots, p_{i-1})$ */
3. Insert p_i into C ;
4. /* $C = \text{CHull}(p_1, \dots, p_i)$ */

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/* P is a set of n points in R^3 */
1. $C \leftarrow \text{CHull}(p_1, p_2, p_3, p_4);$
2. for $i \leftarrow 5$ to n do
3. if p_i is outside C then
4. Delete facets of $C (= \text{CHull}(p_1, \dots, p_{i-1}))$ visible from p_i ;
5. Add new facets incident on p_i ;

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1. $C \leftarrow \text{CHull}(p_1, p_2, p_3, p_4);$
2. for $i \leftarrow 5$ to n do
3. if $F_{\text{conflict}}(p_i) \neq \emptyset$ then
 /* p_i is outside C */
4. Delete facets in $F_{\text{conflict}}(p_i)$ from C ;
5. $L \leftarrow$ horizon edges;
6. for each $(q, q') \in L$ do
7. $f \leftarrow$ triangle (p, q, q') ;
8. Add f to C ; /* merge co-planar facets */
9. Create $P_{\text{conflict}}(f)$ and update conflict graph;

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2. for $i \leftarrow 5$ to n do
3. if $F_{\text{conflict}}(p_i) \neq \emptyset$ then
 /* p_i is outside C */
4. Delete facets in $F_{\text{conflict}}(p_i)$ from C ;
5. $L \leftarrow$ horizon edges;
6. for each $(q, q') \in L$ do
7. $f \leftarrow$ triangle (p, q, q') ;
8. Add f to C ; /* merge co-planar facets */
9. $f_1, f_2 \leftarrow$ faces incident on (q, q') in old convex hull;
10. for each $p \in P_{\text{conflict}}(f_1) \cup P_{\text{conflict}}(f_2)$ do
11. if f is visible from p then
12. $F_{\text{conflict}}(p) \leftarrow F_{\text{conflict}}(p) \cup \{f\};$
13. $P_{\text{conflict}}(f) \leftarrow P_{\text{conflict}}(f) \cup \{p\};$

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