ACCORD: With Approximate Covering of Convex Orthogonal Decomposition

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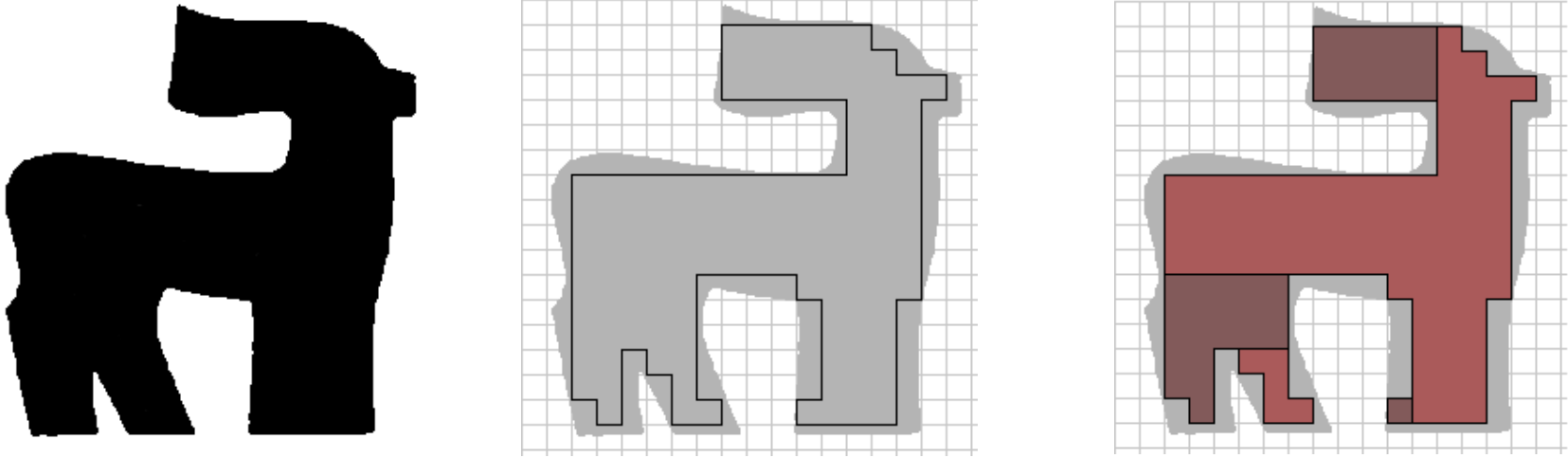
- Objective
- Some Points to Remember
- Basic Rules of Decomposition
- Demonstration
- Conclusion

Objective:

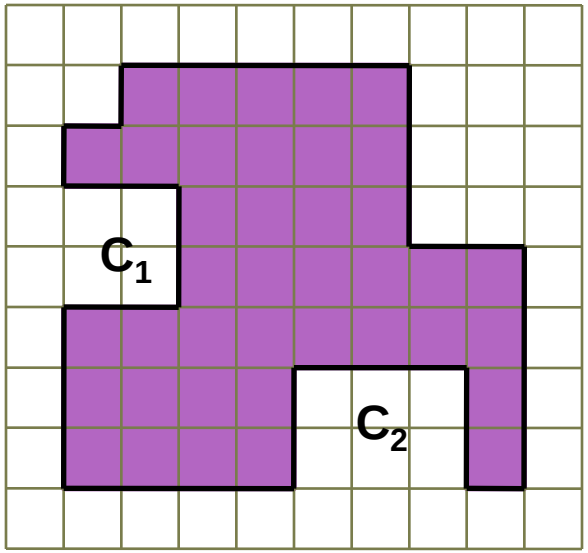
- Given an object (say, *A*)
- Inner isothetic cover, A_{in}, is constructed
- To find the *minimum* number of *orthogonal convex polygons*, using some rules, whose union is exactly *A*

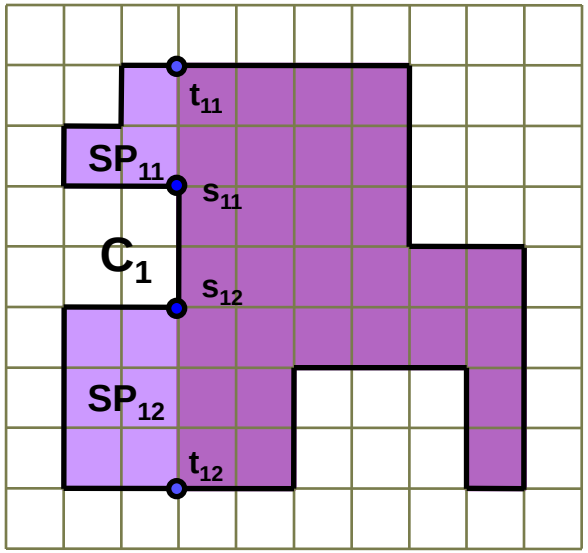


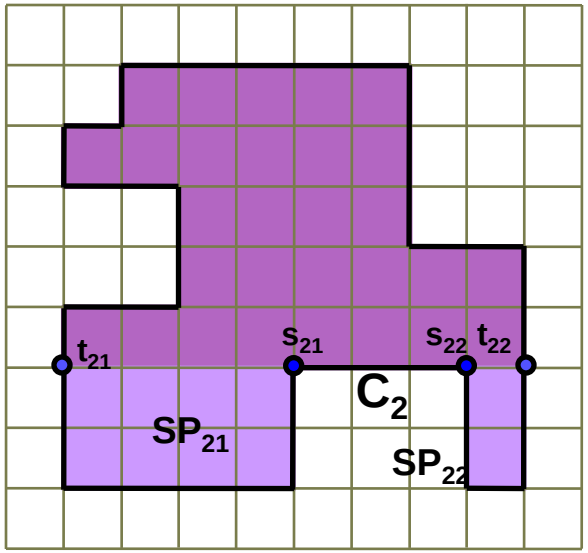
(a) Object *A* (b) Inner Isothetic Cover A_{in} (c) Result of Decomposition

Some Points to Remember:

- **Concavity Pair**: C_1 (concavity appearing first) and C_2 (concavity appearing after C_1)
- The **sub-polygon** appearing **before** C_i: SP_{i1}
- The **sub-polygon** appearing **after** C_i: SP_{i2}
- The **start vertex** of SP_{ij}: s_{ij}
- The **terminal vertex** of SP_{ij}: t_{ij}







Representation of a vertex in L and L_c:

Vertex list, L:

$v_i = <x_i, y_i, t_i, q_i, k_i>$

- type of i^{th} vertex (1 or 3)
- coordinates value of i^{th} vertex
- empty quadrant no. of i^{th} vertex if it is Type-3, else this field is '0'
- component count

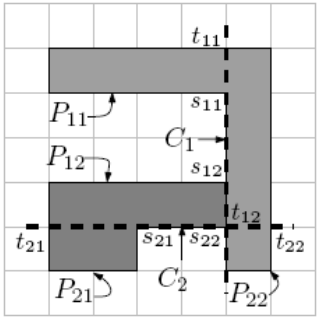
Vertex list, L_c:

$v_{i3} = <x_i, y_i, ct_i, cno_i>$

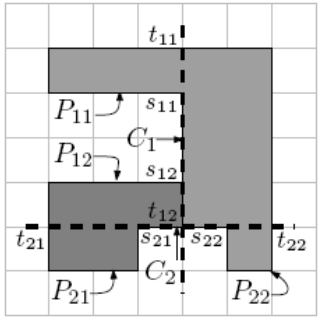
- concavity type (L, R, T, B)
- coordinates value of i^{th} vertex
- concavity number

Rules of Decomposition:

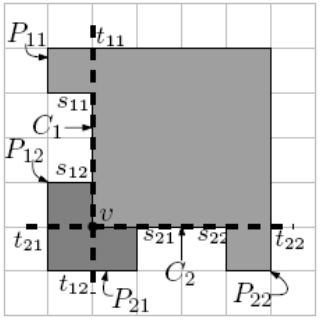
Two Simple, Orthogonal, Consecutive Concavities:



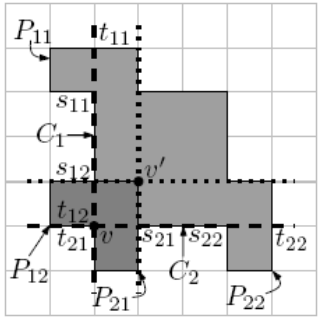
(a)



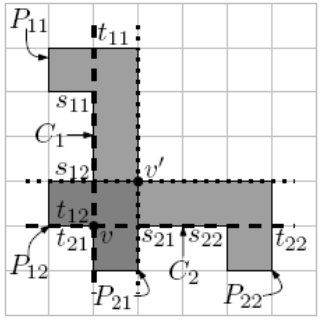
(b)



(c)



(d)



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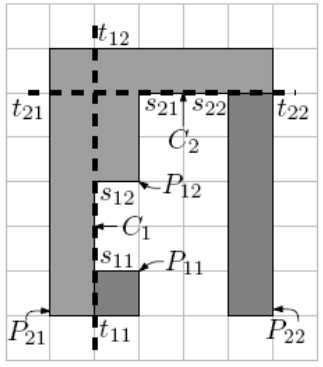
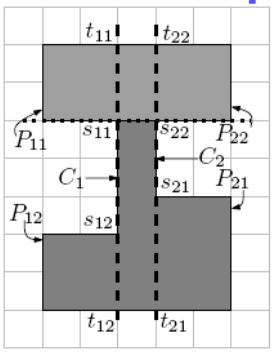
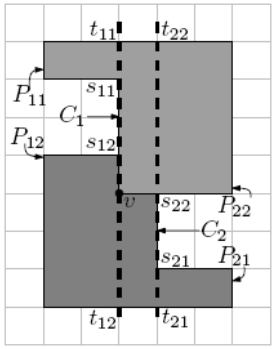


(f)

Two Simple, Parallel, Consecutive Concavities:



(a)



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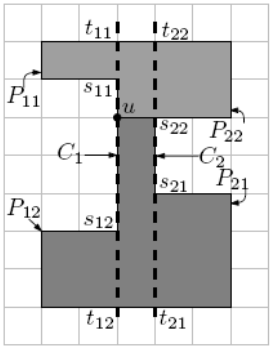

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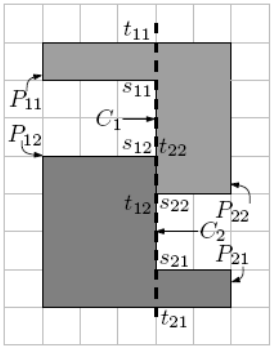

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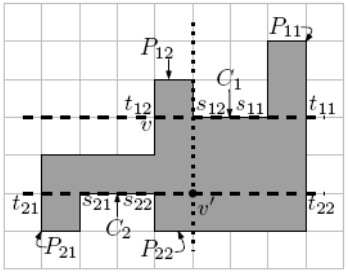

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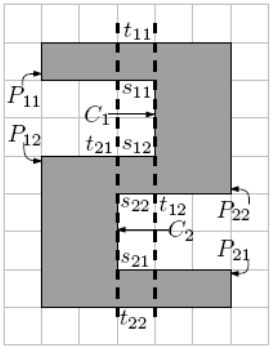
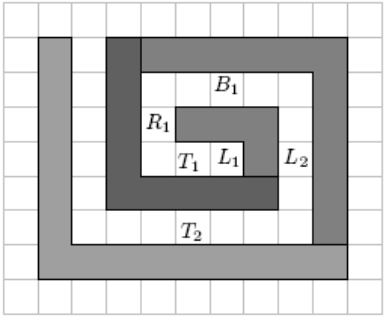
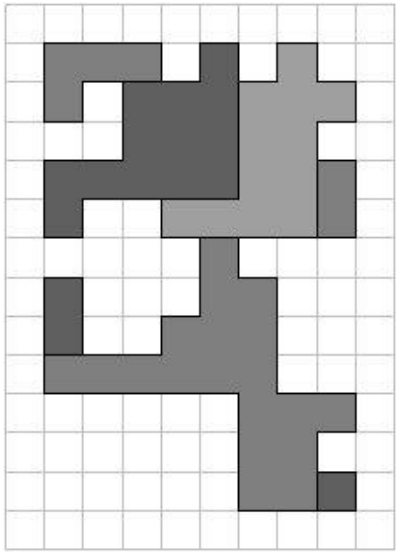


(f)

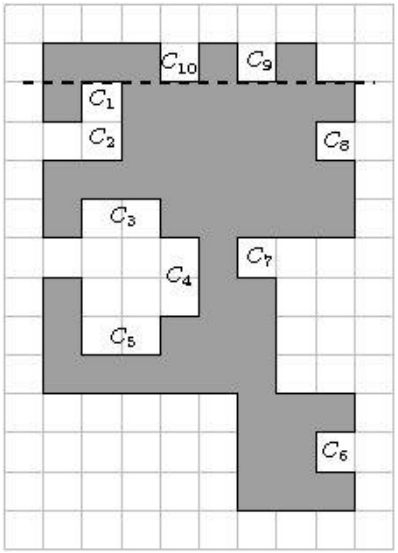
Compound Concavities:



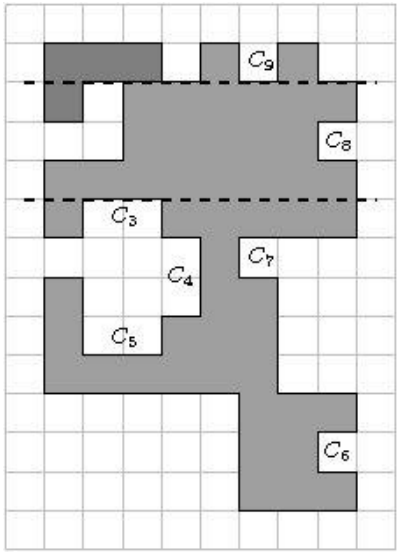
Demonstration:



(a)



(b)



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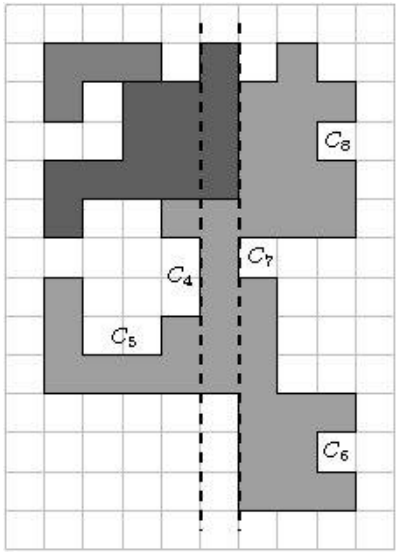

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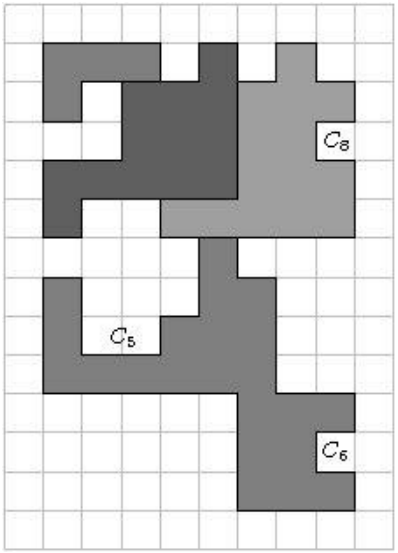

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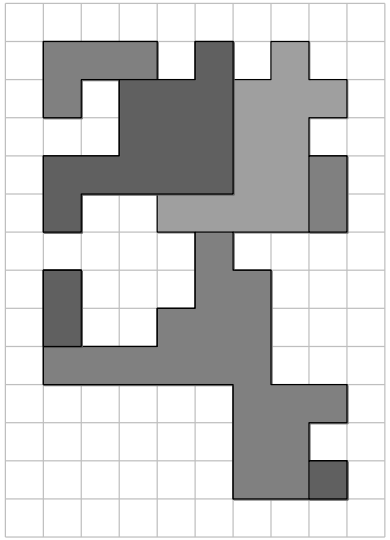

(f)

Conclusion:

- ***Application:*** **shape analysis**
- ***Time Complexity:*** **O(n log n)**
- **Our algorithm can decompose a hole-free orthogonal polygon into a sub-optimal set of OCCs**
- **Total number of decomposed OCCs depends on:**
  - **no of concavities**
  - **orientation of concavities**
  - **grid size**
- **Exhaustive experimentation verifies efficacy and robustness of the algorithm**

Thank You