



UNIUNEA EUROPEANĂ



GUVERNUL ROMÂNIEI



Instrumente Structurale
2007-2013



Platformă de e-learning și curriculum e-content pentru învățământul superior tehnic

Geometrie computacionala

10. Intersectia poligoanelor

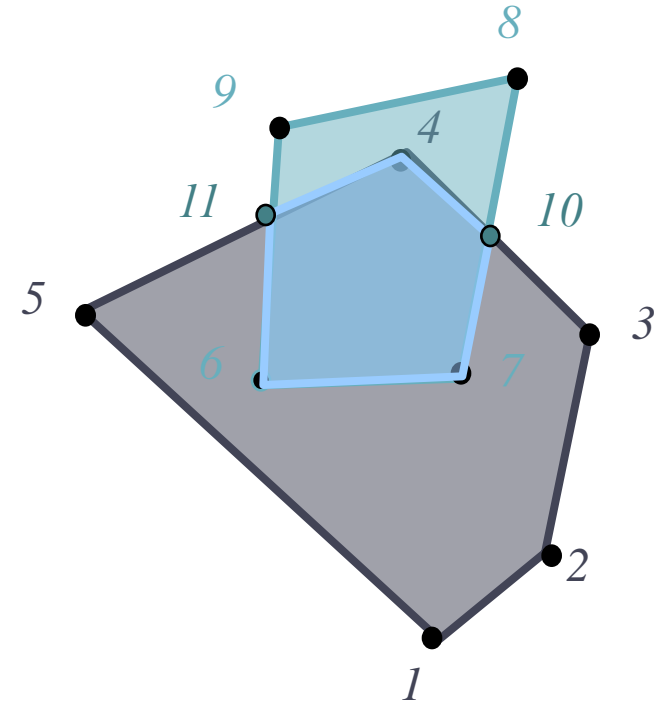
Intersectia poligoanelor convexe

Intrare: Doua poligoane convexe
 $|A| = n$ si $|B| = m$.

Iesire: un poligon convex $|A \cap B|$
 $\leq n + m$ in timp si spatiu
optimal $O(n+m)$.

Observatii:

- Se alterneaza componentele marginale din A si B
- Se alterneaza la punctele de intersectie
- Ordinea varfurilor se pastreaza
- La fiecare intersectie se alege segmentul aflat cel mai in stanga



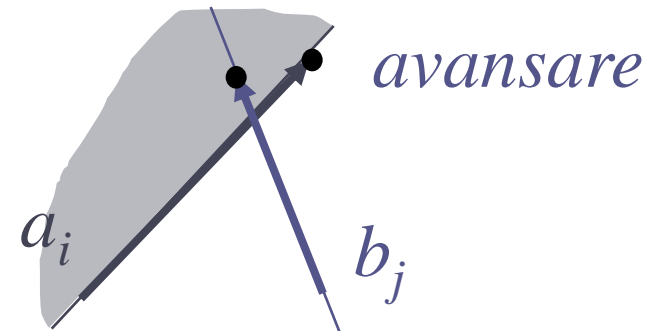
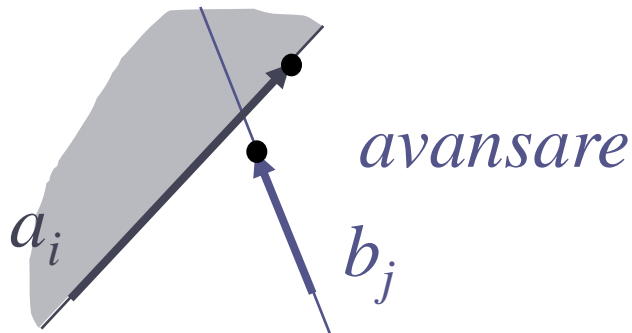
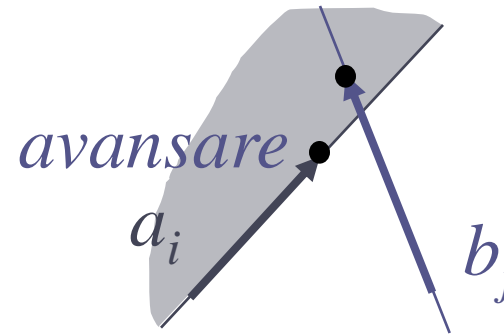
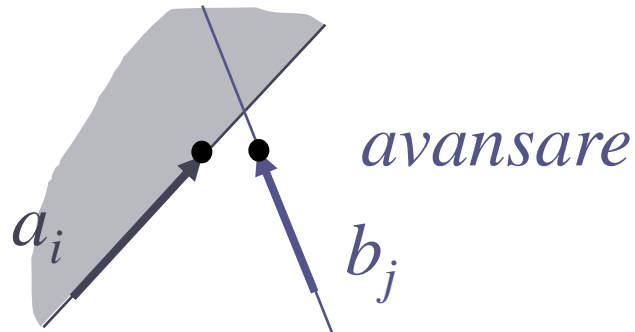
$$A = \{1,2,3,4,5\}$$

$$B = \{6,7,8,9\}$$

$$I = \{10,11\}$$

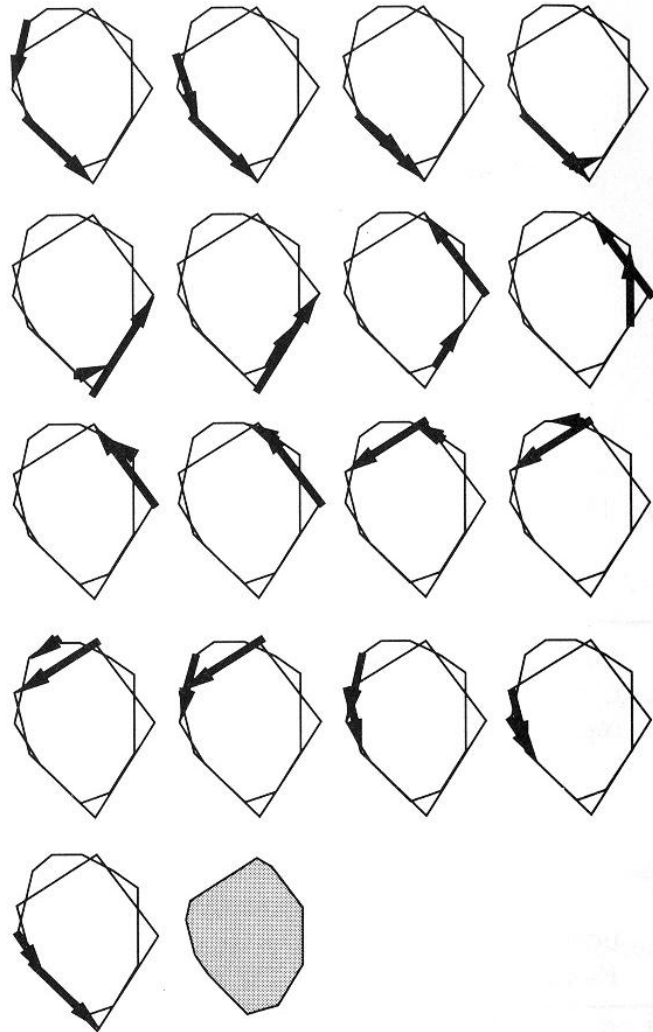
$$A \cap B = \{6,7,10,8,9,11\}$$

Reguli de avansare



Nu se avanseaza pe granita lui A sau B a caror muchie poate contine o intersectie inca nedescoperita.

Exemplu de intersectie convexa (traseu)

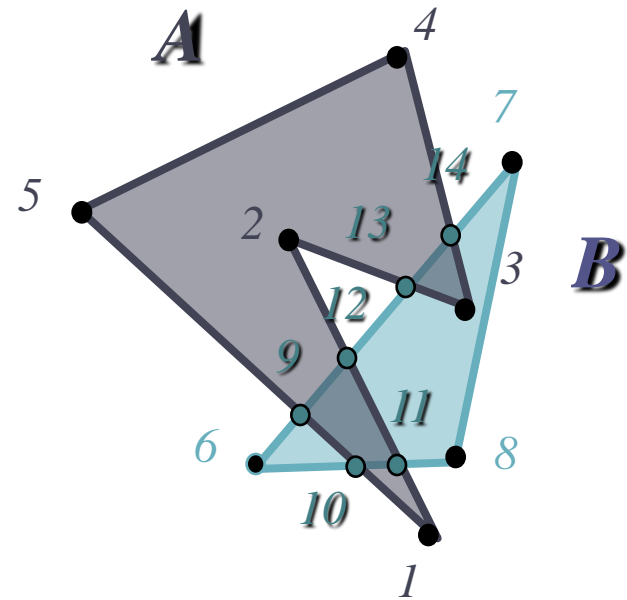


Operatii binare pe poligoane

Operatii: intersectie, reuniune, diferenta.

Observatii:

- Operatiile pe poligoane simple conexe pot duce la gauri sau bucati deconectate
- Operatiile sunt similare, din momentul aflarii punctelor de intersectie. Doar regulile de reconstruire a granitelor difera.
- Numarul maxim de bucati/gauri este de $O(nm)$.

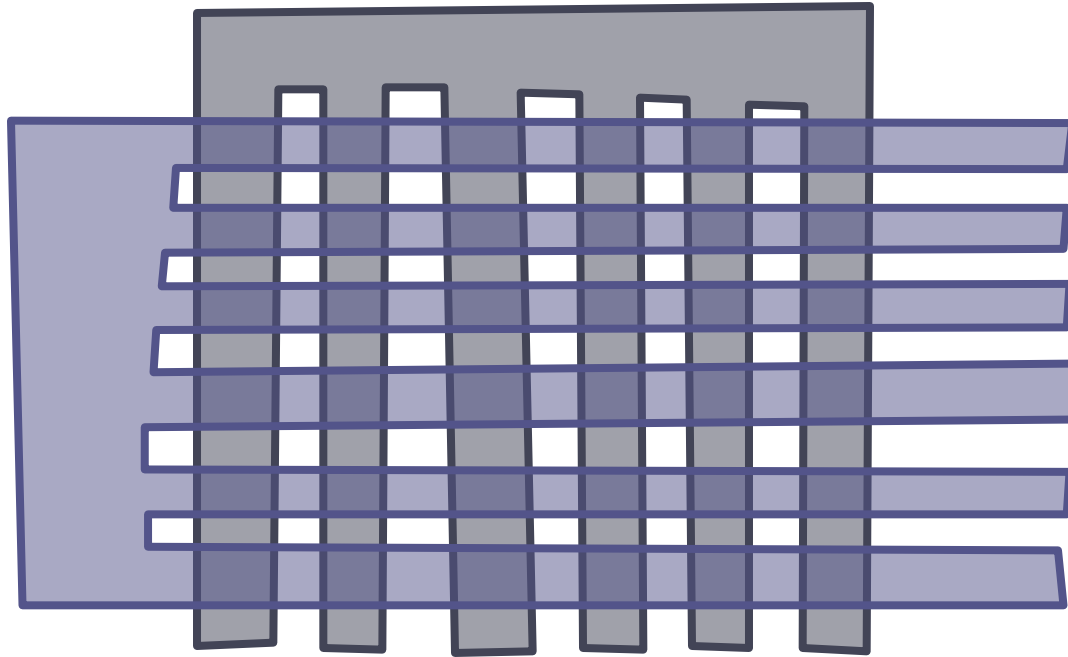


$$A = \{1, 2, 3, 4, 5\}$$

$$B = \{6, 7, 8\}$$

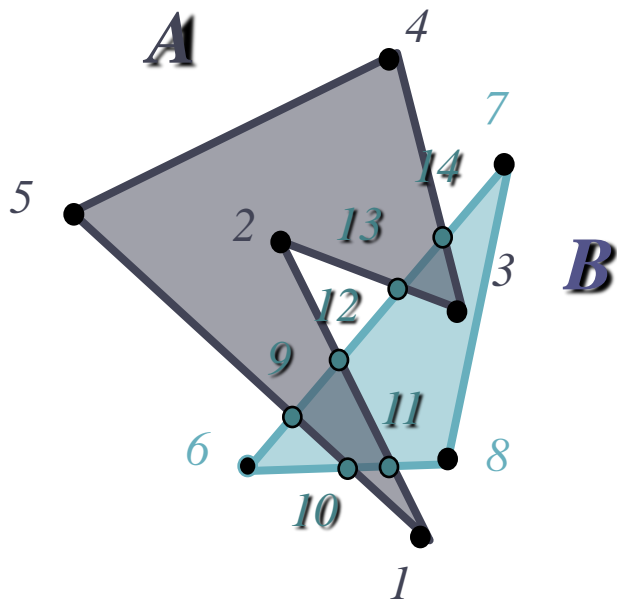
$$I = \{9, 10, 11, 12, 13, 14\}$$

Numarul maxim de bucati/gauri



Fiecare bucata are $O(n)$ partitii.
Intersectia va avea $O(n^2)$ partitii.

Intersectia poligoanelor

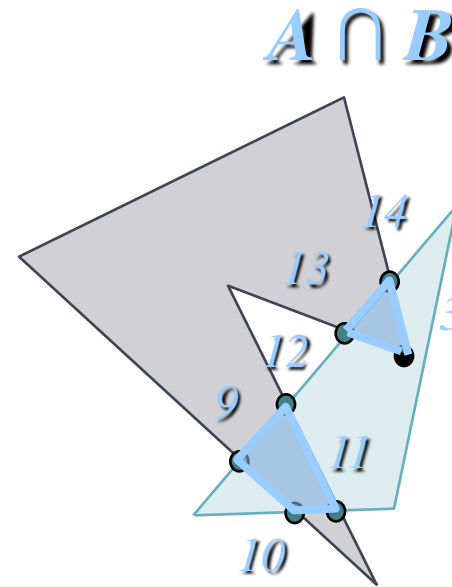


$$A = \{1, 2, 3, 4, 5\}$$

$$B = \{6, 7, 8\}$$

$$I = \{9, 10, 11, 12, 13, 14\}$$

$$A \cap B = \{9, 10, 11, 12\} \cup \{13, 3, 14\}$$

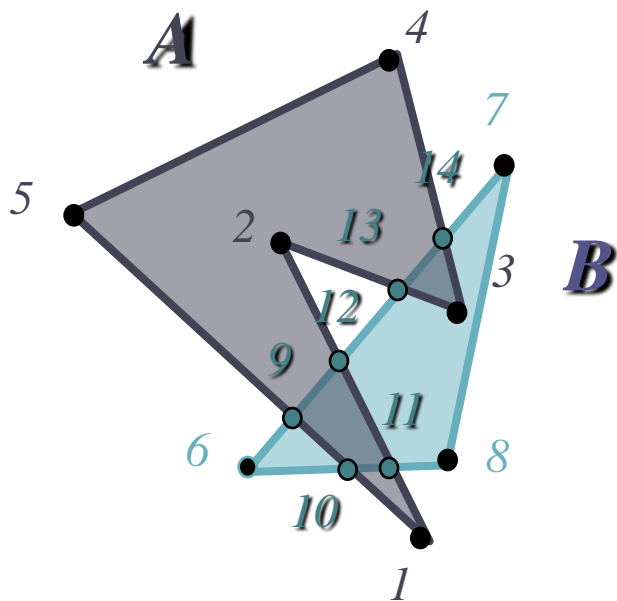


Regula pe granita:

Se urmaresc

segmentele ce au
ambele interioare la
stanga.

Reuniunea poligoanelor

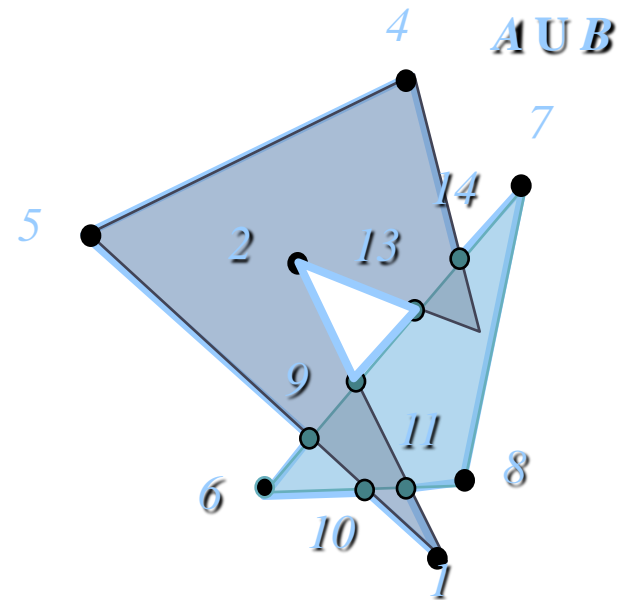


$$A = \{1, 2, 3, 4, 5\}$$

$$B = \{6, 7, 8\}$$

$$I = \{9, 10, 11, 12, 13, 14\}$$

$$A \cup B = \{(6, 10, 1, 11, 8, 7, 14, 4, 5), (9, 2, 13)\}$$

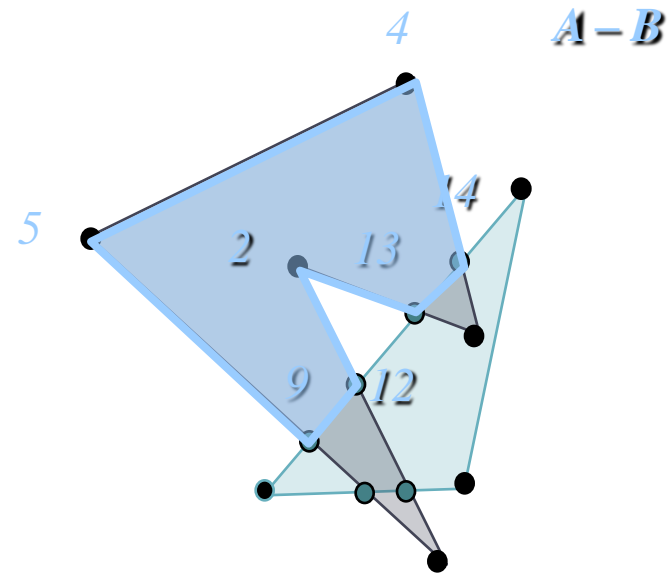
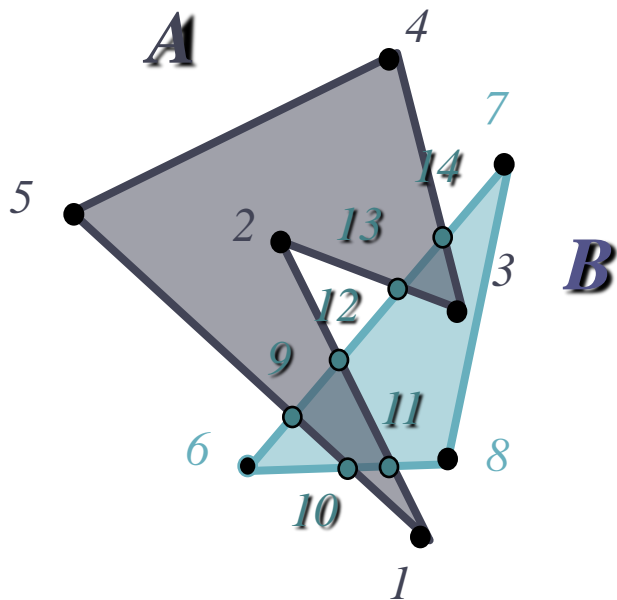


Regula pe granita:

Se urmaresc

segmentele ce au
oricare interior la
stanga.

Diferenta poligoanelor



$$A = \{1, 2, 3, 4, 5\}$$

$$B = \{6, 7, 8\}$$

$$I = \{9, 10, 11, 12, 13, 14\}$$

$$A - B = \{9, 12, 2, 13, 14, 4, 5\}$$

Regula pe granita:

Se urmaresc

segmentele ce au
interiorul lui **A** la
stanga.