

Collision Detection 2

衝突検出

Collision between Triangle Meshes

- If there are N triangles, there are $N(N-1)/2$ number of pairs

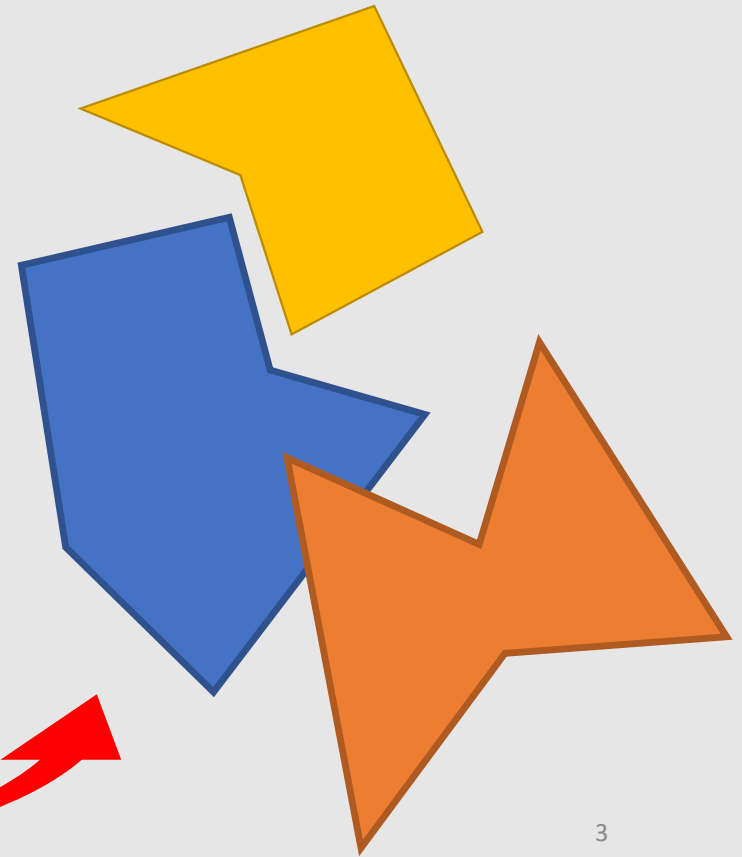
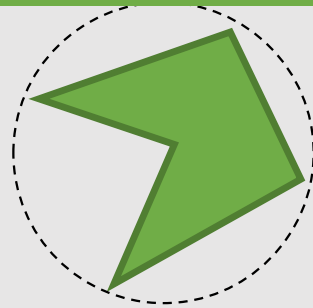
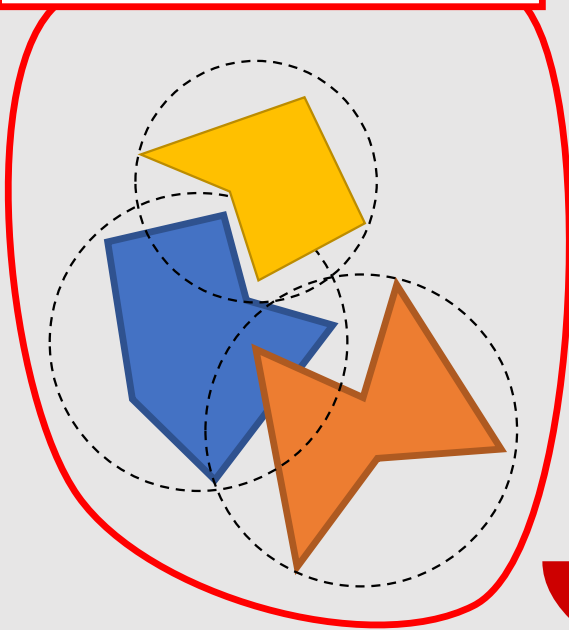
Collision Detection in Two Stages

Broad Phase: extract candidate

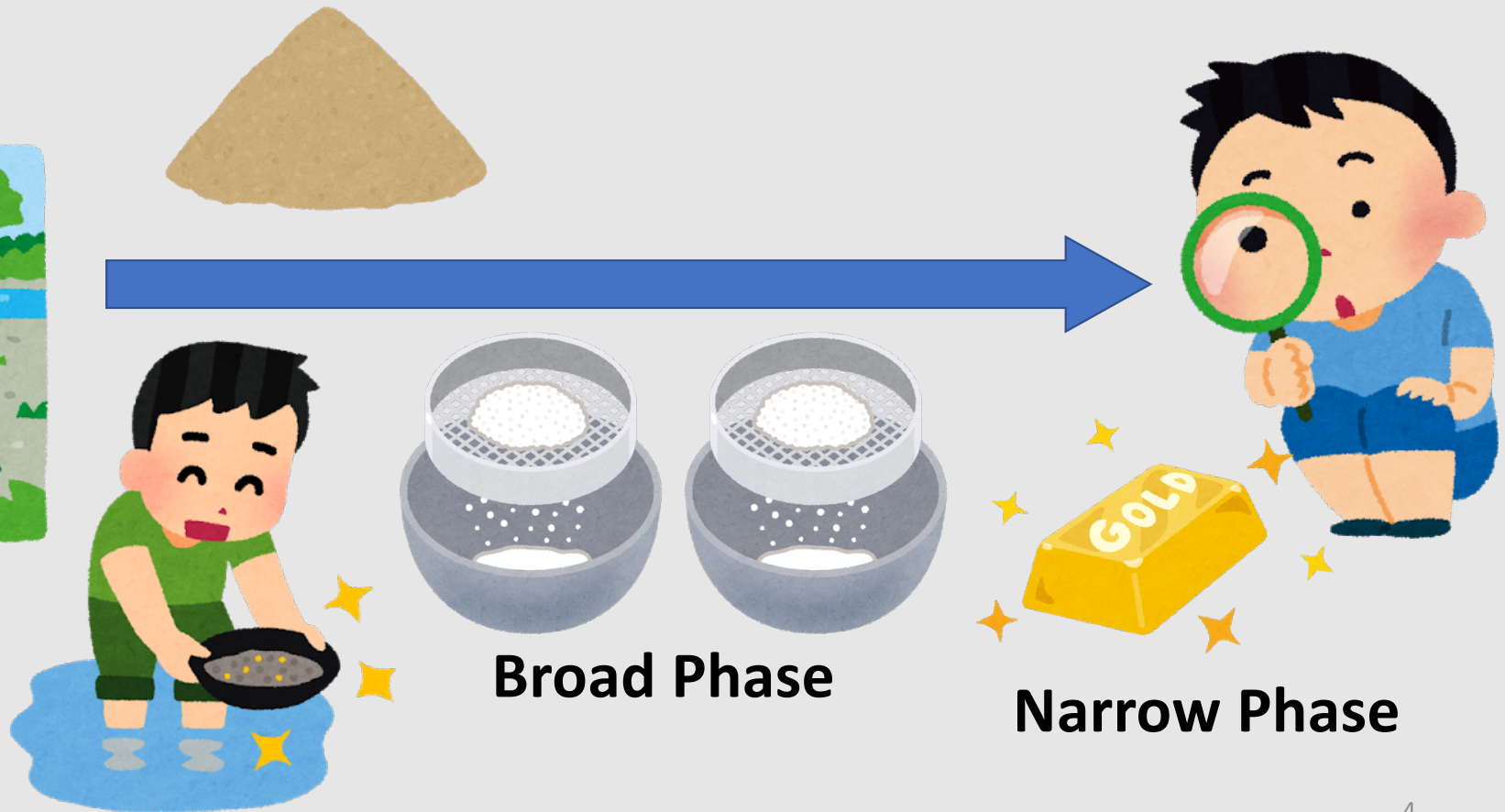
Narrow Phase: actual check

There may be collision

This won't collide



Garimpeiro for Finding Collision in a Mesh

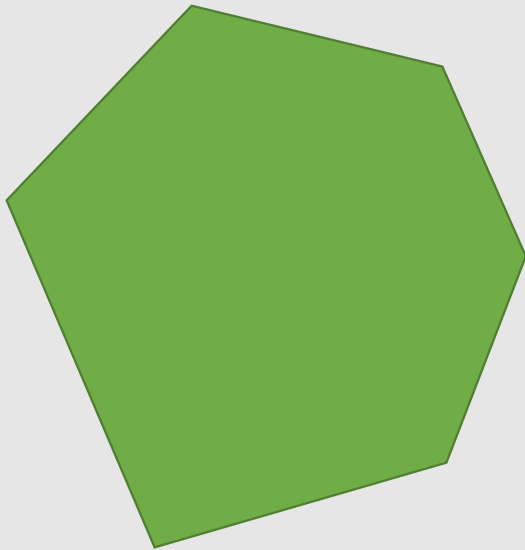


Narrow Phase Collision Detection

Convex Shape

Difference between “Convex” and “Non-Convex” shape?

Convex

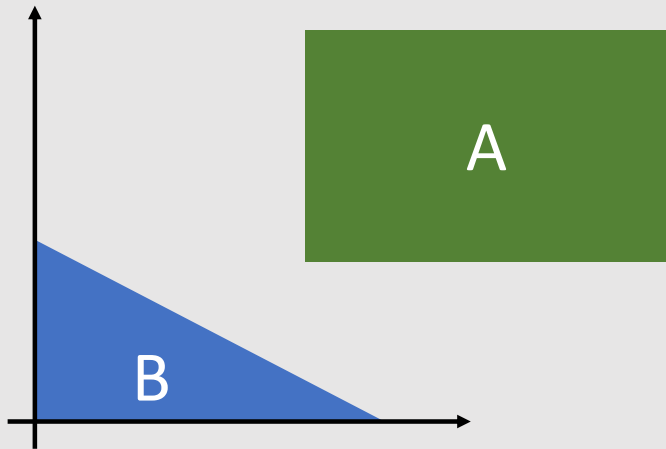


Non-Convex



Minkowski Sum (ミンコフスキー和)

$$A \oplus B = \{a + b | a \in A, b \in B\}$$



Minkowski Difference (ミンコフスキー差)

$$A \ominus B = \{a - b \mid a \in A, b \in B\}$$

Gilbert-Johnson-Keerthi (GJK) Algorithm

Separation Theory

Collision of Two Triangles

- Three patterns

Continuous Collision Detection (CCD)

- CCD is a must for thin objects (e.g., shell, rod)

Sturm's Theorem