

MAE541

Assignment 5: AFAG

In a Face Adjacency Graph the nodes are faces and the links are edges between the faces. Edges have attributes attached indicating convexity. Given the nominal geometry of a part in acis.sat format, generate an Attributed Face Adjacency Graph (AFAG) and output it to a text file.

INPUT:

acis.sat (single part)

OUTPUT:

no. of faces

no. of edges

no. of convex edges

no. of concave edges

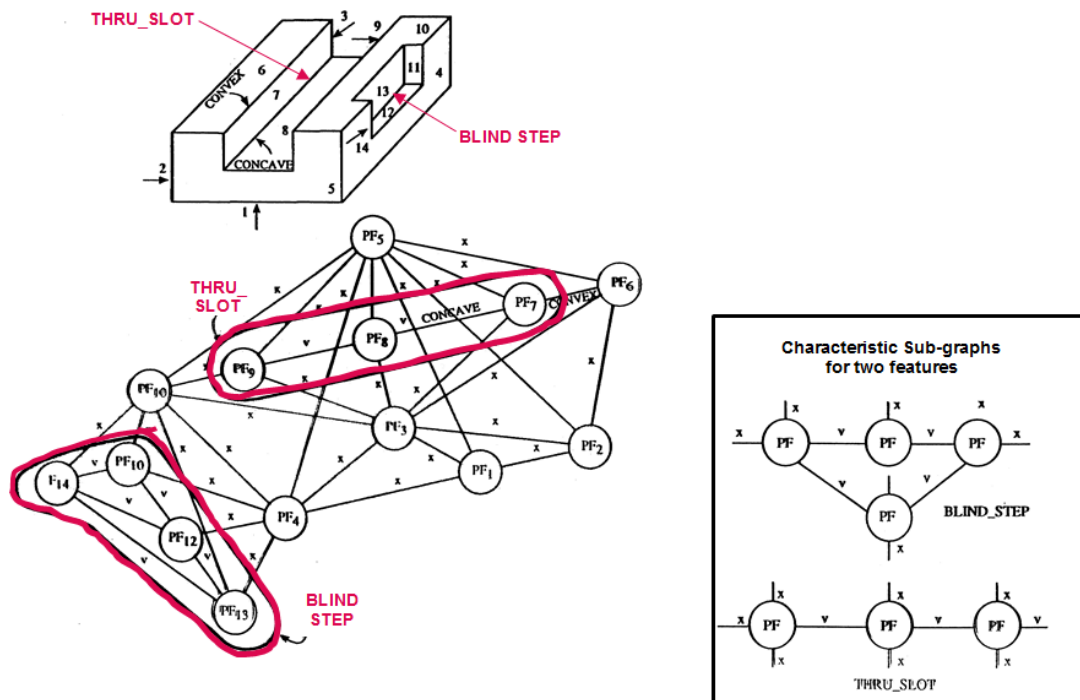
adjacency links with convexity attributes ($F_i - F_j$, vexity_value)

Vexity_value can be integers 1 (convex) and -1 (concave), or chars x and v.

If you use a matrix representation for the AFAG graph, zeroes will represent no link and 1/-1 a convex/concave link.

Background

AFAGs are intermediate data structures derived from BRep to facilitate automatic feature recognition.



Some of the acis functions you will need:

Reading a sat file

Getting entity_list of faces of a body

Getting entity_list of edges of a body

Counting faces and edges

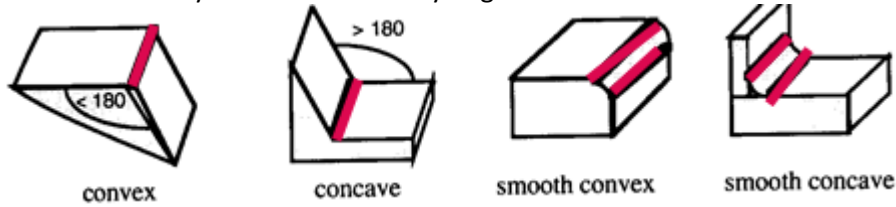
Finding convexity of an edge

Finding faces pointed to by an edge

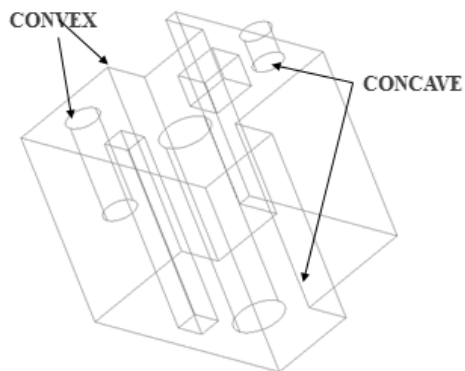
Edge Classification

Edge convexity classification is a key idea used in almost all feature recognition systems. CONVEX edges are usually indicators of depressions (holes, slots...); CONCAVE edges are usually indicators of protrusions (ribs, bosses...).

Fillets are usually removed to classify edges



Example



AFAG for a complex part (from ASU DAL NC feature Recognizer)

