Application of Comparison of Objects Using their 2D and 3D Contours

- Estimation of Phylogenetic Relationships of Japanese Native Fowls -

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We describe a method for comparing objects using their 2D and 3D Contours. We compare 2D contours based on a curvature sequence and compare 3D contours using a spherical attribute image (SAI), a natural expansion of a curvature sequence. An SAI is a spherical image, each node of which has a correspondence node on a 3D contour and its geometrical attribute, i.e., a simplex angle, which is a natural extension of a curvature. Note that an SAI assumes to have obtained a continuous and one-to-one map from a node of a 3D contour to a node of a sphere and that the map can be obtained by the deformable surface method with additional improvements which we propose. From the definition, an SAI is invariant against rotation and scaling of a 3D contour; those are preferable characteristics for the comparison. In actuality, we applied our proposed method to the estimation of phylogenetic relationships of Japanese Native Fowls.