Point-cloud based 3D Shape Analysis
– Parts through Plants –

Shun'ichi Kaneko

Kazusa DNA research Institute
2-6-7 Kazusa Kamatari, Kisarazu, Chiba, 292-0818, Japan
skaneko@kazusa.or.jp

Some effective approaches for point-cloud based 3D shape analysis have been surveyed, such as M-ICP, LCPD, DAI-Matching and then HALF analysis, for mechanical solid parts, and then for field plants. They could utilize geo-metrical properties in their point-cloud data and original computational schema based on the distances and/or the densities with strong robustness for imbalance and occlusion between any pair of 3D shapes. M-ICP is an extended version of the original Iterative Closest Point algorithm by the additional scheme based on M-estimation in order to realize robustness for outlying point-cloud data. LCPD, standing for Local Consistency of Point Density, is another robust matching scheme based on the consistency in point density in the neighboring pairs between any two PC data sets. DAI-Matching utilizes 2D appearance-based matching for registration of 3D curved solid objects. Lastly HALF stands for Histogram of Angles in Longer Arm Features which enables region segmentation into the classes, such as stems, leaves, and knots, of many types of plants by a simple but massive computation. Because of their fundamentality, thry must be more helpful and hopeful tools for more complicated shape analysis tasks together with application-oriented methods.

Short biography:

Shun'ichi KANEKO received the B.S. degree in precision engineering and the M.S. degree in information engineering from Hokkaido University, Japan, in 1978 and 1980, respectively, and then the Ph.D degree in systems engineering from the University of Tokyo, Japan, in 1990. He had been a research assistant of the Department of Computer Science since 1980 to 1991, an associate professor of the Department of Electronic Engineering since 1991 to 1995, and an associate professor of the Department of Bio-application and Systems Engineering since 1995 to 1996, in Tokyo University of Agriculture and Technology, Japan. He has been an professor of the Laboratory of System Sensing and Control in the Graduate School of Information Science and Technology in Hokkaido University since 2004 to 2020.

His research interest includes machine vision, image sensing and understanding, robust image registration. He is a member of IEICE, JSPE, IEEJ, SICE and the IEEE computer society.