- Friday, August 13, 1999
  What's up in Three Dimensional Image Processing: A Yokohama Perspective

  Summary of YORKVIS meeting for Friday August 13, 1999 given byToshiyuki Gotoh (Department of Artificial Environments and Systems, Graduate School of Engineering, Yokohama National Univ., Japan) "What's up in three dimensional image processing: A Yokohama perspective" host: Jim Bebko (Psychology, York) This talk will summarize several topics related to three-dimensional image processing which is researched in our laboratory in Yokohama,Japan.

  Current projects include:

  1. An application of three-dimensional image processing for medical images.Recently, the need for three dimensional medical images, such as those from Computer Tomography(CT) and Magnetic Resonance Imaging(MRI), have increased for medical diagnoses. Medical image ? econstruction? to segment into tissues and/or organs in an image becomes more important for medical investigations, and conventionally it needs to be performed by manually selecting a set of thresholds to separate tissues from one another. We have developed a prototype of a medical image reconstruction system based on three-dimensional image segmentation. The system consists of an image segmentation and human interface units which realize high speed processing by utilizing graph representation of voxel region structures. I will describe the segmentation algorithm for this system, the system configuration, and show you some experimental results.

  2. Resolving three-dimensional segmentation problems based on a plastic-elastic deformation model.The two-dimensional segmentation algorithms based on elastic deformation models, such as SNAKS and Active Net, have been investigated by researchers. However, these algorithms have a problem of computation costs when trying to apply them for three-dimensional images, because they need to be solve optimal solution for the nonlinear objective function. In our method, each elastic modulus between pixels is firstly defined as a function related with the gradient of the gray-scale on an image. Then simulations are performed to evaluate the plastic-plastic deformation of the image plane when the part of pixels is pulled up through a defined axis orthogonal to the original plane, and the regions are extracted based on the simulated results. By means of considering this new orthogonal axis, the amount of computation in elastic simulation is enabled to be reduced. I will describe an algorithm and give experimental results to show our method is effective.

  3. Investigation of a method for a three-dimensional user interface.We are also making an investigation of a user interface to handle three-dimensional objects in computers. I will briefly describe a prototype of an interactive user interface system for handling and modeling virtual objects based on a user's finger motion. It consists of a binocular stereo display, a set of TV cameras, and a couple of Workstations. One of the Workstations inputs the images of the user's fingers from the cameras, and estimates the three dimensional finger's motions. Based on the detection of the finger instructions, another Workstation interactively controls the three-dimensional motions, material and lighting properties of objects' geometric models, and presents them to the user through a binocular display.

  Toshiyuki Gotoh