3-D Medical Image Rendering Using Laplace Equation

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목적(Purpose): A new multi-planar medical image rendering technique is proposed. The method is based on the solution of the Laplaces equation in the electrostatics. Simultaneous multiple interpolation planes between the source and destination planes are obtained in the proposed method. Some experimental and simulation results are shown.

대상 및 방법(Materials and Method): In this approach, two contours for given objects are assumed to have equipotentials. Displacement and rotation of the object (contour) are made in such a way that the centers of mass and principal axes of the objects coincide. Scaling of one object is performed if there are intersections between two objects, so that there is no intersection between the two contours. Multi-planar interpolation may be achieved using the numerical solution of Laplaces equation from the equipotential contours between the two potentials. Inverse scaling, rotation, or displacement is carried out if any process is applied previously. The solution assumes a mostly smoothing changes from one object to the other. The proposed technique is applied to MR head imaging of volunteers.

결과(Results): Some examples by the proposed multi-planar rendering technique are shown. Examples include interpolations from a circle to a square, from one circle to two circles in bifurcation, etc. The technique is also applied to some MR head images.

결론(Conclusion): The propsed multi-planar medical image rendering technique works well. It can be applied to the interpolations between slices where resolution alone slice selection is usually much lower than those in transverse plane. Successful rendering with much improved quality is achieved for the MR head images by the proposed technique.