



"Statistical Shape Modeling and Analysis: Applications to Biomedical Images"

Friday October 12, 2:30 pm
Pickard Hall, Room 304

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Abstract: Shape modeling and surface representation combine physical measurement of objects with mathematical models and are important in a large number of scientific and engineering areas. Biomedical informatics is one of the most important applications. In this talk, I will present two recent results on shape modeling, registration, and analysis with several applications in biomedical informatics.

In the first work, I show a novel surface registration algorithm for arbitrarily shaped but simply connected (i.e., contiguous) 3D objects. Based on the rotational properties of harmonic analysis, a new Parameterization Rotation Theorem is introduced and proved and a fast surface alignment algorithm is developed. This algorithm can accurately and efficiently generate surface correspondences between objects for which spherical harmonics (SPHARM) was used for surface modeling. These techniques have been applied to many biomedical applications, including improving morphological understanding of anatomic structures, dynamic object analysis, and statistical shape classification and analysis.

In the second work, I present a new hemisphere-based harmonic surface model. I define a set of complete hemispherical harmonic basis functions on a hemisphere domain and use these to support a novel parametric shape description method. This method is very useful in efficiently and flexibly representing the surfaces of certain anatomical structures (like the heart ventricles) in biomedical applications.

* Heng Huang received his Ph.D. degree in Computer Science at Dartmouth College in 2006. Before he joined University of Texas at Arlington (UTA), he was working as a postdoctoral researcher in the Center of Biological and Biomedical Computing at Biology department at Dartmouth College. Currently he is an assistant professor at computer science and engineering department at UTA and leading BIOVIZON (biomedical computing and visualization) Lab, where his research focus on the areas of biomedical image analysis, bioinformatics, pattern recognition, and scientific visualization.

The Math Department will provide refreshments 30 min. prior to the presentation.

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