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- Friday, April 27, 2007
  A flux invariant for biological shape

  In the late 60's Blum developed the notion of axis-morphologies for describing 2D and 3D forms. He proposed an interpretation of the local reflective symmetries of an object as as a "medial graph" and suggested that the implied part structure could could be used for object categorization and recognition. In this talk I will discuss a type of an "flux" integral performed on the gradient vector field of the Euclidean distance function to the bounding curve (or surface) of an object. Remarkably, the limiting behavior of this integral as the enclosed area (or volume) shrinks to zero reveals a scalar invariant which both determines the Blum skeleton as well as the geometry of the object that it describes. I will also discuss our work on algorithms for computing medial loci using these ideas as well as the connection to some of the psychophysical literature on medial loci. Much more is covered in my upcoming book with Steve Pizer: "Medial Representations: Mathematics, Algorithms and Applications" (Springer, 2007, in press).

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