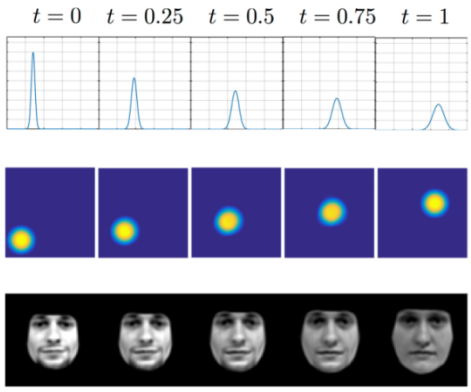

Tutorial 1: Optimal Transport in Biomedical Imaging

Organizers
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Overview

In this tutorial we will present a set of image analysis tools based on the mathematics of optimal transport, which can be used for a variety of biomedical imaging applications. In addition to providing basic theory relating to optimal mass transport, we will describe the recent development of image transforms with well-defined forward and inverse operations that have demonstrable advantages over other image transforms (e.g. Fourier, wavelet, Radon).

The second part of the tutorial will focus on applications of optimal transport relevant to biomedical imaging: image modeling, statistical analysis, classification, and inverse problems. The tutorial will feature live code demonstrations, and we will provide attendees with software that can be used to aid their own research.

Topics

1. Introduction to optimal transport
    a. History and formulations of optimal transport
    b. Linear optimal transport
    c. Transport-embeddings and transforms
2. Transport-based morphometry
    a. Data representation and filtering
    b. Modeling transport processes w.r.t independent variables
    c. Generative discriminative modeling
3. Applications in biomedical imaging
    a. Inverse problems
    b. High content screening
    c. Cell morphometry
    d. Brain morphometry
    e. Image classification

Audience

The target audience is general ISBI attendees with basic understanding of signal processing and machine learning. A knowledge of Matlab or Python will also be useful for running code demonstrations. Any imaging researchers are welcome to join the tutorial; however, the examples that we will present are focused on cell, brain imaging, knee osteoarthritis, and analysis of human faces.