

Course Announcement: STOR 892, Fall 2014

Object Oriented Data Analysis

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Tu-Th 12:30 - 1:45, Hanes 125

Object Oriented Data Analysis (OODA) is the statistical analysis of populations of complex objects. Examples include data sets where the data points could be curves, images, shapes, movies, or tree structured objects. In addition to providing an elegant mathematical framework containing a wide array of interesting analytic methods, OODA provides new statistical terminology that facilitates inter-disciplinary discussion which are often critical to the effective analysis of modern complex data sets.

Understanding variation of such populations, and how data objects relate to each other, is a key task in OODA. Methods such as principal components, and various extensions and modifications will be studied.

A second key OODA task that is currently labeled "machine learning", i.e. clustering/classification will also be studied in depth. Methods such as Support Vector Machines, kernel embedding approaches, and various modifications will be studied.

A common feature of OODA data sets is that often the dimensionality is very high, which invalidates most classical statistical methods, leaving a large area for the development of new methodologies, some of which will be studied. A new mathematical statistical theory, relevant to such data, will be explored.

Another interesting OODA direction, motivated by recent developments in medical image analysis, is the statistical analysis of populations of data objects which are elements of mildly non-Euclidean spaces, such as data lying on a manifold, and of strongly non-Euclidean spaces, such as sets of tree-structured data objects. These new contexts for OODA create several potentially large new interfaces between mathematics and statistics.