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SenSIP Graduate Student Seminar Series

Modeling Human Actions as Riemannian Trajectories

Presenter: Rushil Anirudh, PhD
March 4 (Friday), 2016, 11:00 AM / Room: GWC 487

Abstract

The proliferation of sensors in our everyday lives has spawned a variety of applications. These require an accurate representation, analysis and comparison of sensor data. Parallely, this has also led to increasingly specific sensors that result in very structured data. Examples include gyroscopes in virtual reality headsets, depth sensors such as Microsoft Kinect, mocap systems such as OptiTrak etc. The sensor data typically has certain geometric constraints – for example, the data from a gyroscope measures orientations, which can be interpreted as points on the curved surface of a 2-sphere, S2. Skeletal representations, which can be obtained from the Kinect, or OptiTrak, tend to change non-linearly over time, and state-of-the-art methods involving such skeletons map them on to the product space of the Special Euclidean group SE(3). A sequence of such skeletons or orientations over time results in a curve or trajectory on the corresponding feature manifold. As a result, exisiting tools for the vector space fail to generalize and need to be re-built from first principles. In this talk, we will focus on exploiting the statistical properties of such trajectories for improved performance in human action recognition and action quality estimation. By measuring the variance of such trajectories, we show that we can compute generalizations of principal component analysis (PCA) and other dimensionality reduction techniques to Riemannian trajectories.

Biography:
Rushil Anirudh is finishing his PhD at Arizona State University this Spring, working on modeling spatio-temporal events such as human actions using Riemannian geometry. He obtained his MS degree at ASU in 2012 and a B.Tech degree at National Institute of Technology Karnataka, India in 2010.

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Sponsored by the SenSIP Center and NSF I/UCRC
Technical Co-Sponsorship by the IEEE Signal Processing and Communications Chapter, Phoenix Section

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