Non-Rigid Structure from Motion

Lourdes Agapito
Queen Mary University of London, UK

Abstract

Recovering the 3D shape of a deformable surface from a single video stream remains an open problem due to its inherently ill-posed nature - many different 3D shapes have the same image projections. The last decade has seen the surge of Non-Rigid Structure from Motion (NRSFM) as a successful extension of its rigid equivalent to the case of deformable scenes. These methods use 2D tracking data as the only input, and make use of spatio-temporal smoothness priors to resolve ambiguous cues. Over the last 10 years some successful solutions have been proposed. In this talk I will describe the most influential approaches in the literature and will address their shortcomings.

The second part of my talk will focus on our new formulations to escape these limitations. In particular, so far, NRSFM algorithms have been demonstrated on simple sequences where the deformations are only small deviations from a rigid component. Instead, our new piecewise approach is able to reconstruct strongly deforming surfaces composed of multiple local deformations. We demonstrate this on sequences with fast deformations where traditional approaches fail and show how our energy based formulation can also be used to reconstruct 3D human articulated motion.

Keywords: Non-Rigid SFM