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Priors for people tracking from small data sets

We introduce Gaussian Process Dynamical Models (GPDMs) for modeling human pose and motion. The GPDM provides a low- dimensional embedding of human pose and motion, and defines a density function that gives higher probability to poses and motions close to the training data. With the use of Bayesian model averaging a GPDM can be learned from relatively small amounts of training data, and it generalizes gracefully to motions outside the training set. We use the GPDM to learn prior models of human pose and motion for the monocular 3D people tracking. In this talk we consider two classes of motion, walking, and golf swings. We show that GPDM priors are effective for tracking, despite weak and noisy image measurements and significant occlusions. The tracking is formulated in terms of a simple MAP estimator on short sequences of poses within a sliding temporal window. (Joint work with Raquel Urtasun, Jack Wang, Aaron Hertzmann, and Pascal Fua.)

David Fleet
Unversity of Toronto