

Intrinsic on-manifold trajectory learning for robotics

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Abstract: Many of the tools available for robot learning were designed for Euclidean data. However, many applications in robotics involve manifold-valued data. In robot learning, manifold-valued data are often handled by relating the manifold to a suitable Euclidean space, either by embedding the manifold or by projecting the data onto one or several tangent spaces. These approaches can result in poor predictive accuracy, and convoluted algorithms. An intrinsic approach that works directly within the manifold is proposed. It involves taking a suitable probability distribution on the manifold, letting its parameter be a function of a predictor variable, such as time, then estimating that function non-parametrically via a “local likelihood”. We name the method kernelised likelihood estimation.