

Learning and Lie Groups

Monday 11 June 2018 09:00 (1 hour)

Machine learning methods are mostly based on calculus and probability and statistics on Euclidean spaces. However, many interesting problems can be articulated as learning in lower dimensional embedded manifolds and on Lie groups. This talk reviews how learning and Lie groups fit together, and how the machine learning community can benefit from modern mathematical developments. The topics include:

- Introduction to Calculus on Lie Groups (Differential Operators, Integration)
- Probability on Lie Groups (Convolution, Fourier Analysis, Diffusion Equations)
- Application 1: Workspace Generation and Inverse Kinematics of Highly Articulated Robotic Manipulators
- Application 2: Pose Distributions for Mobile Robots
- Application 2: Lie-Theoretic Invariances in Image Processing and Computer Vision
- Application 3: Coset-Spaces of Lie Groups by Discrete Subgroups in Crystallography
- Prospects for the Future

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