Curve recognition Modulo Lie group action

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In computer vision, objects are often represented by the boundary of their projection onto a plane (picture). So the problem of object recognition is often reduced to curve recognition up to Lie group action. In mathematical terms, the question we are trying to answer can be formulated as follows:

Given a Lie Group G acting on a manifold M and two curves $C_1, C_2 \in M$, does there exist a transformation $g \in G$ such that $g \cdot C_1 = C_2$.

Our solution is based on Fels-Olver moving frames. We prolong the action of G onto $M^{\times(n)} := M \times M \times \ldots \times M$ (n times), the *Cartesian space* of M, which is a discrete version of the jet bundle. Suitably chosen invariants of this action are used to parameterize a noise-resistant signature of optimal dimension. Our method is completely algorithmic and works for most Lie groups. The examples of the Euclidean, affine and similarity (Euclidean + scaling) Lie groups will be discussed.