
Equivariant neural networks based on moving frames

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Résumé

Moving frames are a classical method of obtaining invariants to the action of a Lie group on a Manifold.

We apply the method of moving frames to obtain equivariant or invariant neural network layers. We show two methods to obtain equivariant networks using moving frames: one uses differential invariants as their main layer and the other method uses a moving frame computed from the input image. We implement networks invariant to rotations in 2 and 3 dimensions and the methods are shown to have a better performance than a CNN on tasks where rotational invariance is important. The 3D rotation invariant networks are shown to increase performance on low-resolution datasets and to be more data efficient in a protein structure classification task.

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