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Diffeomorphisms for Dummies and Augmentations for Awesommies

Deep learning is making tremendous impact in computer vision and machine learning tasks where data is plentiful. However, those of us not working for a big data collection company often find that data is not as plentiful as needed. A common trick is to artificially increase the size of your data set by synthetically deforming the data, e.g. new images can be generated by rotating old ones. The difficult part is to find the right set of deformations to apply, which is a manual laborious task akin to feature engineering in classic computer vision. I'll present some techniques for automating these processes. To get there, we'll discuss links to image registration, infinite dimensional Lie groups, and deep neural networks. To close the talk, I'll demonstrate how the developed tools can be used to improve both convergence and performance of spatial transformer nets.