Multi-scale Decomposition of Transformations (MUSCADET)

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In many applications, transformations between two domains are defined through point-wise mappings. These functions can be costly to store and compute, but also hard to interpret in a geometric fashion. In this work, we propose a way to overcome these difficulties. The main idea is a novel multi-scale decomposition of complex transformations into a cascade of elementary, user-specified, transformations.

This methods allows to: (i) Construct efficient approximations for elements of large spaces of complex transformations using simple understandable blocks, (ii) Use transformations to measure similarities between complex objects, (iii) Deal with invariance under certain transformations, (iv) Perform statistical inference tasks on sets of transformations.

We will describe the method as well as provide theoretical guarantees on the quality of the multi-scale approximations. Then we will present some numerical experiments that show its computational efficiency.

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