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Alignment based kernel learning with a continuous set of base kernels

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Abstract The success of kernel-based learning methods depends on the choice of kernel. Recently, kernel learning methods have been proposed that use data to select the most appropriate kernel, usually by combining a set of base kernels. We introduce a new algorithm for kernel learning that combines a continuous set of base kernels, without the common step of discretizing the space of base kernels. We demonstrate that our new method achieves state-of-the-art performance across a variety of real-world datasets. Furthermore, we explicitly demonstrate the importance of combining the right dictionary of kernels, which is problematic for methods that combine a finite set of base kernels chosen *a priori*. Our method is not the first approach to work with continuously parameterized kernels. We adopt a two-stage kernel learning approach. We also show that our method requires substantially less computation than previous such approaches, and so is more amenable to multi-dimensional parameterizations of base kernels, which we demonstrate.

Keywords Two-stage kernel learning · Continuous kernel sets

1 Introduction

A well known fact in machine learning is that the choice of features heavily influences the performance of learning methods. Similarly, the performance of a learning method that uses a kernel function is highly dependent on the choice of kernel function. The idea of *kernel learning* is to use data to select the most appropriate kernel function for the learning task.

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