Week3

Paper1: Learning Kernels with Random Features

- Randomized features provide a computationally efficient way to approximate kernel machines in machine learning tasks.
- Problem: This representation comes with a cost, as kernelized learning algorithms require time that grows at least quadratically in the data set size, and predictions with a kernelized procedure require the entire training set.
- We combine kernel learning with randomization, exploiting the computational advantages offered by randomized features to learn the kernel in a supervised manner.
- Our approach optimizes kernel compositions with respect to an alignment metric, but rather than work with Gram matrices in the original data representation, we work with randomized feature maps that approximate RKHS emeddings.

Paper2: Cross Pixel Optical Flow Similarity for Self-Supervised Learning

- We propose a novel method for learning convolutional neural image representations without manual supervision.
- We use motion cues in the form of optical flow, to supervise representations of static images.
- We instead propose a muh simper learning goal: embed pixels such that the similarity between their embeddings matches that between their optical flow vectors.
- Since predicting flow vectors directly is ambiguous, we propose instead to require the similarity between pairs of embedding vectors to align to the similarity between the corresponding flow vectors.

Paper3: Zero-Shot Kernel Learning

- We apply well-established kernel methods to learn a non-linear mapping between the feature and attribute spaces.
- We propose an easy learning objective inspired by the Linear Discriminant Analysis, Kernel-Target Alignment and Kernel Polarization methods that promotes incoherence.
- We evaluate the performance of our algorithm on the Polynomial as well as shift-invariant Gaussian and Cauchy kernels.

Paper4: A kernel Theory of Modern Data Augmentation

- We seek to establish a theoretical framework for understanding data augmentation.
- We provide a general model of augmentation as a Markov process.
- We analyze more directly the effect of augmentation on kernel classifiers.

Paper5: An overview of kernel alignment and its applications

- We present an overview of the research progress of kernel alignment and its applications.
- We introduce the basic idea of kernel alignment and its theoretical properties, as well as the extensions and improvements for specific learning problems.
- The typical applications, including kernel parameter tuning, multiple kernel learning, spectral kernel learning and feature selection and extraction, are reviewed in the context of classification framework.
- The relationship between kernel alignment and other evaluation measures is also explored.