Image Classification Based on K-Nearest Neighbors(k-NN)

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The K-nearest neighbor algorithm is a supervised learning algorithm. In essence, it is to find the K instances closest to a certain test sample A in a given training sample, and then count the class with the highest category count among the k instances, which is A Category.

The application of the k-NN algorithm to the image classification problem is how to evaluate the distance between the image A to be classified and the P training sample images.

For example, a photo of a cat, the image classification model reads the picture and generates the probability that the picture belongs to each label in a set of animals.

The key question is what is the feature of the image selected, and the pixels of the image must be preprocessing for k-NN. For an image, it can be understood as a pixel as a feature, and the preprocessing step of k-NN needs to Normalize the data

Because k-NN is calculated by distance metrics, I also need to reduce the dimensionality of the data

Main Question need to solve:

1. K's choice:

2. Measures of distance: Manhattan

3. Classification decision rules

4. Choice of data set: I decide to use the dataset CIFAR10 http://www.cs.toronto.edu/~kriz/cifar.html which labeled subsets of the 80 million tiny images dataset

5. Image classification: I will consider direct classification, that is, the pixel value of each pixel of the image as a feature, then the distance between the two images is the absolute difference of the pixel value of each corresponding pixel The sum of the values.

6. Accuracy Test