K-Nearest Neighbors (KNN) Classification with Different Distance Metrics

1. Download Animals with Attributes (AwA2) dataset from https://cvml.ist.ac.at/AwA2/. This dataset consists of 37322 images of 50 animal classes with pre-extracted deep learning features for each image. Split the images in each category into 60% for training and 40% for testing (use the same training/test split as in Project 1). You can use K-fold cross-validation within the training set to determine hyper-parameters, such as K in KNN.

2. Use KNN for image classification based on the deep learning features.

3. When measuring the distance between two samples, try **different simple distance metrics** (e.g., Chebyshev distance, Euclidean distance, Manhattan distance, Cosine distance) and explore which metric can achieve the optimal performance.

4. Use **at least one metric learning** method to learn a good metric, which can help improve the performance of KNN.

5. Summarize your experimental results and write a project report in English. The project report should contain experimental setting (i.e., dataset, feature, training/testing split), the distance metrics you tried, the experimental results you obtained, and the experimental observations based on your experimental results.