Prior Knowledge about Attributes: Learning a More Effective Potential Space for Zero-Shot Recognition

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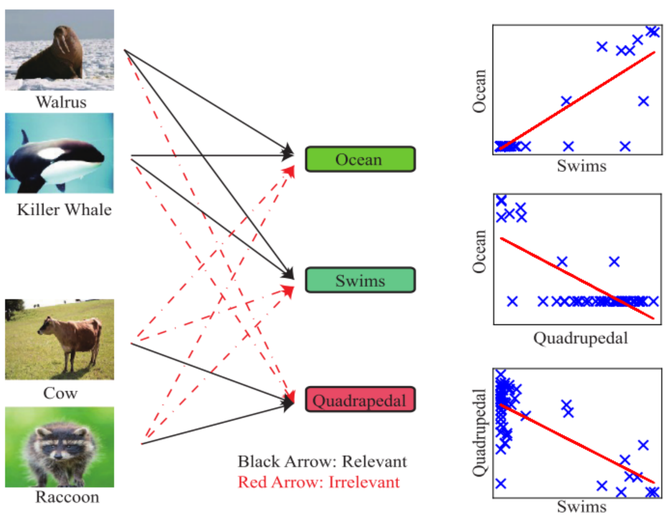
1. Introduction

Zero-shot learning aims to recognize unseen classes accurately by learning seen classes and known attributes, but correlations in attributes were ignored by previous study which lead to classification results confused. To solve this problem, we build an Attribute Correlation Potential Space Generation model which uses a graph convolution network and attribute correlation to generate a more discriminating potential space. Combining potential discrimination space and user-defined attribute space, we can better classify unseen classes. Our approach outperforms some existing state-of-the-art methods on several benchmark datasets, whether it is conventional ZSL or generalized ZSL.

2. Correlation

An illustrative diagram of semantic attributes correlation. It can be seen from the figure that if an animal has a certain attribute, it is likely to also have an attribute related to it; otherwise, it is likely not to have an attribute not related to it.



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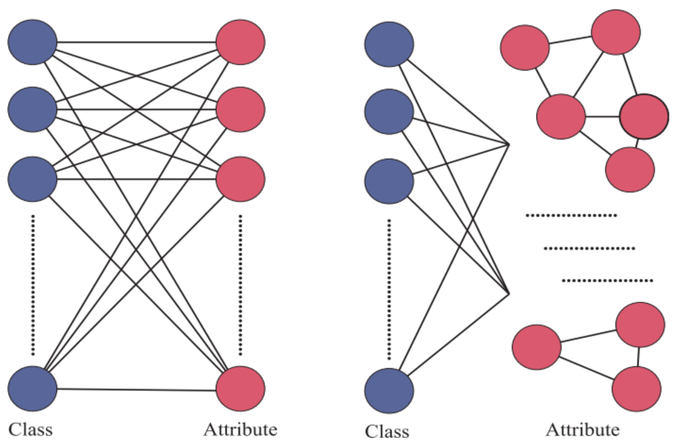
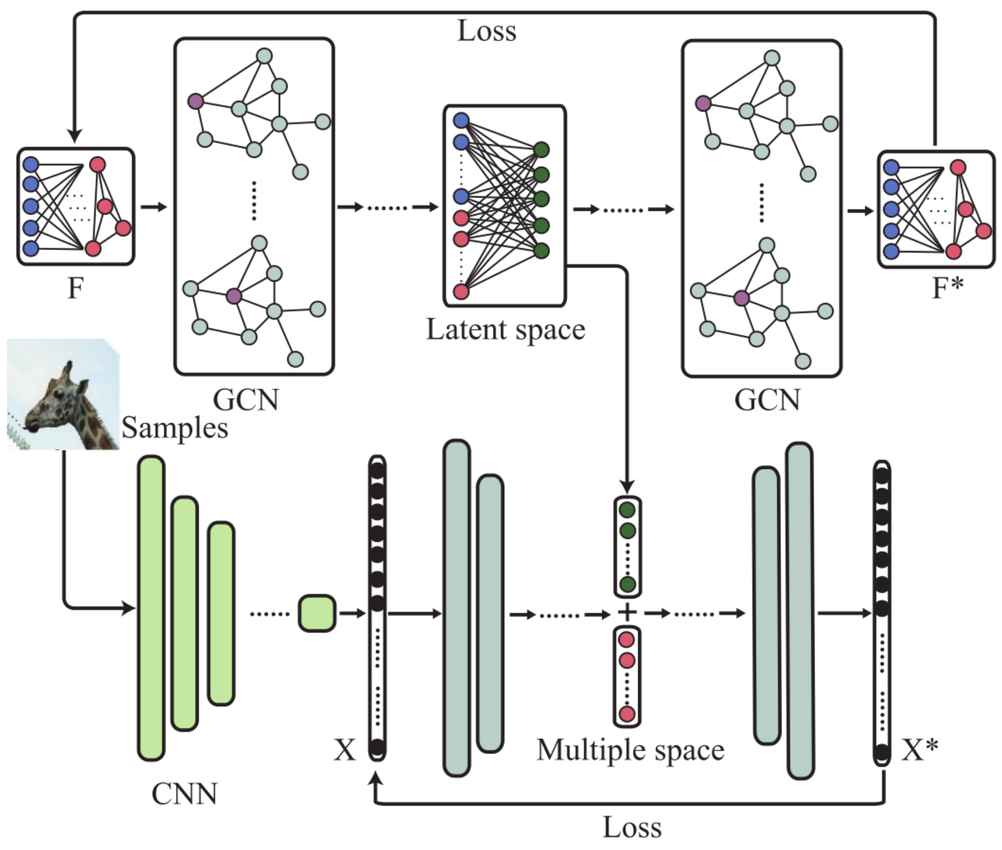


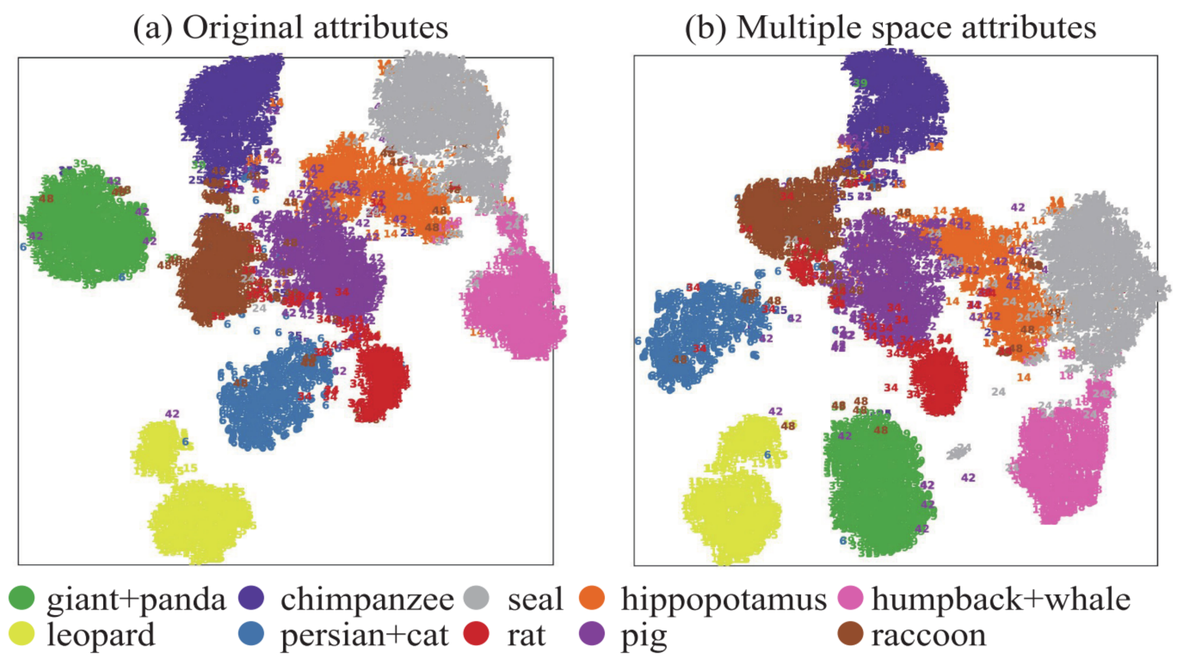
3. Model

Overall illustration of the framework proposed in this paper. At the first stage, we added the correlation between attributes as a prior knowledge, using a graph convolution model to generate a latent discernment space. In the second stage, we use autoencoders to map visual features into multiple spaces and learn a reliable decoder.



4. Experiments

The t-SNE visualization of multiple space on AwA2. (a) represents the predicted attribute distribution of the unseen classes without using potential discrimination space. (b) represents the predicted attribute distribution of unseen classes in the case of multiple spaces. Different colors represent different species.



5. Conclusions

In this paper, we put forward the concept of attribute correlation in ZSL, and explore the correlation in attribute nodes, it makes attribute nodes are interrelated rather than isolated. To use attribute correlation as a prior knowledge of ZSL, we propose the model to make full use of the correlation between nodes. Specifically, our model learns multiple spaces that are more discernible than the original space. Using this method, we integrated attribute correlation into the ZSL model successfully. Besides, we have done a lot of experiments to verify the effectiveness of our model.