REPORT OF THE COMP6248 REPRODUCIBILITY CHALLENGE

Anonymous authors
Paper under double-blind review

ABSTRACT

This report is the reproduction of an article, Multi-pseudo Regularized Label for Generated Data in Person Re-Identication. This article is included in ICLR 2019. The main object of this paper is to use a special way called MpRL to assign targets to the icidences generated from DCGAN to increase the prediction accuracy of the resnet. In this report, our team work to confirm if this method can improve the prediction accuracy.

1 INTRODUCTION

Person re-identification technology is a research hotspot in the field of computer vision, with a very wide range of application scenarios. For example, you can use the city surveillance system to cooperate with this technology to find the criminal's movements, missing children, and track illegal vehicles. In order to train person re-identification model and improve the judgment accuracy of the model, a training sets with a large number of incidences is required. However, in practical applications, the amount of data available for training is often very limited.

In order to solve the above problems, we can use generative adversarial networks (GAN) to generate artificial sample data based on the original data. GAN can solve the problem of insufficient training sample data, but the sample data generated by GAN have no labels, so you need to assign labels to the manually generated data before you can use these sample data for deep network training.

In order to make the generated sample data play a better role in training the model, people decide to assign multi-label to manually generated data because it can avoid overfitting. One of the assigning multi-label method is LSRO, which assign the multi-label to the incidences with equal weight of each categories. In the paper we want to reproduce, the authors develop a new assigning method that assign the multi-label to the incidence with the weight based on the categories dirtribution in real data. In this report, we will verify whether the effect of this method of assigning labels is consistent with the results in the paper. We choose to use Market-1501 dataset and compare the performance between baseline and dMpRL-II with index mAP and rank-1.

2 TARGET QUESTIONS

The target question for this paper is to evaluate a labelling method called 'Multi-pseudo Regularized Label' for the data generated by GAN in the person re-identification (re-ID) task.

To produce more data for training a deep network, Generative Adversarial Network is used to generate synthetic data. Due to the huge workload of labelling the images, a labelling method called 'Multi-pseudo Regularized Label'(MpRL) was proposed in this paper to solve this problem. MpRL assigns each generated data a proper virtual label which reflects the likelihood of the affiliation of the generated data to pre-defined training classes in the real data domain. The virtual label is a set of weight-based values, each value is between 0 and 1. This is called multi-pseudo label and reflects the degree of relation between each generated data to every pre-defined class in the real data.

The labelled real and synthesized data is evaluated convolutional neural networks. By comparing the metrics obtained from baseline and the workflow with MpRL, we can get the improvement of the proposed labelling method.

3 EXPERIMENTAL METHODOLOGY

In general, the graph below shows the steps of the baseline and the workflow with MpRL:

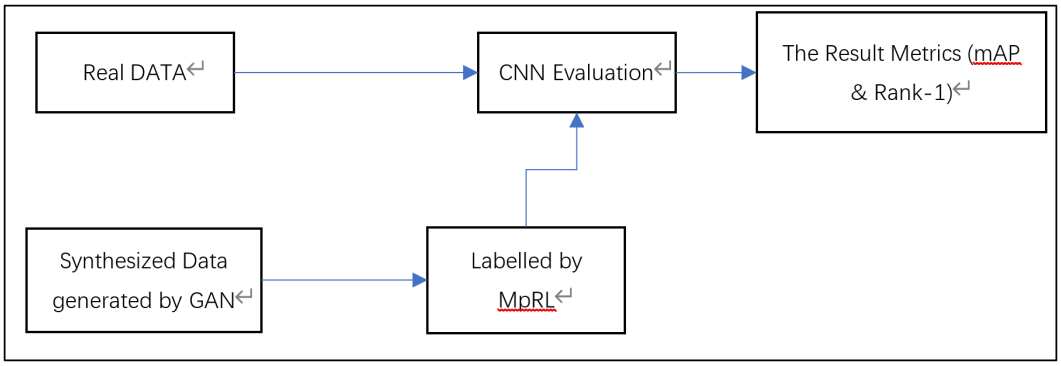

Figure 1: The steps of the baseline and the workflow with MpRL

The baseline uses only real data, and the workflow with MpRL uses both real data and the synthesized data labelled by MpRL.

The dataset used in this experiment is Market-1501 (collected from six cameras in Tsinghua University). It contains 12,936 training images and 19,732 testing images. The number of identities is 751 and 750 in the training and testing sets respectively.

GAN trains two models at the same time: a generator that simulates the distribution of real data, and a discriminator that distinguishes whether an example/image comes from the real data. We mainly use the DCGAN model for experimental comparisons. The Tensorflow and DCGAN packages are used to train the GAN model. Only data from the training set are used.

2 types of CNNs were used to evaluate the real and synthesized data. The first is an Identif network that takes person re-ID as a multi-classification task according to the number of pre-defined training classes in the real data domain. The second one is a Two-stream network that combines the Identif network with a verification function to train the network.

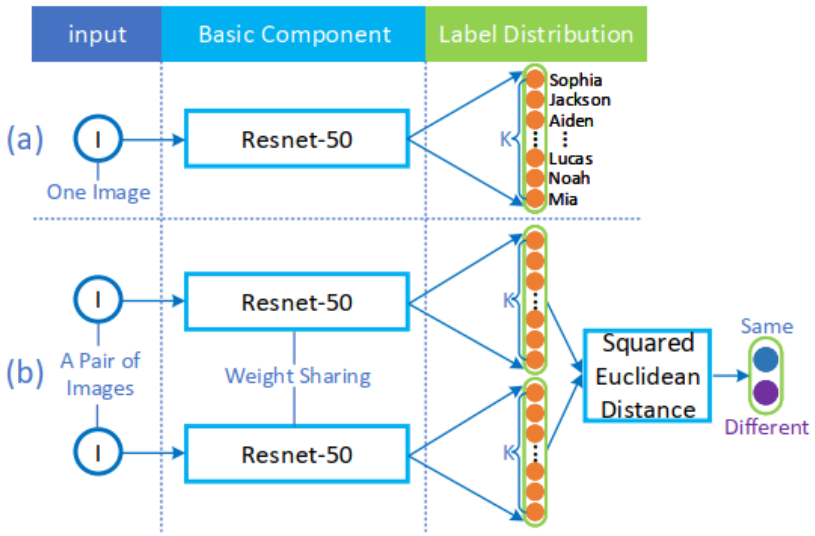

Figure 2: Two types of CNNs used to evaluate the real and synthesized data

4 IMPLEMENTATION

The work of us is mainly modified from MpRL-for-person-re-ID[1].

4.1 GENERATE DATA THROUGH GAN

When using deep learning techniques in person re-identification, we need sufficient labeled training set to get a good performance. Although we already had a large dataset Market-1501, we still have to manually label the same people show up at different camera views in the images since the data expensive to collect and the number of images of each person is limited. To address the problem of data deficiency, we use GANs to generate the data which can improve the performance of person re-identification. In GANs, two neural networks (generative network and discriminative network) are built to contest with each other under some rules and provided a training set, GANs learns to generate new data with the same statistics as the training set. And we decided to use deep convolutional generative adversarial networks (DCGANs) in Tensorflow which mainly composes of convolution layers without max pooling or fully connected layers. Then we take advantage of the DCGAN code which is from https://github.com/layumi/DCGAN-tensorflow to generate our own fake images. In this case, we generate 24000 images for Market-1501 which makes the training set much larger. However the generated images are unlabeled, so we need further process.

4.2 TRAIN THE DEEP NETWORK

The work in this part is conducted in train.m. The steps are shown as follows.

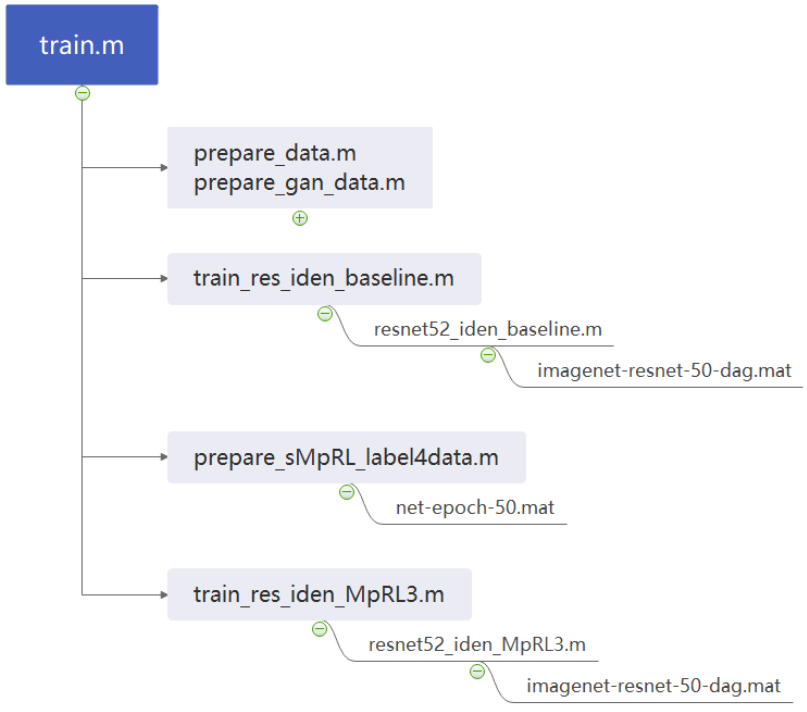

Figure 3: Flow chart of train.m

Before run the train.m, we need to install the Cuda-8.0 and Cudnn-5.1. And then we need to run gpu_compile.m to run matlab using GPU. And we also need to create two new folders, data and rusult. Put the original data and data generated by GAN in data and the ResNet-50 model pretrained on Imagenet[2] in rusult. Now, we can run the train.m. All the steps follow is consisted in train.m. The first step is to prepare the data from original dataset and GAN. Because the images in original

dataset and GAN have no label, we need to assign the label to the data in these two codes. Second, we need to run train_res_iden_baseline.m to get the deep network model learned from normal label. Third, we run prepare_sMpRL_label4data.m to assign dMpRL-II labels to data. Last, we run train_res_iden_MpRL3.m to get the deep network model learned from dMpRL-II labels.

4.3 EVALUATE THE PERFORMANCE

First, we run ./test/test_gallery_query_crazy.m to extract feature of images in the gallery and query set. They will store in a .mat file in test. We can use it to do evaluation. Then, we run ./evaluation/zzd_evaluation_res_faster.m to get the rank-1 accuracy and mAP.

5 THE RESULT OF THE REPRODUCIBILITY STUDY

What we achieved in this task is get the result from prepare_data.m and prepare_gan_data.m. The results are url_data.mat and url_data_gan_24000.mat and stored in data folder. But it needs GPU compile to go to the next step train_res_iden_baseline.m. I download and install the Cuda-8.0 and Cudnn-5.1 in my computer but there is a error to run the gpu_compile.m. The error massage is that lack of setting a path to make nvcc visible to mex. I try my best and spent a lot of time on dealing with this error but it is too hard for me. Thus I know the logit of these codes but can not run the whole project because of the matter about GPU acceleration on Matlab.

The github repository website is https://github.com/COMP6248-Reproducability-Challenge/Multi-Pseudo-Regularized-Label-for-Synthesized-Data-generated-by-GAN

REFERENCES

[1] https://github.com/Huang-3/MpRL-for-person-re-ID

[2] http://www.vlfeat.org/matconvnet/models/imagenet-resnet-50-dag.mat