Introduction to Deep Learning (Project 4)

Implement a convolution neural network to determine whether the person in a portrait image is wearing glasses or not using Celeb-dataset

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Introduction :

Our goal is to train different prediction models using convolutional neural network to predict whether the samples from Celeb-dataset contain celebrities with glasses .

Data Sets :

Celeb-Data set :

We extract the Celeb data set using the command :

```
path_train = "./img_align_celeba/img_align_celeba/"

for fname in os.listdir(path_train):

        if(fname.endswith(".jpg")):

           image = cv2.imread(path_train+fname)

           im_gray = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)

           im_resize = cv2.resize(im_gray, (28, 28))

           train.append(np.reshape(im_resize, (1, 784)))

           # train_label.append(count)

        count = count + 1
```

We read the Celeb data set from the local storage . We parse the folder structure to read image , downscale it to n * n resolution . We then train the dataset on only the images with glasses on by Downsampling .

To one hot encode our labels , we follow an approach to convert all -1 to [1,0] and 1 to [0,1]

CNN Model :

Hyper Parameter Tuning :

We tune our model based on a wide variety of hyper parameters , namely Number of Convolutional layers, number of nodes per layer , learning rate , Batch Size , Sample size , Dropout and Resolution .

Resolution(28*28) , epoch(500) , SampleSize(5000) , Learning rate (1e-4) , Batchsize(50) ,

```
Beginning Load
End of load
step 0, training accuracy 0.342835
step 100, training accuracy 0.759168
step 200, training accuracy 0.806471
step 300, training accuracy 0.840524
step 400, training accuracy 0.85624
0.825774
0.810771
```

Resolution(28*28) , epoch(500) , SampleSize(5000) , Learning Rate(1e-6) , Batchsize(50)

Sl Number	Number of Layers(conv)	Number of Nodes Per Layer	Learning Rate(Adaptive learning)	Batch size	Sample Size	Dropout %	Resolution	Accuracy(percentage)
1	2	64,32	1e-4	50	5000	0	28 * 28	85.62
2	2	64,32	1e-6	50	5000	20	28 * 28	86.2
3	2	128,64	1e-4	50	10000	50	24 * 24	85.3
4	3	128,64,64	1e-4	100	10000	50	28 * 28	87.7

The best set of hyper parameters with the lowest accuracy were = Learning rate 1e-4 , BatchSize = 100, SampleSize = 10000 , Dropout = 50 % , Resolution = 28 * 28 .

Test Accuracy = 81.2238 %

Conclusion :

We train a CNN to be able to predict whether a particular image contains a celebrity wearing glasses . We tuned various hyper parameters over our validation set to achieve the least validation error and further tested it on our test data set . The test error accuracy we got was about __81.2238 %___ .