Weekly Work Report

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1 Research problem

During this period of week, I spend time studying deep learning courses and working about Faster R-CNN algorithm and flow guided feature aggregation for video object detection method in order to prepare URPC2018. Our team try to let code program output relevant documents to evaluate algorithm performance. Besides, I receive three kinds of image restoration datasets to train a model and test how good the restoration algorithm are.

Because of code modification, I have difficulty in adding codes to realize the function which can output a txt which includes information about picture ID, class, confidence and bounding box. Besides, I need to rectify and debug the relevant codes of algorithm until they can meet the requirement to test and evaluate a contest model. At last, I should build a simulation environment for flow guided feature aggregation.

2 Research approach

In the process of research, I use the method of documentary analysis, comparative analysis and experimental research method. I read the thesis of Fast R-CNN [1], Faster R-CNN algorithm [2] and flow guided feature aggregation [3]. I try to unferstand core ideology in paper and learn about concept introduced by author.

Besides, I need to clone codes from github which shared by other researcher. Then I debug and run the demo program to learn how to realize an algorithm which can be called experimental method.

For deep learning, I watch videos and write down the issues which I think are much important for further research. And then, I not only have learned the lessons of deep learning, but also put them into code editing action.

3 Research progress

During preparation for URPC2018, I receive three kinds of image restoration datasets to train a model and test how good the restoration algorithm are. I continue to learn about Faster R-CNN algorithm [2] and relevant codes of flow guided feature aggregation [3]. Furthermore, I receive three datasets which have been image restored. By using the remote server, I try to train three knids of contest models with data sets and test how well model run. I will list details about weekly work in Tab. 1 below.

Table 1: Weekly work progress.

URPC2018	Finish reading paper flow-guided feature aggregation for video object detection written by Xizhou Zhu *et al.*. Finish changing size of restored image from 256× 256 to original size. Finish training three kinds of models with image restoration data sets. Succeed in outputting the txt to meet the requirement of contest.
Deep learning courses	Finish learning improving deep neural network course: Hyper-parameter tuning, regularization and optimization, which is the second lesson Finish learning structuring machine learning projects which is the third lesson.

4 Progress in this week

During preparation for URPC2018, I have learned to do some relevant work in order to achieve the goal of contest. Our team adopt three different kinds of image restoration methods to produce three data sets which have been used to train models. And I have succeed in outputting the txt to meet the requirement of contest. The progress has been maked at the present stage as shown in table blow.

Step 1 Finish changing size of restored images from 256× 256 to original size.

Step 2 Finish training three kinds of models with image restoration data sets.

Step 3 Finish outputting the txt to meet the requirement of contest.

Step 4 structuring machine learning projects which is the third lesson.

4.1 Data Sets

In this week, my colleague in our team adopt three different kinds of image restoration methods to produce three data sets, which can be called cla2, cla6 and hsv just as shown in Fig. 1. Then I change thousands of pictures into VOC2007 format which is necessary for training. Fig. 1(a) is the picture restored by cla2 method, Fig. 1(b) is the picture restored by cla6 method and Fig. 1(c) is the picture restored by hsv method.

Because the image sizes of restored picture is different from xml files which have been made last week, I need to change size of restored images from 256× 256 to original size by coding script files in 4.1.

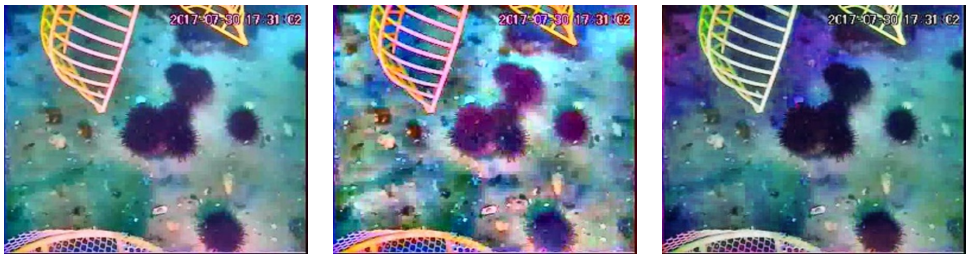
```
set -e  # or use "set -o errexit" to quit on error.
set -x  # or use "set -o xtrace" to print the statement before you execute it.

FILES=*.jpg
for f in $FILES
do
echo "$f"
convert $f -resize 586x480! $f
done
```

4.2 Train a Contest Model

We put restored picture data sets to the remote server and try to train a model that can meet requirement of contest. Before doing like this, appropriate code modification is necessary because self.classes and label is not as same as VOC. In the project of Faster R-CNN files, relevant codes in pascal_voc.py need to revise, for example contents in self._classes variable has become what we want that are holothurian, echinus, scallop and starfish.

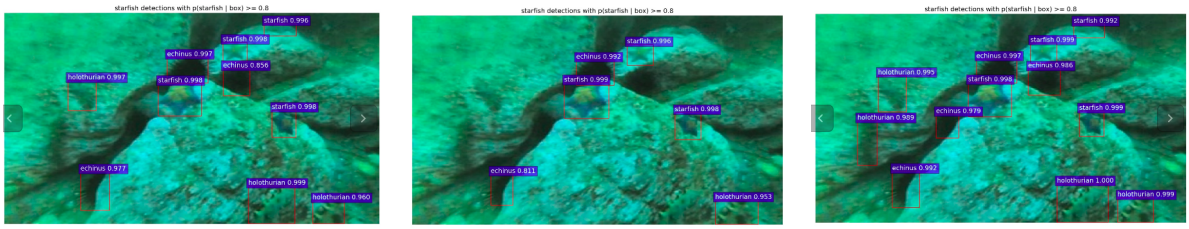
I train the contest model from Tuesday to Friday on the server. Then I run demo.py to test the performance of model as shown in Fig. 2. Fig. 2(a) is experimental results of cla2, Fig. 2(b) is experimental results of cla6, and Fig. 2(c) is experimental results of hsv.

Furthermore, I should check total loss of my model to learn more about my model. Simulation results prove that this improved algorithm achieves an effect in accelerating the converging rate.



(a) (b) (c)

Figure 1: Three kinds of image restoration.



(a) (b) (c)

Figure 2: Experimental results of the contest model.

4.3 Outputs of Contest Format

From the instruction of contest, we need to submit a test which conbines $< image\_id >< class\_id >< confidence >< xmin >< ymin >< xmax >< ymax >$. So I learn to write txt and succeed in outputting the standard file and the codes which I add is in following part 4.3. Besides, the output file can be seen in Fig. 3.

```
for i in inds:
bbox = dets[i, :4]
score = dets[i, -1]
if class_name == '__background__':
fw = open('result.txt', 'a')
fw.write(str(im_name) + ' ' + class_name + ' ' + str(score) + ' ' +str(int(bbox[0])))
fw.close()

elif class_name == 'holothurian':
fw = open('result.txt', 'a')
fw.write(str(im_name) + ' ' + class_name + ' ' + str(score) + ' ' +str(int(bbox[0])))
fw.close()


elif class_name == 'echinus':
fw = open('result.txt', 'a')
fw.write(str(im_name) + ' ' + class_name + ' ' + str(score) + ' ' +str(int(bbox[0])))
fw.close()
```

```
000646.jpg echinus 0.992467 615 71 791 267
000646.jpg echinus 0.97598445 205 285 392 451
000646.jpg echinus 0.8669188 942 236 1128 444
000646.jpg scallop 0.97792596 1516 976 1582 1034
000646.jpg scallop 0.84640044 971 265 1096 369
001834.jpg echinus 0.9957711 286 221 358 274
001834.jpg echinus 0.99474156 572 354 654 404
001834.jpg echinus 0.99387383 210 159 291 232
001834.jpg echinus 0.9901002 512 162 586 225
001834.jpg echinus 0.9786573 128 265 191 337
001834.jpg echinus 0.96457976 5 189 127 282
001834.jpg scallop 0.99456304 435 221 487 269
001834.jpg starfish 0.9989497 416 67 489 142
001099.jpg holothurian 0.9996463 406 314 528 403
001099.jpg holothurian 0.9979194 336 340 410 404
001099.jpg echinus 0.9957254 67 366 136 404
001099.jpg echinus 0.97485614 223 48 275 109
002269.jpg echinus 0.9971222 11 278 105 345
002269.jpg echinus 0.9960381 250 184 287 219
002269.jpg echinus 0.9920779 267 148 297 182
002269.jpg echinus 0.95983243 331 152 357 180
002269.jpg echinus 0.9457494 686 76 719 130
002269.jpg starfish 0.9969651 307 212 338 242
002269.jpg starfish 0.99554473 560 147 609 197
```

Figure 3: Output file in contest format.

```
elif class_name == 'scallop':
fw = open('result.txt', 'a')
fw.write(str(im_name) + ' ' + class_name + ' ' + str(score) + ' ' +str(int(bbox[0])))
fw.close()

elif class_name == 'starfish':
fw = open('result.txt', 'a')
fw.write(str(im_name) + ' ' + class_name + ' ' + str(score) + ' ' +str(int(bbox[0])))
fw.close()
```

5 Plan

Objective: Finish training a model with restored images.
Deadline: 2018.08.5

2018.07.16—2018.07.22 Finish neural networks and Deep Learning.

2018.07.23—2018.07.29 Finish improving deep neural networks courses.

2018.07.30—2018.08.05 Finish structuring machine learning projects courses.

2018.08.06—2018.08.12 Finish convolutional neural networks courses.

2018.08.13—2018.08.19 Finish sequence models courses.

References

[1] R. Girshick. Fast R-CNN. In *ICCV*, 2015. 1

[2] S. Ren, K. He, R. Girshick, and J. Sun. Faster R-CNN: Towards real-time object detection with region proposal networks. In *NIPS*, 2015. 1

[3] X. Zhu, Y. Wang, J. Dai, L. Yuan, and W. Yichen. Flow-guided feature aggregation for video object detection. In *ICCV*, 2017. 1