Assignment6 - **Evaluation** of KITTI 3D objection detection results

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Contents

1 Instructions

1. Set up the KITTI object detection evaluation environment.
   (a) git clone git@github.com:prclibo/kitti_eval.git
   (b) g++ -O3 -DNDEBUG -o evaluate_object_3d_offline evaluate_object_3d_offline.cpp
   (c) sudo apt-get install gnuplot
   (d) sudo apt-get install texlive-extra-utils
2. Download and read the KITTI Object Detection dataset "devkit" readme.
3. Divide the KITTI 3D Object Detection (training data) into training set and validation set.
   (a) KITTI train/val split used in 3DOP/Mono3D/MV3D
   (b) "train.txt" for training, "val.txt" for testing, ignore the "test.txt/trainval.txt"
4. Generate object detection results on KITTI validation set.
   (a) Option 1: find any open-source 3d object detector, run it.
   (b) Option 2: copy the ground truth as the result, but you need to process it into the correct format.
5. Evaluation: ./evaluate_object_3d_offline gt_dir result_dir

Supplementary:

1. In step 1-(a), if there is an error of "boost/numeric/ublas/matrix.hpp: No such file or directory", the solution is executing the commands: "sudo apt-get update" and "sudo apt-get install libboost-all-dev".

2 Evaluation Procedures

2.1 3rd step - split dataset

The KITTI 3D object detection benchmark consists of 7481 images (and point clouds). Since "train.txt" and "val.txt" have 3712 and 3769 data indexes, the training set and validation set correspondingly have 3712 and 3769 data.

This step is completed by "data_process/generate_train_and_val_datasets.py".

2.2 4th step - generate object detection results

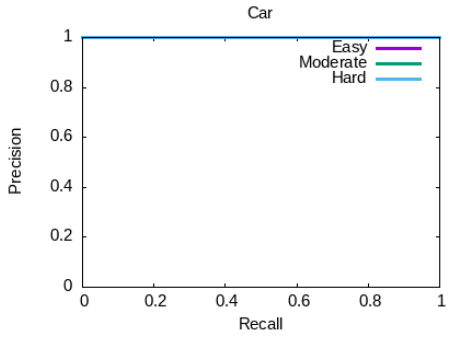
This step is completed by "data_process/generate_fake_results.py". In this step, I followed the option 1, copying the ground truth as the result and then processing it into the correct format.

In ground-truth files, each labeled object consists of 15 values that describe it from eight aspects: type, truncated, occluded, alpha, bbox, dimensions, location, and rotation_y. By comparison, objects in result files require an additional 16th value, a floating value representing the confidence score.

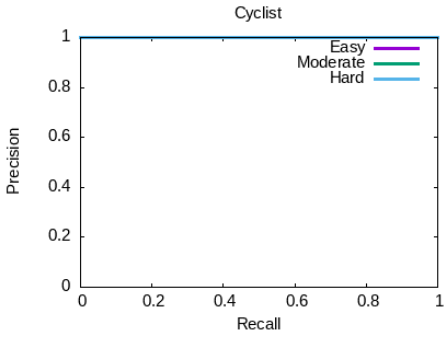
Todo: it deserves to use an open-source 3d object detector or training one to complete this step, as described in option 2.

2.3 5th step - evaluation

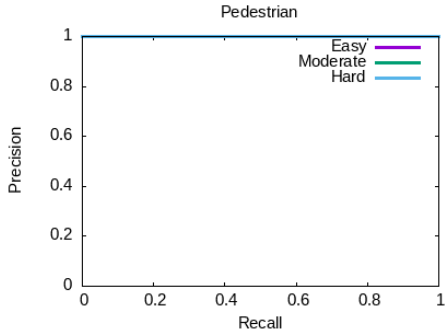
Figure 1 proves that I have completed the evaluation of KITTI 3D object detection results. However, it means nothing. Since I just appended a random confidence score to each labeled object, the precision-recall curves remain at 1. In order to obtain an actual precision-recall curve, we must follow option 2 to complete the 4th step.



(a) Car 3D detection



(b) Cyclist 3D detection



(c) Pedestrian 3D detection

Figure 1: KITTI 3D object detection precision-recall curve.