PowerAI Vision Workshop Exercise 3 – Object detection in videos

In this exercise you will practice Object Detection in videos. Object Detection allows a ML algorithm to learn how to locate and identify defined objects in scenes. In case of motion pictures, the movie is decomposed to still frames and individual frames are used for prediction. This technique in PAIV does not take into consideration temporal correlation and dependence between (adjacent) images.
The goal of the exercise is to familiarize with the user interface, and extend the knowledge learned in the previous exercises to more complex scenarios.
You will use the file: car_training_video.mp4.

1. Creata a **dataset** called Cars.
    a. On the welcome screen, press 'Get Started' (alternatively, select Data Sets from the menu bar). The Data Sets screen appears.
    b. Press the plus sign to 'Create a new dataset' on the leftmost tile. (.zip file upload is valid only for datasets exported from PAIV). Name the data set 'Cars'.
    c. Click on the tile 'Cars'. A 'Data set / 'Cars' screen will open.
    d. Click on 'Import files' under the leftmost tile 'Drop files here'. Upload the reference video.
    e. The 'Cars' data set is created.
    f. The video is represented with a cyan color.
2. Define and **label** objects.
    a. Click on the video and select 'Label objects'
    b. Add new objects, e.g. 'redcar', 'whitecar', 'blackcar', 'othercar'. At least 5 frames is necessary per each object.
    c. Select 'Auto capture' and specify 2 seconds as the interval.
    d. Many frames will be created. Review all frames and manually eliminate some / capture more if required.
    e. Label the frames with the specified categories.
3. When ready, you may try to augment the data set. The model will use a set of still frames for training. Augmentation should be used sparingly.

4. Train the model for Object detection. Wait for the training loss to stabilize below your acceptance level.
5. Deploy the model. It should be a fair model.
6. Test the model using other reference videos. (Make sure camera angles and lighting conditions are rather similar.)
    a. You can test its performance on still frames as with the classic object detection
    b. You can test the video performance:
        i. Click 'Open', and upload a test video.
        ii. Only one video can be tested at any time.
        iii. Uploading and preparation takes a while.
        iv. Evaluate the model performance and iterate on improvement until the results are acceptable.
7. If you have other training videos, make similar experiments with them – these need not be traffic videos.

This concludes the exercise.