

General Provisions

Hackathon participants will be given a task on the subject of Computer Vision. To have an idea about the task, please examine the example below.

To solve the problem you should write a program. The program operation results for any test set will be examined automatically.

Participants use only their own computers during the course of the competition and may use any program software of their own choice. Organizers do not provide computers or notebooks to participants.

At the jury's request participants should be able to demonstrate the program running under one or several test video files.

List of Recommended Programs and Libraries

OpenCV, FFMpeg or other resources for video files and frames.

Eigen, SciPy and other resources to simplify and accelerate calculations.

Round General Description

Participants receive the task specification in the natural language.

The Training Set, the Validation Set and model output text file are available for this task. During the competition participants have to develop a program capable of solving the task and providing results in the specified format.

1 or 2 hours before the round ends, the Final Test Set will be presented. Before the round ends participants have to deliver the output of their program for the Final Test Set in the specified format. Upon the round completion only the last valid submission will be considered.

Task Specification

You receive 10 sec. video clips filmed by a video camera at 30 frames per second in FullHD format. Video recording environment such as time of the day and weather conditions may vary. The camera is rigidly fixed at the car windshield, however it may slightly oscillate. The car velocity is less than 10 km/h — this is a case when the car is standing still or moving slowly in a traffic jam or at a signal-controlled intersection. For each video clip you need to determine the presence of such event as the traffic lights switching from red to green, i.e. if it is possible for the car to start moving, and to show in which frames it happens. Only one frame number for each video clip can be specified. One frame may feature the switching of several traffic lights, however in such case this frame can be mentioned only once. Considering such difficulties as lamp blinking, 6 frame error is allowed from the time the green

signal is switched on. If a video clip did not feature any traffic lights or traffic lights switching, such information should be delivered in the specified format.

Sizes of Test Sets

Training Set	100 videos
Validation Set	100 videos
Final Test Set	100 videos

Links to Test Sets

- The Training Set <https://goo.gl/rSdNRL>
- The Validation Set <https://goo.gl/1EKnGT>. The password will be send in the beginning of the tour.
- The Final Test Set will be sent 1 or 2 hours before the end of the round (on August, 20). For more information see the announcements.

Assessment Criteria and Format

Solution for every test set is a text file with information about all videos. Let's assume that there were N videos in the test set. Then the output text file should contain N lines. Each line should contain the name of a video file and an integer number which indicates presence or absence of a traffic light in the video. These two items should be separated by a space. If there is no traffic light in the video output -1, otherwise output the number of the frame (it should be a positive number) where the light switch occurs. The numeration of frames starts with 0. Lines can be positioned in any order. See example of an input file for the Training Set **ideal.txt**.

Light switch is considered detected if the answer differs from the model answer by less than 6 frames.

Solutions are assessed according to the following criteria. For each video assessment may produce several results:

- TP (true positive) – the program detected the light switch and the light switch was actually there.
- TN (true negative) - the program did not detect the light switch and the light switch was not there.
- FP (false positive) - the program detected the light switch but the light switch was not actually there or the number of the frame was wrong.
- FN (false negative) the program did not detect the light switch but the light switch was actually there.

This is how many points are awarded for each assessment result:

TP	2
TN	1
FN	1
FP	0

Then the sum of all assessment results is converted into percentage, i.e. 100 points will be awarded if the program gives correct answers for every video.

Important details

It is impossible for the jury to determine the runtime of the program considering the assessment process. However, the Final Test Set will be given to participants only 1 or 2 hours before the end of the round. Consequently, participants will have only 1 or 2 hours to submit the output text file to the online judge system. Until then, participants should make sure that their program is ready so that they have enough time to run it under the Final Test Set.

Note! Not the best-performing but the last valid solution (output text file) will be considered.

Note! It is absolutely prohibited to change any test set manually. Participants changing a test set manually will be disqualified.