SMIRK Dataset

Technical specifications

Description: ESI Pro-SiVIC simulation of pedestrians and non-pedestrian objects crossing or moving along a country road. The dataset contains images from a forward-facing camera, mounted on a stationary car, together with bounding box and segmentation maps for the moving objects.

Data quality: All images and labels are extracted from the ESI Pro-SiVIC simulator and should be complete, accurate, and consistent.

The total size: ~120 GB

Individual file size: 6 x ~20 GB zip files + 1 x ~1GB zip file. Each image is ~300KB. Each segmentation map is ~6KB

Files type: camera images: png; Segmentation maps: png; Labels: csv

Annotations: the dataset has been annotated with bounding boxes and Segmentation maps. All crossing objects are annotated with bounding box and segmentation map (100%). No other parts of the scene are annotated. Ground truth from the simulator used for the annotation. See above.

Data index: no particular indexing.

Data for each crossing object is stored in a separate folder. Where each folder has the following structure:

object_name

├── labels.csv

├── scenario_id1

│ ├── cam000001.labels.png

│ ├── cam000001.png

│ ├── ...

```
|  ├── camXXXXXX.labels.png
|  └── camXXXXXX.png
├── ...
└── scenario_idX
   ├── cam000001.labels.png
   ├── cam000001.png
   ├── ...
   ├── camXXXXXX.labels.png
   └── camXXXXXX.png
```

Where:

object_name

the name of the crossing object.

scenario_idX

a unique id for each crossing scenario.

camXXXXXX.png

image from the camera sampled at 10 FPS.

camXXXXXX.labels.png

segmentation map for the corresponding camera image.

labels.csv

Bounding boxes, labels, and metadata for each frame. The structure is described below.

The labels.csv has one entry for each camera image. An image contains at most 1 object/bounding box. The file contains the following columns:

file

Path to the camera image file relative to the object_name directory e.g., "scenario_id1/cam000001.png"

frame_index

Position of the image in the video sequence e.g., the first image has index 1, the second image has index 2, etc.

image_width

The width of the image in pixels.

image_height

The height of the image in pixels.

x_min

Left side of bounding box. If there are objects.

x_max

Right side of bounding box. If there are objects.

y_min

Top side of bounding box. If there are objects.

y_max

Bottom side of bounding box. If there are objects.

is_occluded

True/False. Indicates if not all parts of the object are within the field of view of the camera.

current_distance

Distance (m) between car and object.

class_text

Indicates the type of object present in the image. Can be one of pedestrian, object, or background.

run_id

Unique id for the scenario. All images belonging to the same scenario will have the same run_id.

scenario_type

Indicates if the object is crossing from the left/right or moving towards/away from the car.

object_type

Type of object.

start_distance_from_car

Scenario configuration. At what distance (m) from the car did the object start.

speed

Scenario configuration. At what speed (m/s) is the object moving

angle

Scenario configuration. For left/right scenarios. At what angle (degrees), relative to the side of the road, is the object moving. 0 indicating away, 180 towards.

offset_from_road_center

Scenario configuration. For towards/away scenarios. At what offset from the center of the road (m) is the pedestrian walking.

Legal information

Data collection purpose: The SMILE3 research project investigates the verification & validation of critical automotive systems that rely on machine learning. SMIRK is an experimental pedestrian emergency braking ADAS (advanced driver-assistance system) facilitating research on quality assurance of machine learning-based systems. The SMIRK dataset was collected to train, validate, and test camera-based pedestrian detection model in line with the AMLAS guidelines developed by the University of York, UK (https://www.york.ac.uk/media/assuring-autonomy/documents/AMLASv1.1.pdf)

Personal data: SMIRK dataset does not contain any personal data, synthetic pedestrians only.

Other: Don't ever encourage anyone to train pedestrian detectors for use in the real world using this data. A big disclaimer is needed. On the other hand, feel free to see how training data from ESI Pro-SiVIC can be used to train object detectors.