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Open Source Multipurpose Multimedia Annotation Tool

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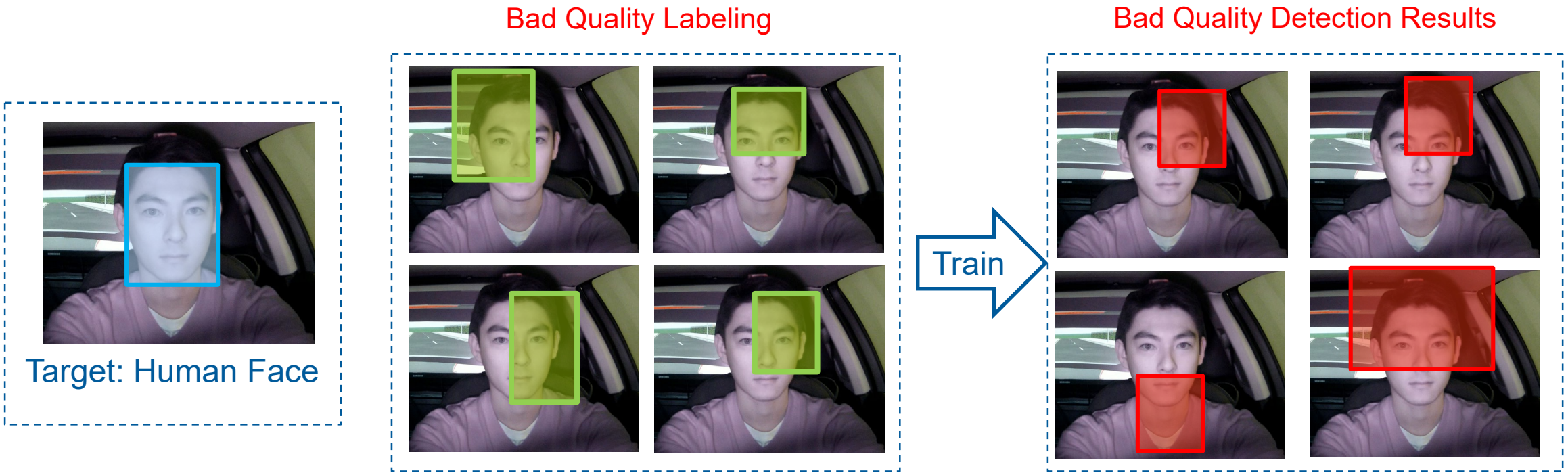
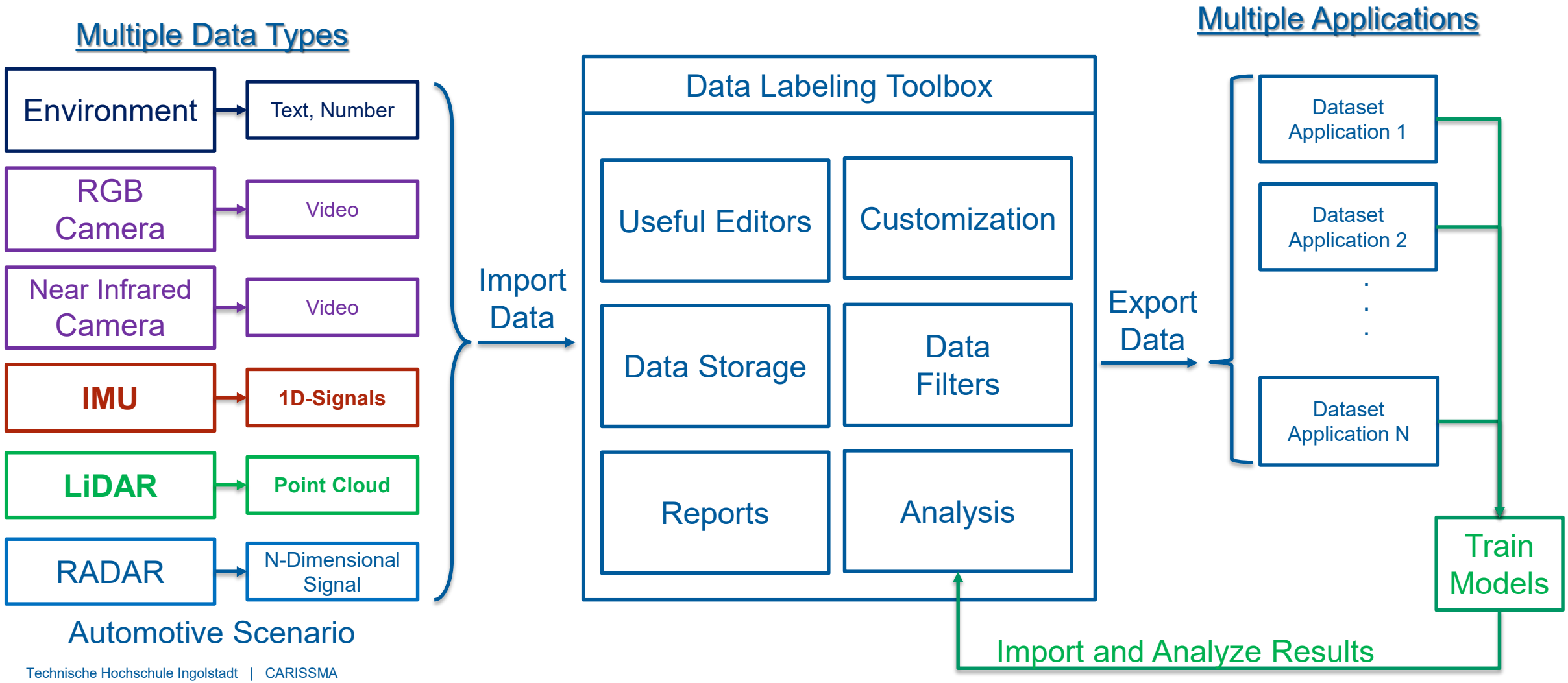
- **Important task**
- Models trained with **bad** quality labeled dataset **may** not achieve good results



- Efficient Data Labeling requires Efficient Tools
- Current Open Source Labeling Tools:
  - Supports only few data types: Image or Video or Audio [1,2,3]
  - Few customization
  - Few/no integrated data analysis

Common Data Annotation Workflow

- Current Demands: Multimedia and Multipurpose



Proposal

Proposal

Main Objectives

Open Source Project	The users can collaborate, improve and customize the application according to their requirements.

Multipurpose	- Multiple annotation types:
	  - 2D Label: Bounding Boxes, Ellipse, Polygons, Custom.
	  - General Data: Text, Number, Boolean, Arrays, States, Checklist.
	- Attributes customization according the project.
	- Grouped Data.

Multimedia	Support multiple types of data: - Image, Video, Audio, Point Clouds, Signals.
Data Analysis	- Statistics: Basic, Descriptive Analysis, Hypothesis Tests, ANOVA. - ML Metrics: Accuracy, Precision, Recall, F1-Score, mAP, etc. - Data Filtering: create subsets based on labeled data.
Export	- YOLO Format, Data Frame, CSV, Excel, JSON,.

Proposal

Software Technologies

python™

PyQt

VTK

matplotlib

Seaborn

PyQtGraph

mongoDB®

pandas

HDF5

NumPy

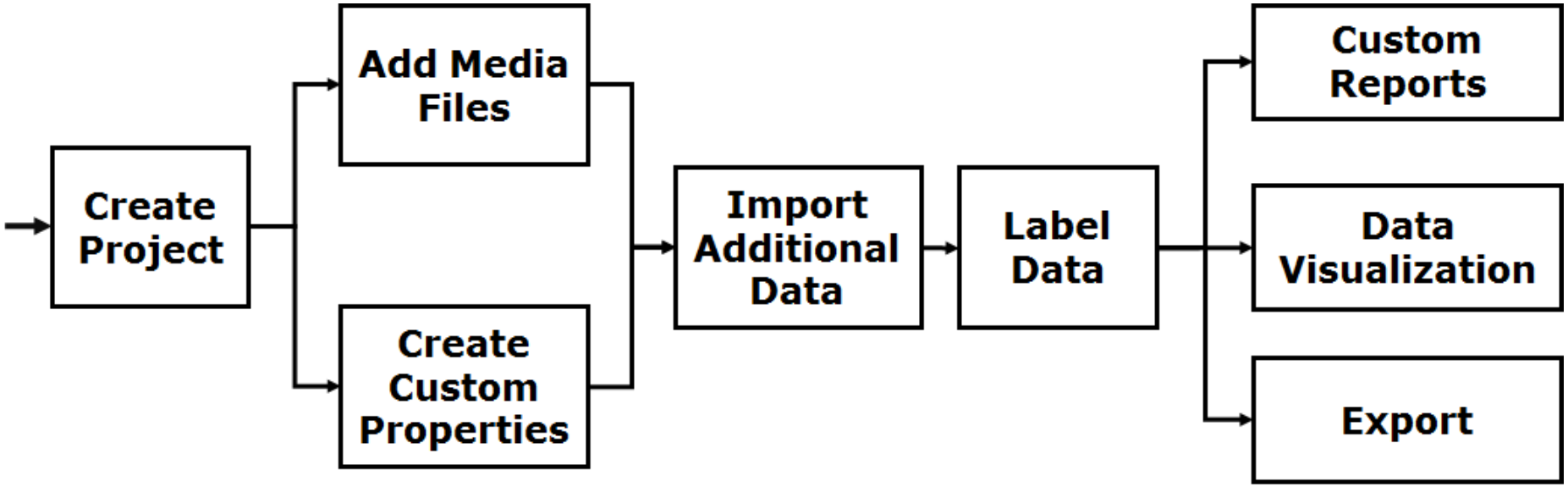
PyMC3

scikit learn

OpenCV

Proposal

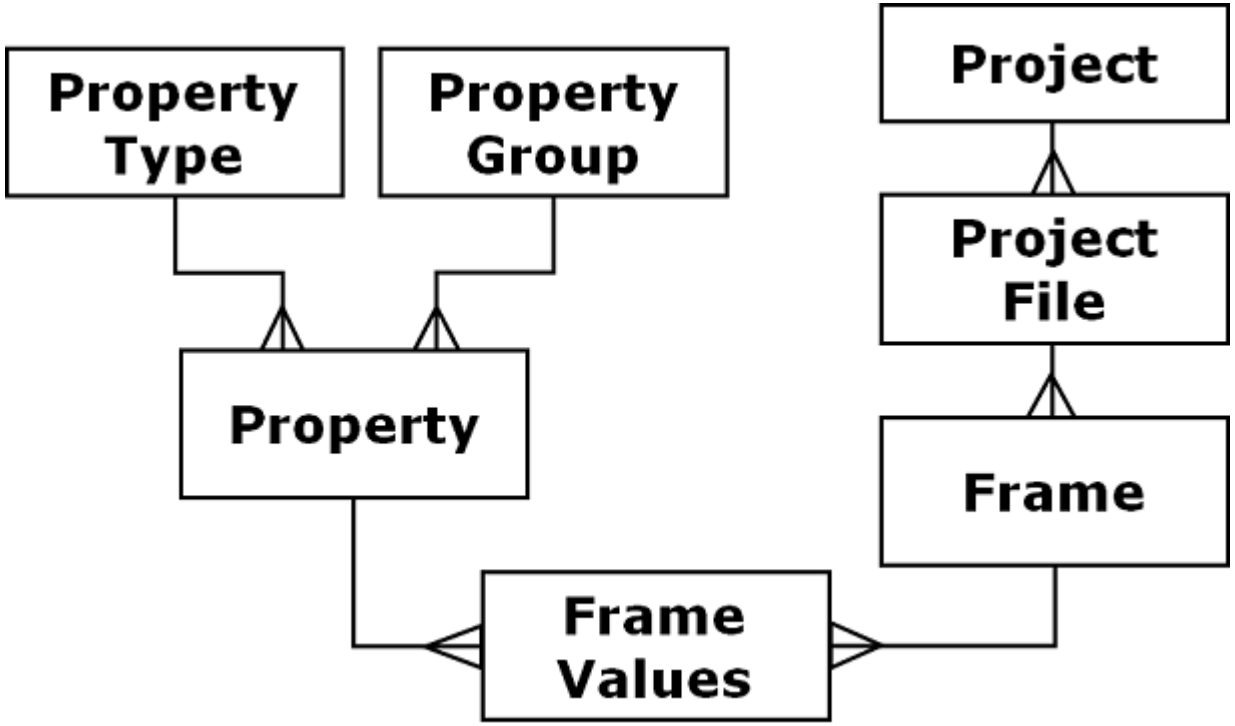
Recommend Workflow



Proposal

Data Storage Model

- Generic Properties
- Document Based is Suitable
- Functions: Map and Reduce
- Remote Labeling



Use Cases

Use Case 1

Driver Distraction Database

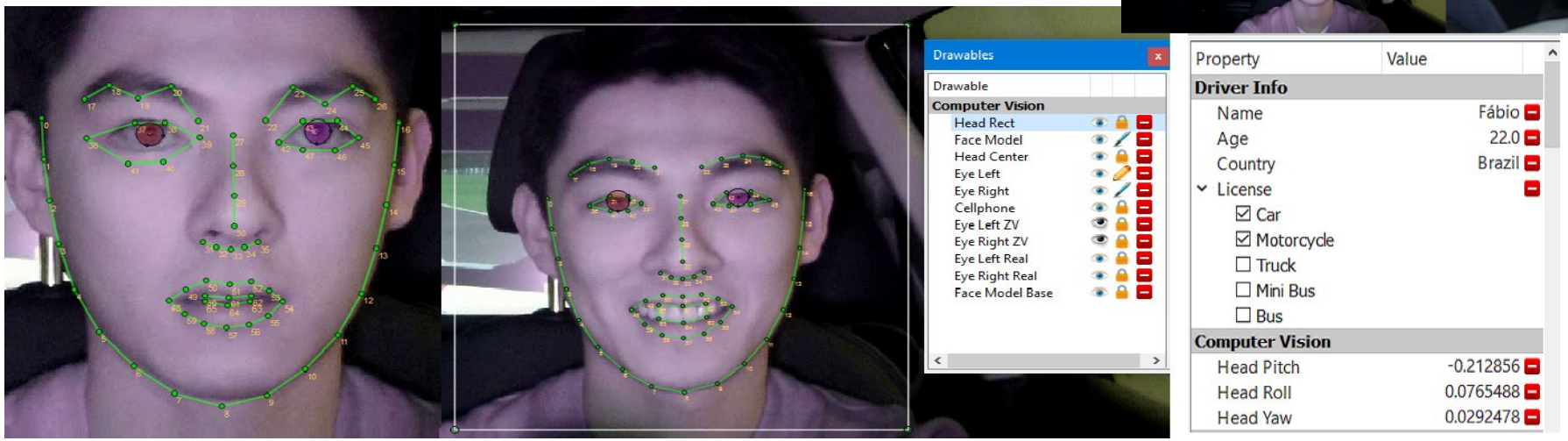
- Objective: Driver Distraction Monitoring [4]
- Driver Info: Name, Age, Country, Automobile Licenses
- Computer Vision: Head Pitch, Roll, and Yaw angles
- 2D Label: Custom Deformable Face Model, Eyes, Head Region
- Event Annotation: Texting, Radio, Cellphone use

Head Angle

Inertial Sensor

Camera and Illumination

Simulator



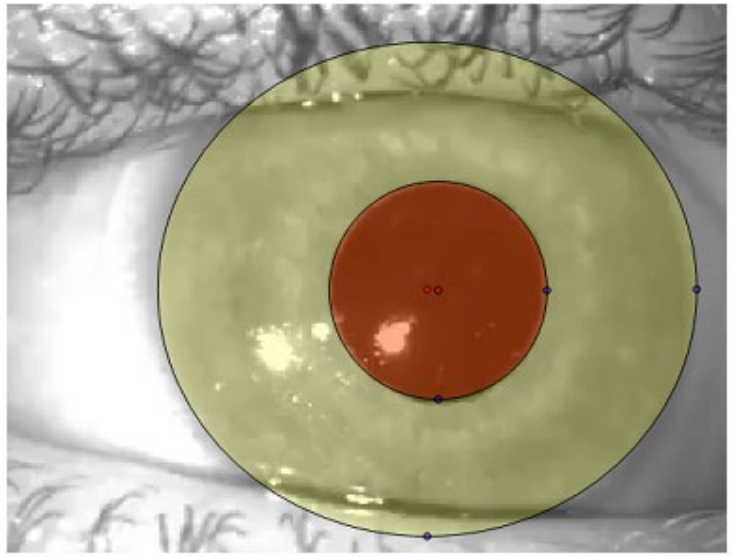
Vehicle Data

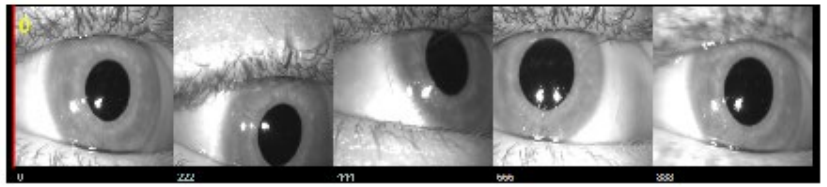
- Velocity
- Steering Angle
- Position
- Break Pressure
- etc.

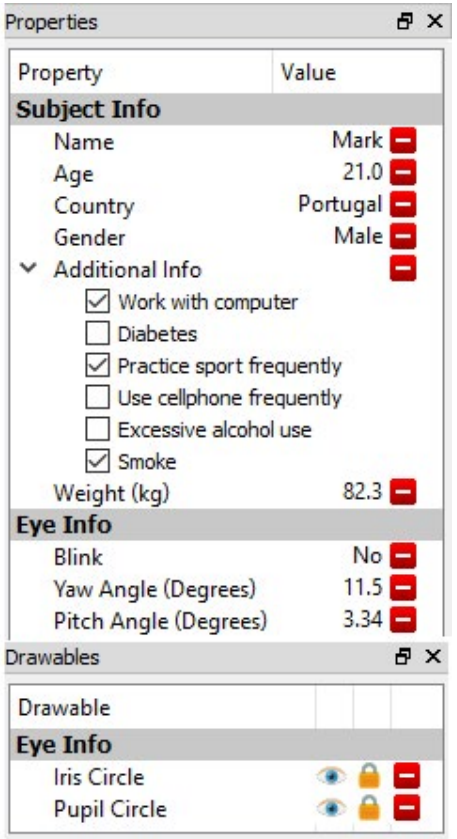
Use Case 2

Eye Movement Study - Pupillometry

- Objective: Eye Study based on Infrared Images
- Subject Info:
  - Name, Age, Gender, Weight
  - Additional Info
- Eye Info:
  - State: Blink (Yes, No)
  - Yaw and Pitch Angle
- 2D Label:
  - Iris (Ellipse)
  - Pupil (Ellipse)



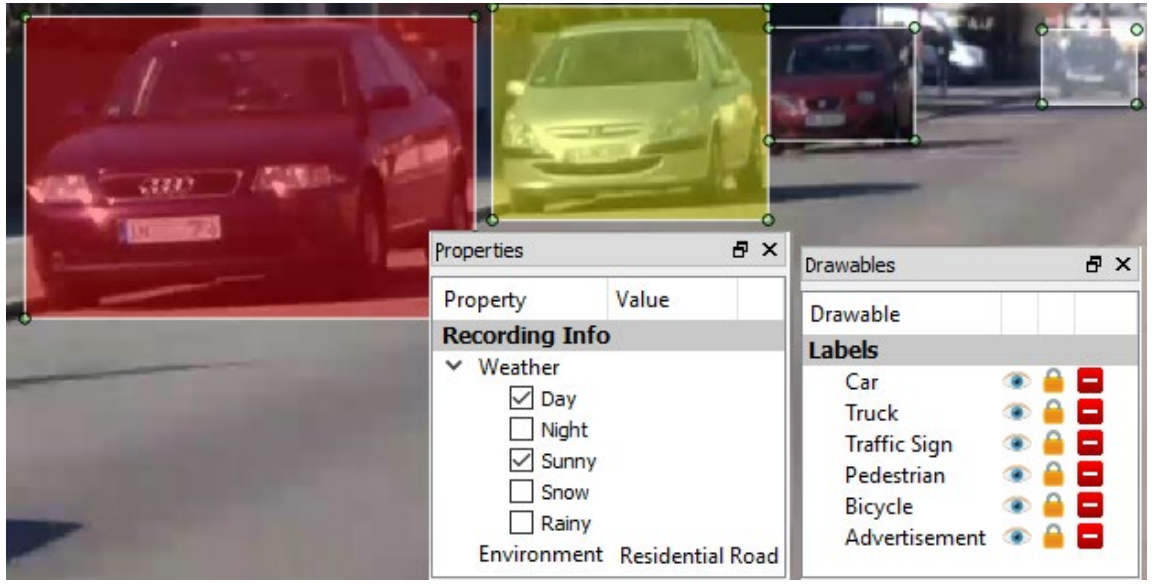




Use Case 3

Multi-Object Traffic Dataset

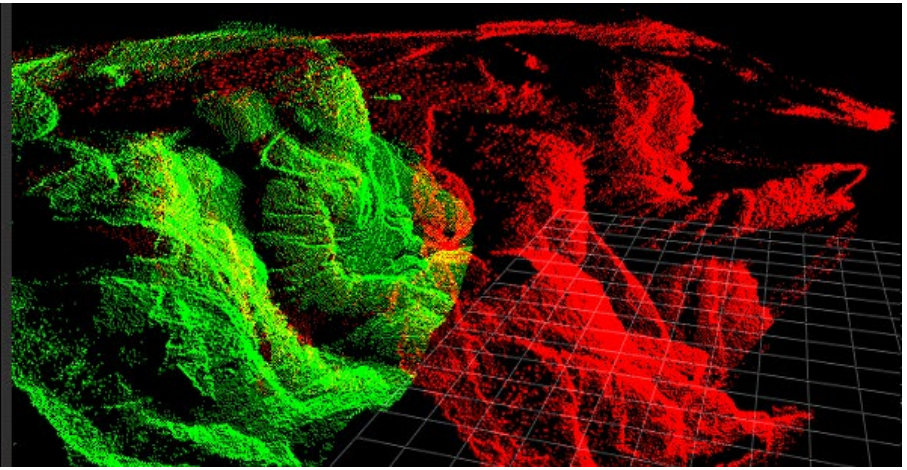
- Objective: Label objects in traffic scenario
- Recording Info:
    - Day, Night, Sunny, Snow, Rainy
- Environment:
    - Highway, Residential Road
- Drawables:
    - Bouding Boxes: Car, Truck, Traffic Signs, Pedestrian, Bycicle, Advertisement

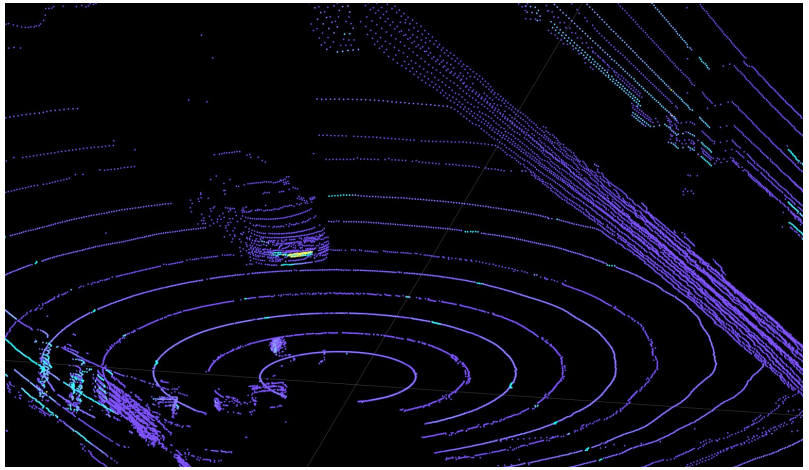


Use Case 4

Image + Point Cloud Annotation

- Objective: Label Image and Point Cloud
- 3D Object Detection and Segmentation



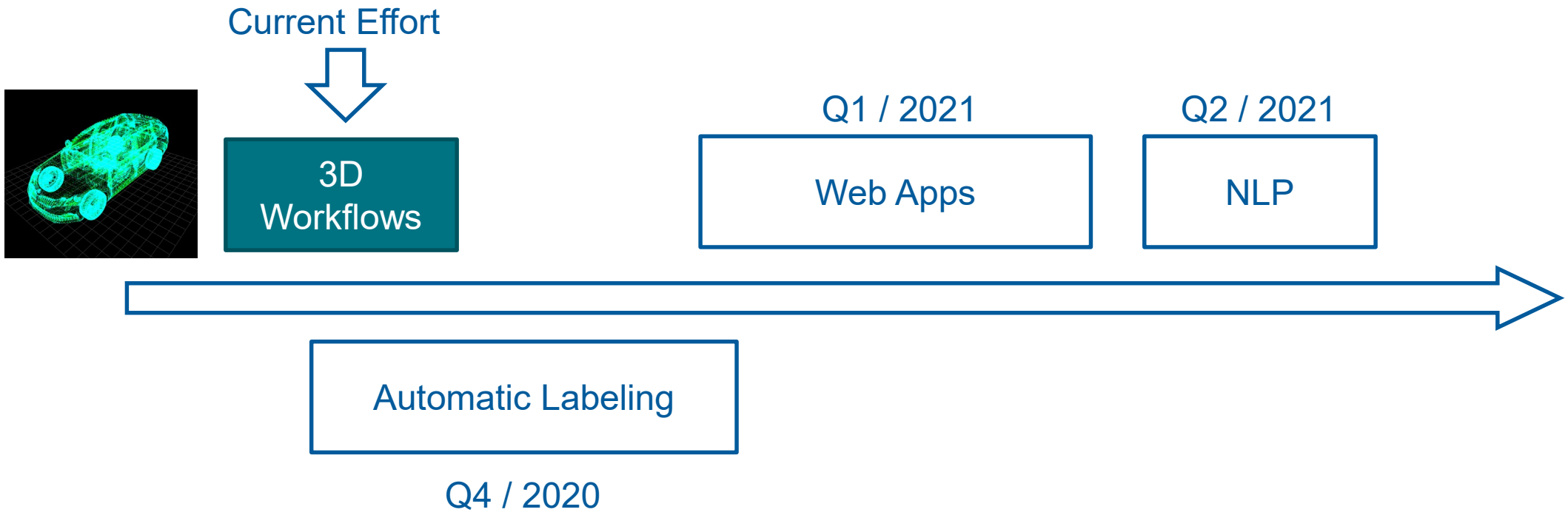


Project Roadmap

Roadmap

Project Roadmap

- New Features for Implementation:



Access

Download

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www.thi.de/go/thi-labeling-tool

Thank you!

Questions?

References

[1] Ambardekar, A., Nicolescu, M., Dascalu, S.: Ground truth verification tool (GTVT) for video surveillance systems. In: 2009 Second International Conferences on Advances in Computer-Human Interactions, pp. 354–359. IEEE (2009)

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[4] da Silva, J.L., Thomas Brandmeier, A.Z.: Automatic measurement of automobile drivers attention level via computer vision. In: XXIV Congresso Brasileiro De Engenharia Biom´edica (2014)