KOGNIC

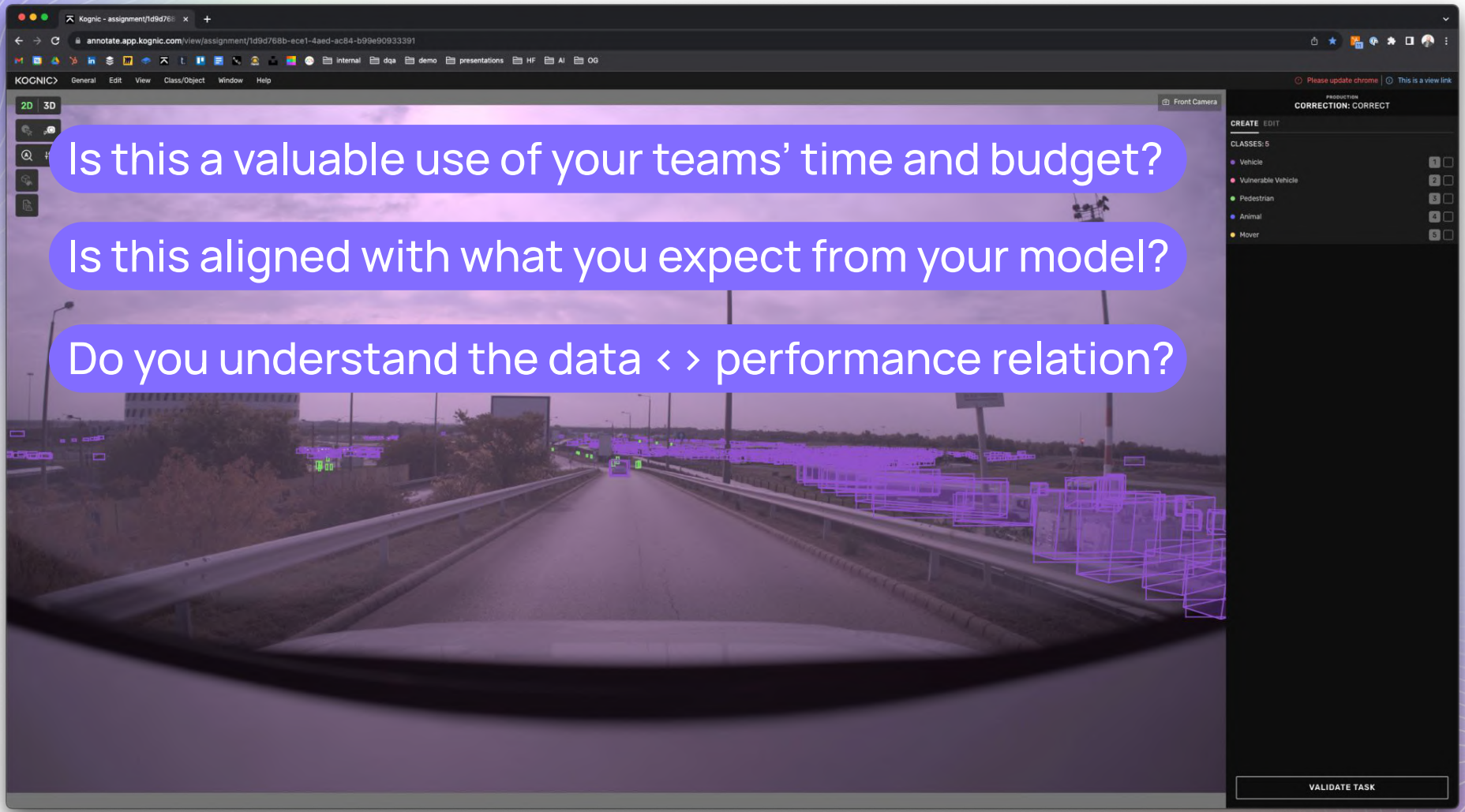
Machines learn faster with
Human Feedback

kodiak ZF BOSCH Qualcomm Gatik JAGUAR LAND ROVER

Continental TIER IV einride zenseact embotech VOLVO

Beyond LiDAR: Constructing Multi-Modal Autonomy Data Pipelines

- How to label data from dozens of sensors within time and budget
- The benefits and limitations of automation
- Weighing the prospects of E2E/VLMs VS a layer-based (PPP) approach
- The role of human feedback for next-gen AD systems paradigms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internal
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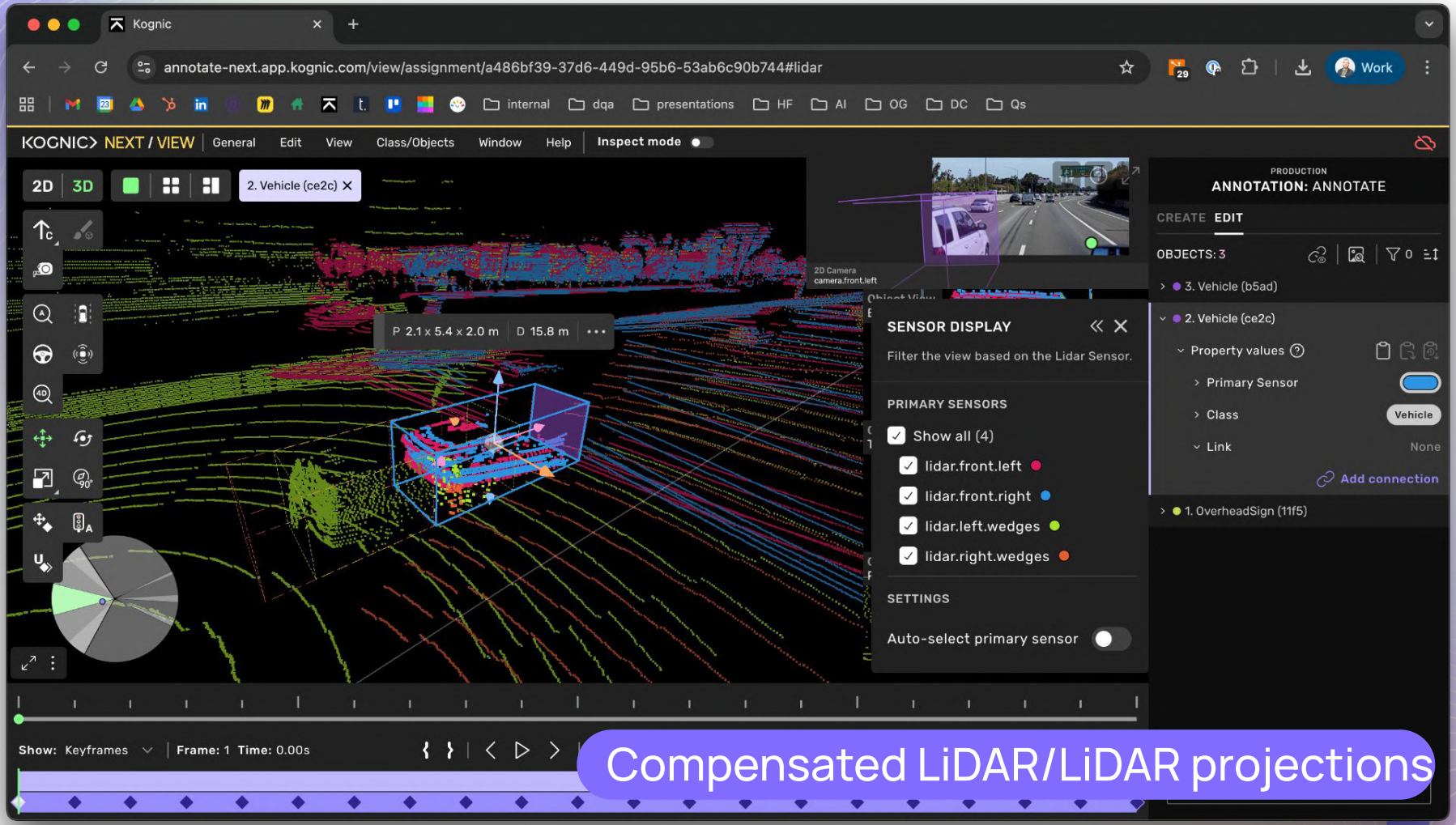
KOGNIC>
General
Edit
View
Class/Object
Window
Help
Please update chrome
This is a view link
2D
3D
Front Camera
PRODUCTION
CORRECTION: CORRECT
CREATE
EDIT
CLASSES: 5
Vehicle
Vulnerable Vehicle
Pedestrian
Animal
Mover
VALIDATE TASK
Is this a valuable use of your teams' time and budget?
Is this aligned with what you expect from your model?
Do you understand the data < > performance relation?


Kognic
annotate-next.app.kognic.com/view/assignment/a486bf39-37d6-449d-95b6-53ab6c90b744#lidar
Work
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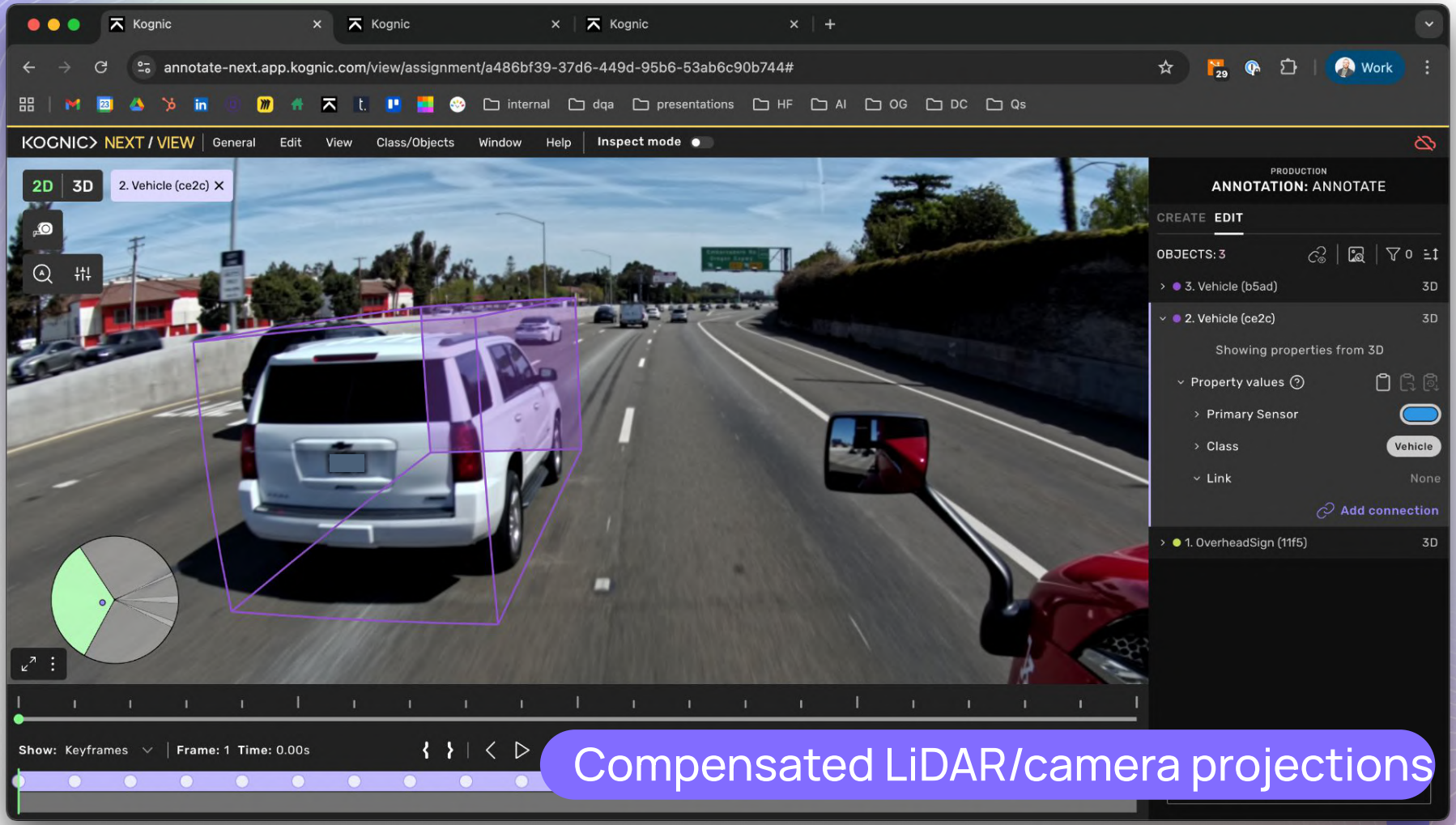
DC
Qs
KOGNIC> NEXT / VIEW
General
Edit
View
Class/Objects
Window
Help
Inspect mode
2D
3D
2. Vehicle (ce2c)
P 2.1 x 5.4 x 2.0 m
D 15.8 m
2D Camera
camera.front.left
SENSOR DISPLAY
Filter the view based on the Lidar Sensor.
PRIMARY SENSORS
Show all (4)
lidar.front.left
lidar.front.right
lidar.left.wedges
lidar.right.wedges
SETTINGS
Auto-select primary sensor
PRODUCTION
ANNOTATION: ANNOTATE
CREATE
EDIT
OBJECTS: 3
3. Vehicle (b5ad)
2. Vehicle (ce2c)
Property values
Primary Sensor
Class
Vehicle
Link
None
Add connection
1. OverheadSign (11f5)
Show: Keyframes
Frame: 1
Time: 0.00s
Compensated LiDAR/LiDAR projections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AI
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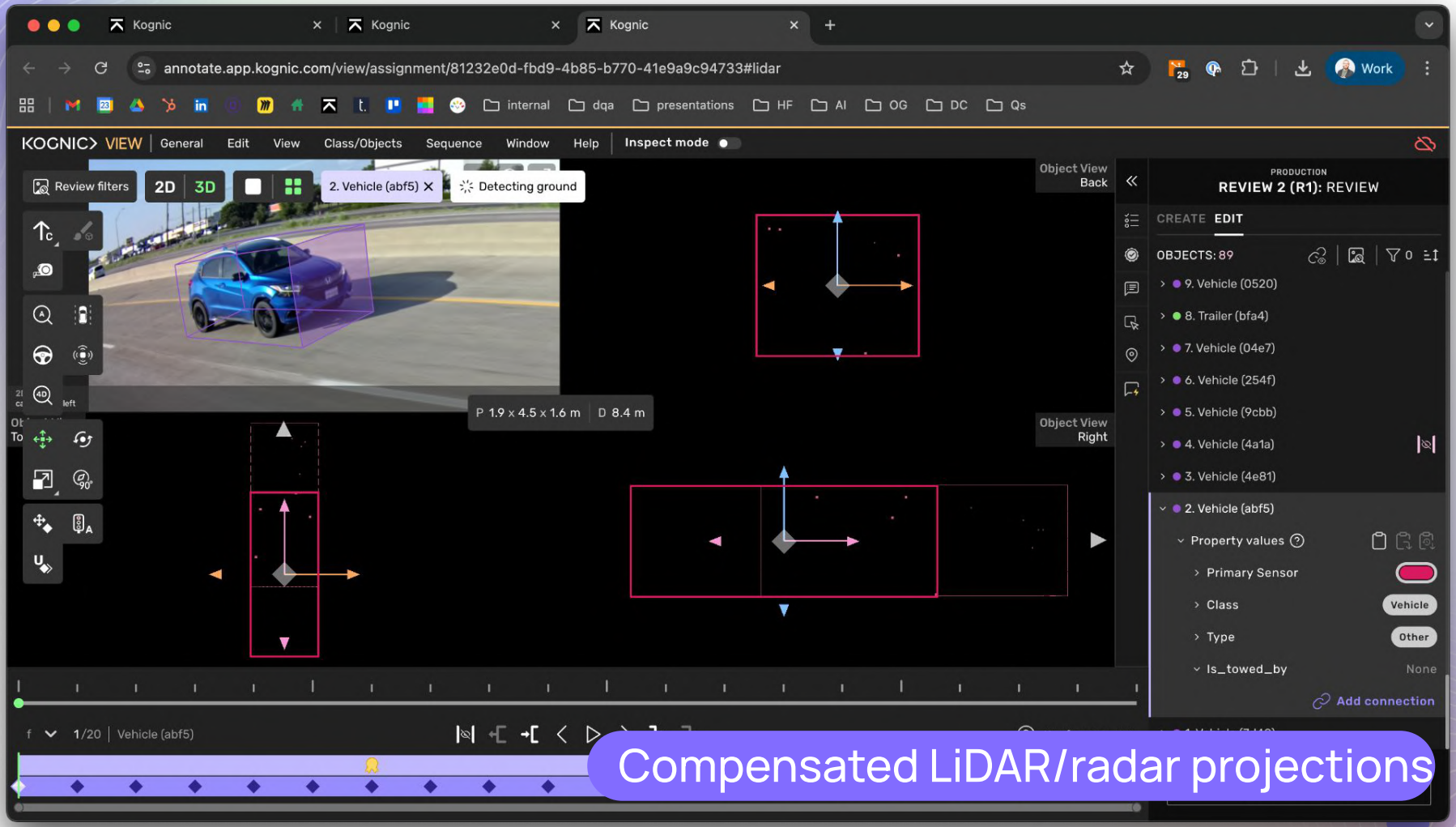
DC
Qs
KOGNIC> NEXT / VIEW
General
Edit
View
Class/Objects
Window
Help
Inspect mode
2D
3D
2. Vehicle (ce2c)
PRODUCTION
ANNOTATION: ANNOTATE
CREATE
EDIT
OBJECTS: 3
3. Vehicle (b5ad) 3D
2. Vehicle (ce2c) 3D
Showing properties from 3D
Property values
Primary Sensor
Class
Vehicle
Link
None
Add connection
1. OverheadSign (11f5) 3D
Show: Keyframes
Frame: 1 Time: 0.00s
Compensated LiDAR/camera projections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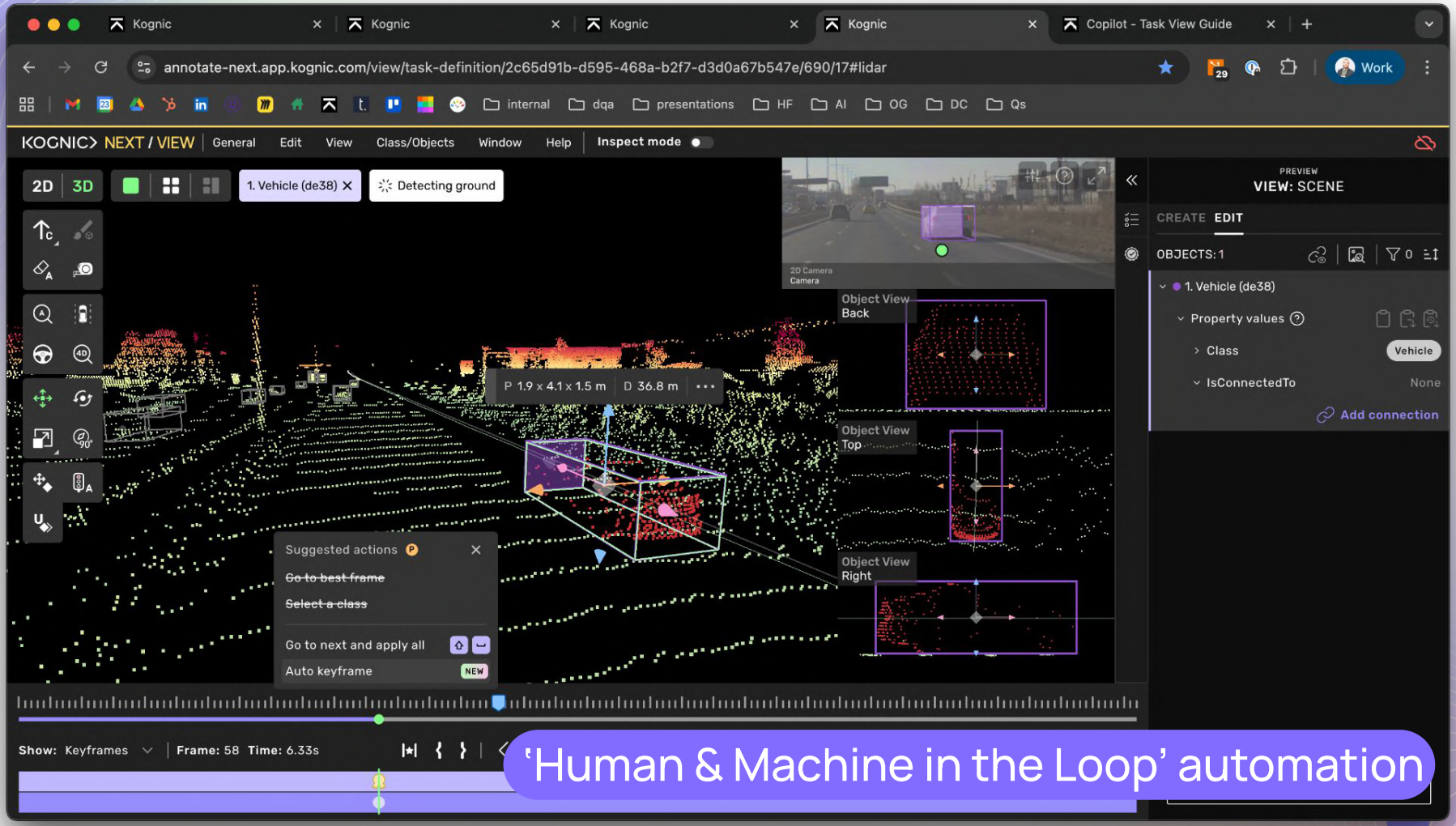
KOGNIC> VIEW
General
Edit
View
Class/Objects
Sequence
Window
Help
Inspect mode
Review filters
2D
3D
2. Vehicle (abf5)
Detecting ground
Object View Back
Object View Right
P 1.9 x 4.5 x 1.6 m
D 8.4 m
PRODUCTION
REVIEW 2 (R1): REVIEW
CREATE
EDIT
OBJECTS: 89
9. Vehicle (0520)
8. Trailer (bfa4)
7. Vehicle (04e7)
6. Vehicle (254f)
5. Vehicle (9cbb)
4. Vehicle (4a1a)
3. Vehicle (4e81)
2. Vehicle (abf5)
Property values
Primary Sensor
Class
Vehicle
Type
Other
Is_towed_by
None
Add connection
1/20
Vehicle (abf5)
Compensated LiDAR/radar projections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Copilot - Task View Guide
annotate-next.app.kognic.com/view/task-definition/2c65d91b-d595-468a-b2f7-d3d0a67b547e/690/17#lidar
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KOGNIC> NEXT / VIEW
General
Edit
View
Class/Objects
Window
Help
Inspect mode
2D
3D
1. Vehicle (de38)
Detecting ground
2D Camera
Camera
Object View
Back
Object View
Top
Object View
Right
P 1.9 x 4.1 x 1.5 m
D 36.8 m
Suggested actions
Go to best frame
Select a class
Go to next and apply all
Auto keyframe
NEW
PREVIEW
VIEW: SCENE
CREATE
EDIT
OBJECTS: 1
1. Vehicle (de38)
Property values
Class
Vehicle
IsConnectedTo
None
Add connection
Show: Keyframes
Frame: 58
Time: 6.33s
‘Human & Machine in the Loop’ automation

How to label data from dozens of sensors within time and budget

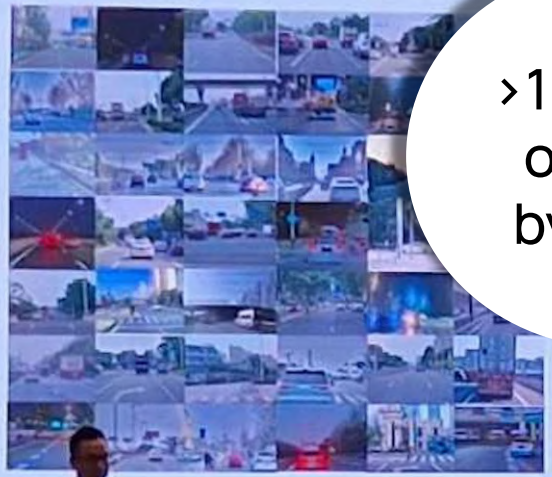
- Understand (how to iterate on) your needs
- Understand 2D/3D temporal implications and use-case requirements
- Use automation for tasks at which machines perform well
- Direct human feedback to where it matters

“Will this even matter two years from now?” E2E models and the role of human feedback

Training an AI Model Requires Massive Amount of Data at Low Cost

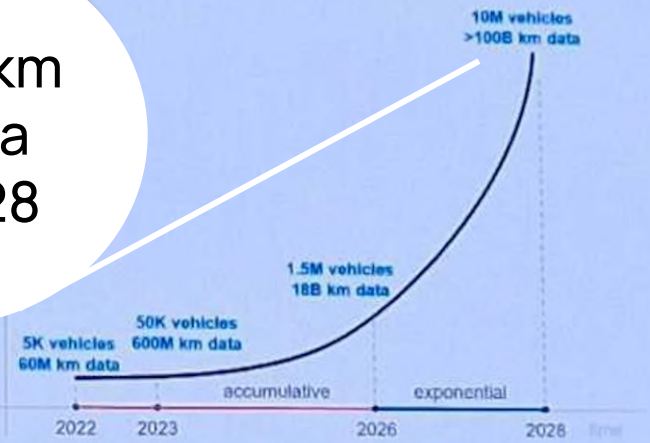
- **Fleet**: 300+ development vehicles worldwide
- **Data Amounts**: **150+PB** historical data, **1PB** new data per day
- **Training Excellence**: **9000+** GPUs, **400+** model iteration tasks per week
- **Automation**: More than **95%** auto labeling, continuously increas

- **Image Perception Data**: **4.5B** (TOP1 of software companies)
- **Lidar Perception Data**: **1.5B**
- **Event Data**: multi-scenario, multi-environment, various weather and lighting
  250K event per day, **47M+** event in total. (As of January 2024)



opment & Customer Fleet Data Example

>100B km
of data
by 2028



In 2028, accumulated data are expected to surpass 100billion km, solving the ultimate long-tail problem in autonomous driving.

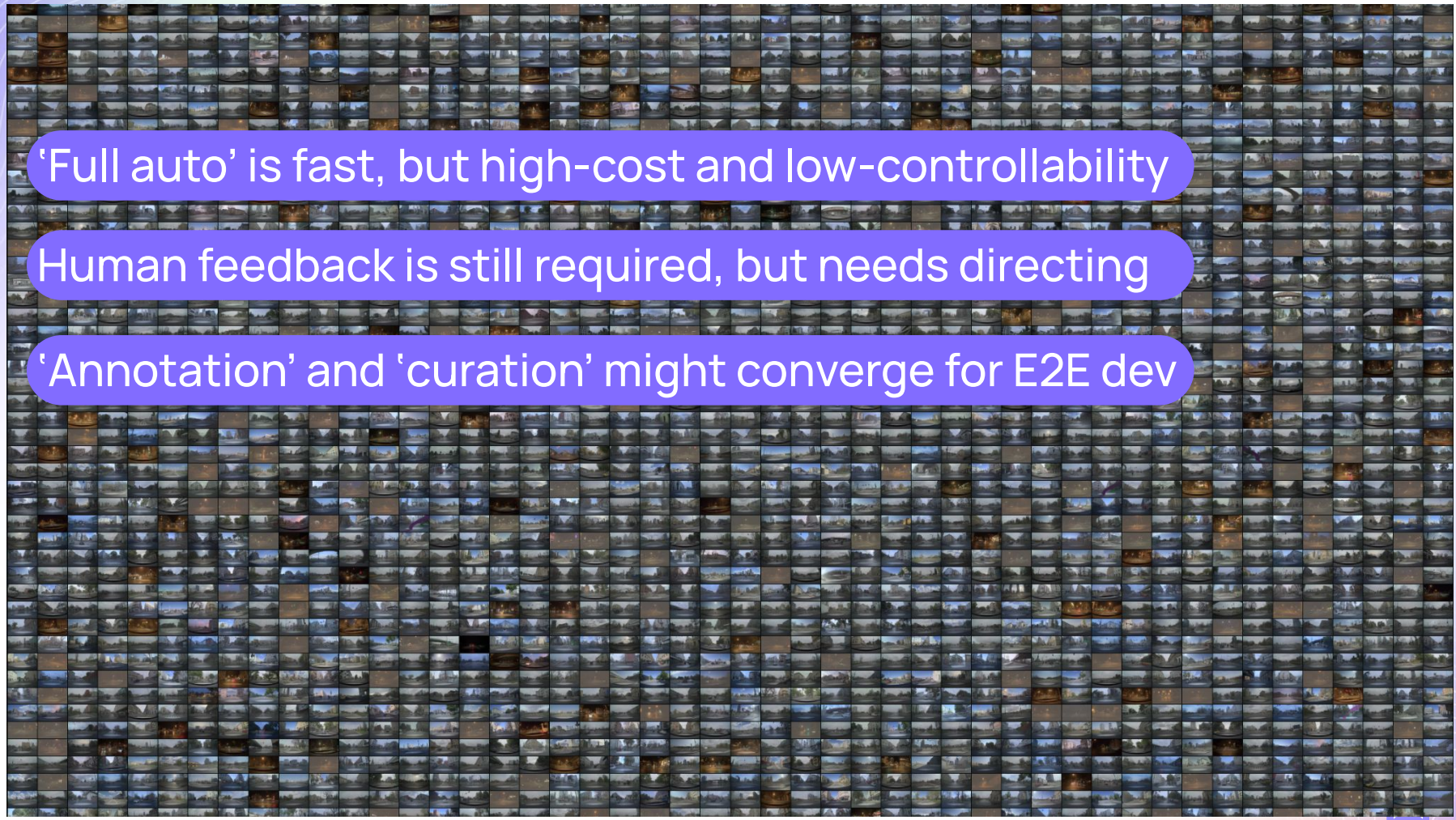
Source: Momenta @ AutoSens Hefei 2024

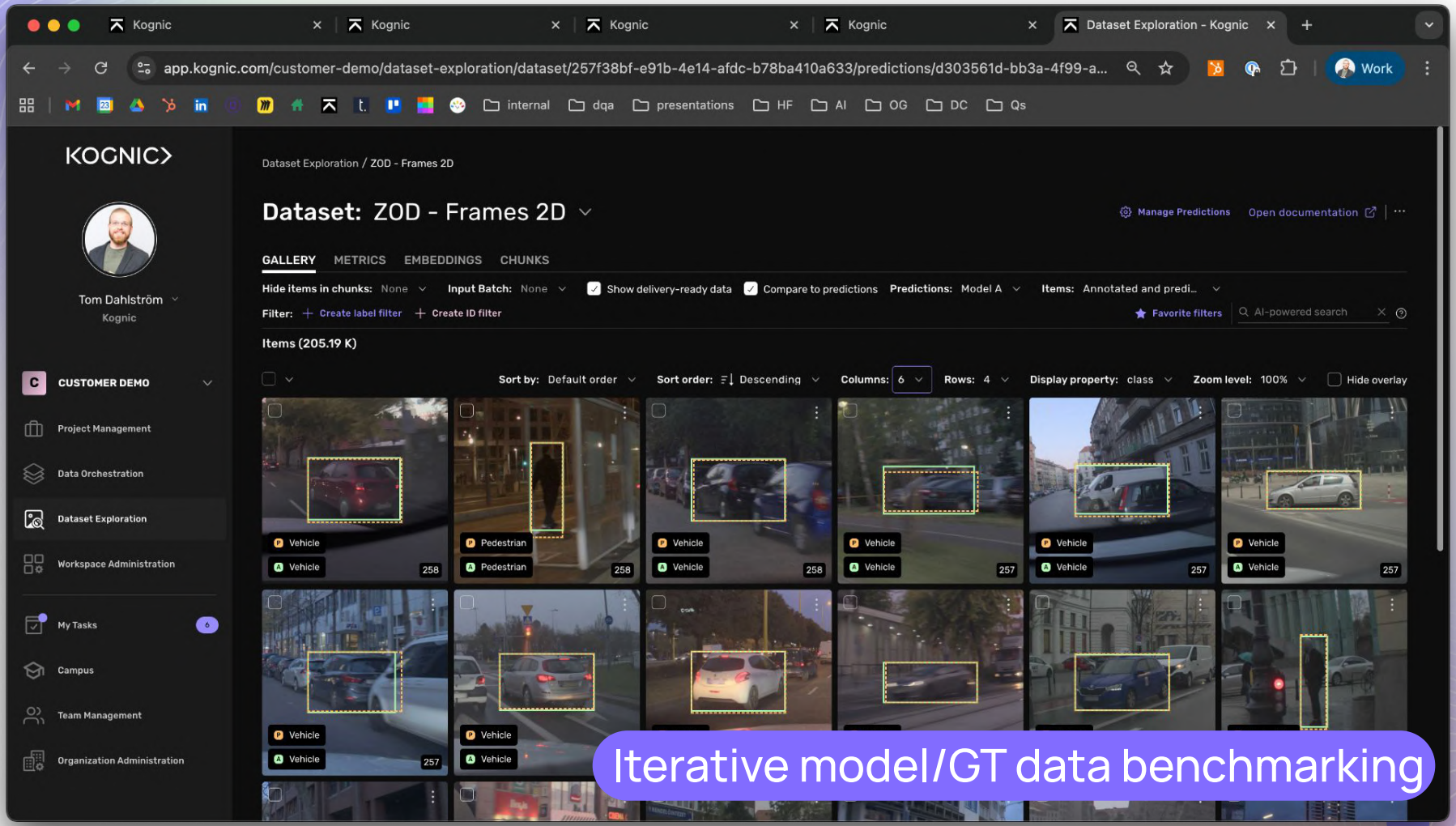
“Let’s run inference on everything …?”

GPU Tasks	
Nvidia B200	$6.25 / h
Nvidia H200	$4.54 / h
Nvidia H100	$3.95 / h
Nvidia A100, 80 GB	$2.50 / h
Nvidia A100, 40 GB	$2.10 / h
Nvidia L40S	$1.95 / h
Nvidia A10	$1.10 / h
Nvidia L4	$0.80 / h
Nvidia T4	$0.59 / h

Source: modal.com/pricing, Nov 10, 2025


“Let’s do some curation first …?”


‘Full auto’ is fast, but high-cost and low-controllability
Human feedback is still required, but needs directing
‘Annotation’ and ‘curation’ might converge for E2E dev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Dataset Exploration - Kognic
app.kognic.com/customer-demo/dataset-exploration/dataset/257f38bf-e91b-4e14-afdc-b78ba410a633/predictions/d303561d-bb3a-4f99-a...
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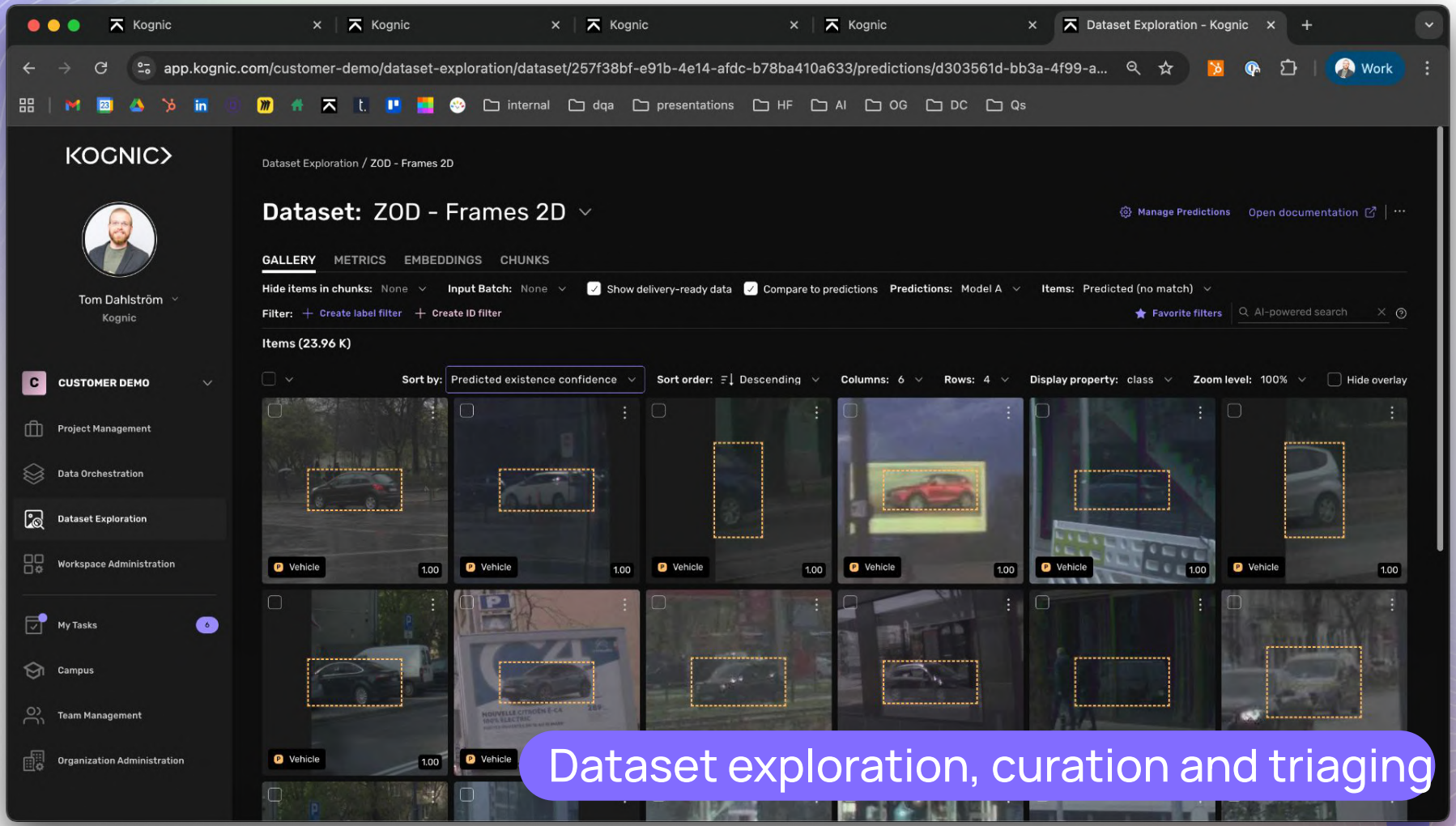
KOGNIC
Tom Dahlström
Kognic
CUSTOMER DEMO
Project Management
Data Orchestration
Dataset Exploration
Workspace Administration
My Tasks
Campus
Team Management
Organization Administration
Dataset Exploration / ZOD - Frames 2D
Dataset: ZOD - Frames 2D
Manage Predictions
Open documentation
GALLERY
METRICS
EMBEDDINGS
CHUNKS
Hide items in chunks: None
Input Batch: None
Show delivery-ready data
Compare to predictions
Predictions: Model A
Items: Annotated and predi...
Filter: Create label filter
Create ID filter
Favorite filters
AI-powered search
Items (205.19 K)
Sort by: Default order
Sort order: Descending
Columns: 6
Rows: 4
Display property: class
Zoom level: 100%
Hide overlay
Vehicle
Pedestrian
Iterative model/GT data benchmarking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CUSTOMER DEMO
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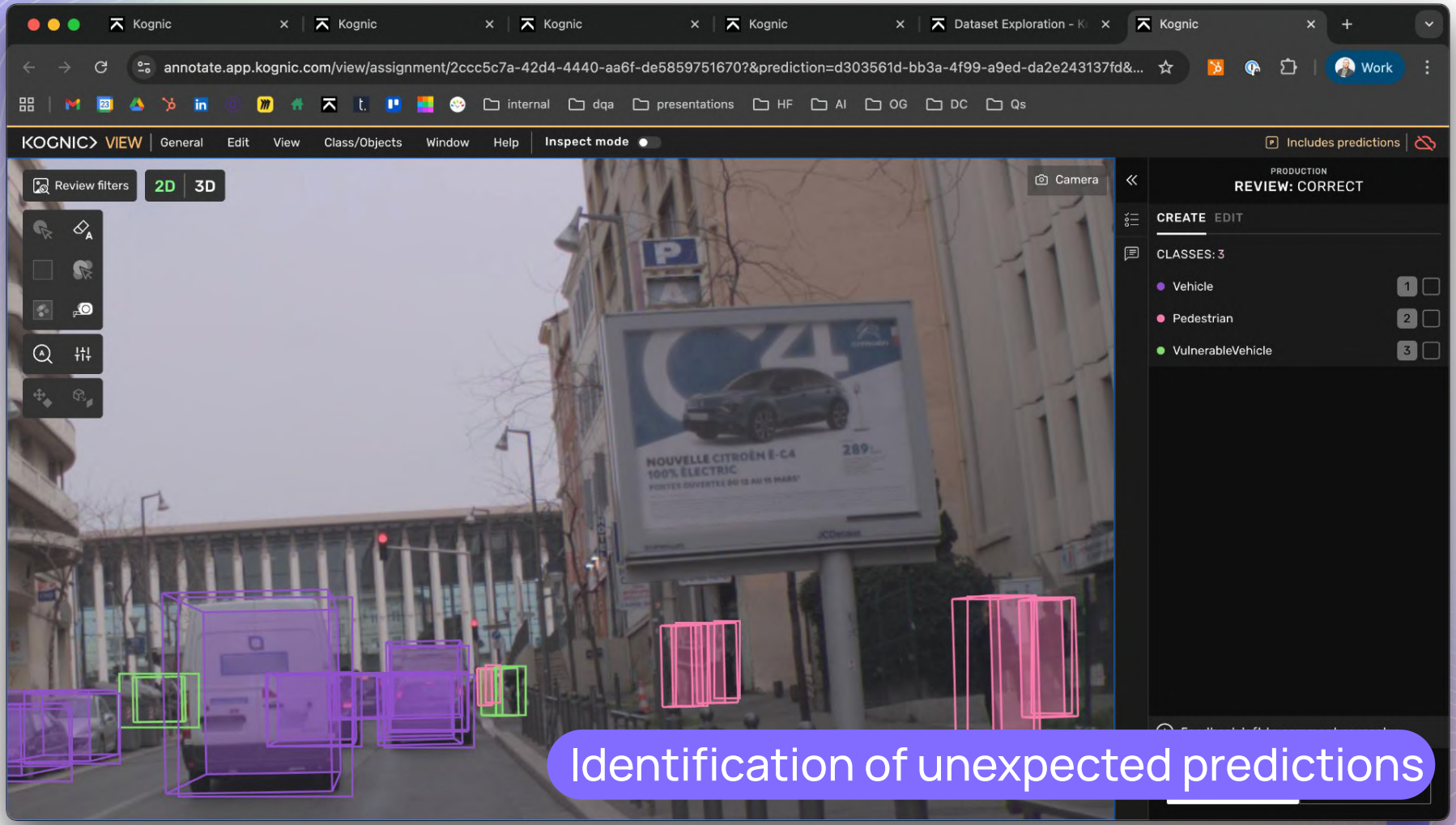
Dataset Exploration / ZOD - Frames 2D
Dataset: ZOD - Frames 2D
Manage Predictions
Open documentation
GALLERY
METRICS
EMBEDDINGS
CHUNKS
Hide items in chunks: None
Input Batch: None
Show delivery-ready data
Compare to predictions
Predictions: Model A
Items: Predicted (no match)
Filter:
Create label filter
Create ID filter
Favorite filters
AI-powered search
Items (23.96 K)
Sort by: Predicted existence confidence
Sort order: Descending
Columns: 6
Rows: 4
Display property: class
Zoom level: 100%
Hide overlay
Vehicle
1.00
Dataset exploration, curation and triaging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Dataset Exploration - K
Kognic
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KOGNIC VIEW
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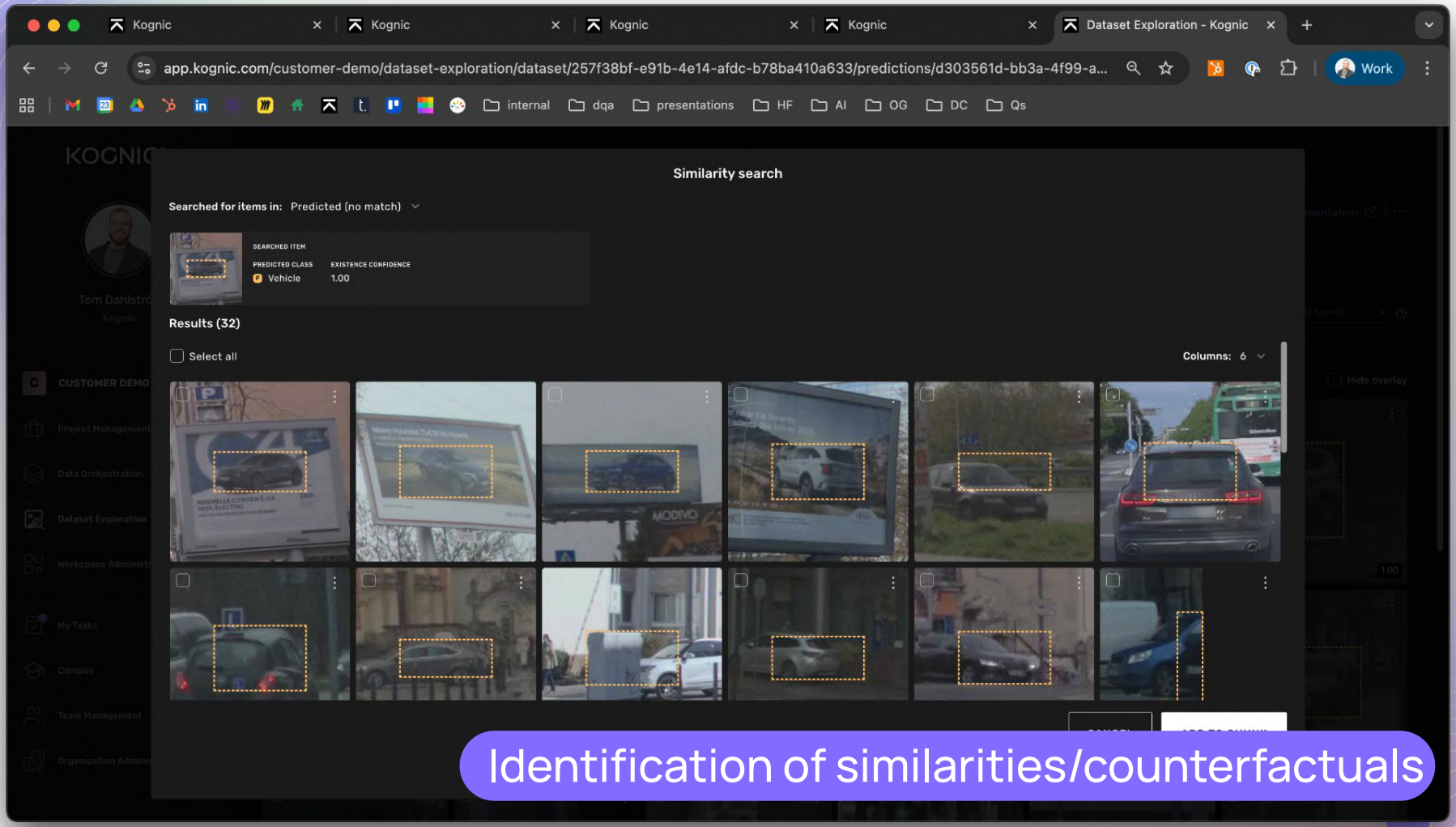
Window
Help
Inspect mode
Includes predictions
Review filters
2D
3D
Camera
PRODUCTION
REVIEW: CORRECT
CREATE
EDIT
CLASSES: 3
Vehicle
1
Pedestrian
2
VulnerableVehicle
3
NOUVELLE CITROËN É-C4
100% ÉLECTRIC
Identification of unexpected predictions


Kognic
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Dataset Exploration - Kognic
app.kognic.com/customer-demo/dataset-exploration/dataset/257f38bf-e91b-4e14-afdc-b78ba410a633/predictions/d303561d-bb3a-4f99-a...
Work
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presentations
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OG
DC
Qs
Similarity search
Searched for items in: Predicted (no match)
SEARCHED ITEM
PREDICTED CLASS
Vehicle
EXISTENCE CONFIDENCE
1.00
Results (32)
Select all
Columns: 6
Identification of similarities/counterfactuals

Taming the long tail problem:
Can VLM/VLA models bridge the gap?

"Is a violation of traffic rules acceptable at this time?"

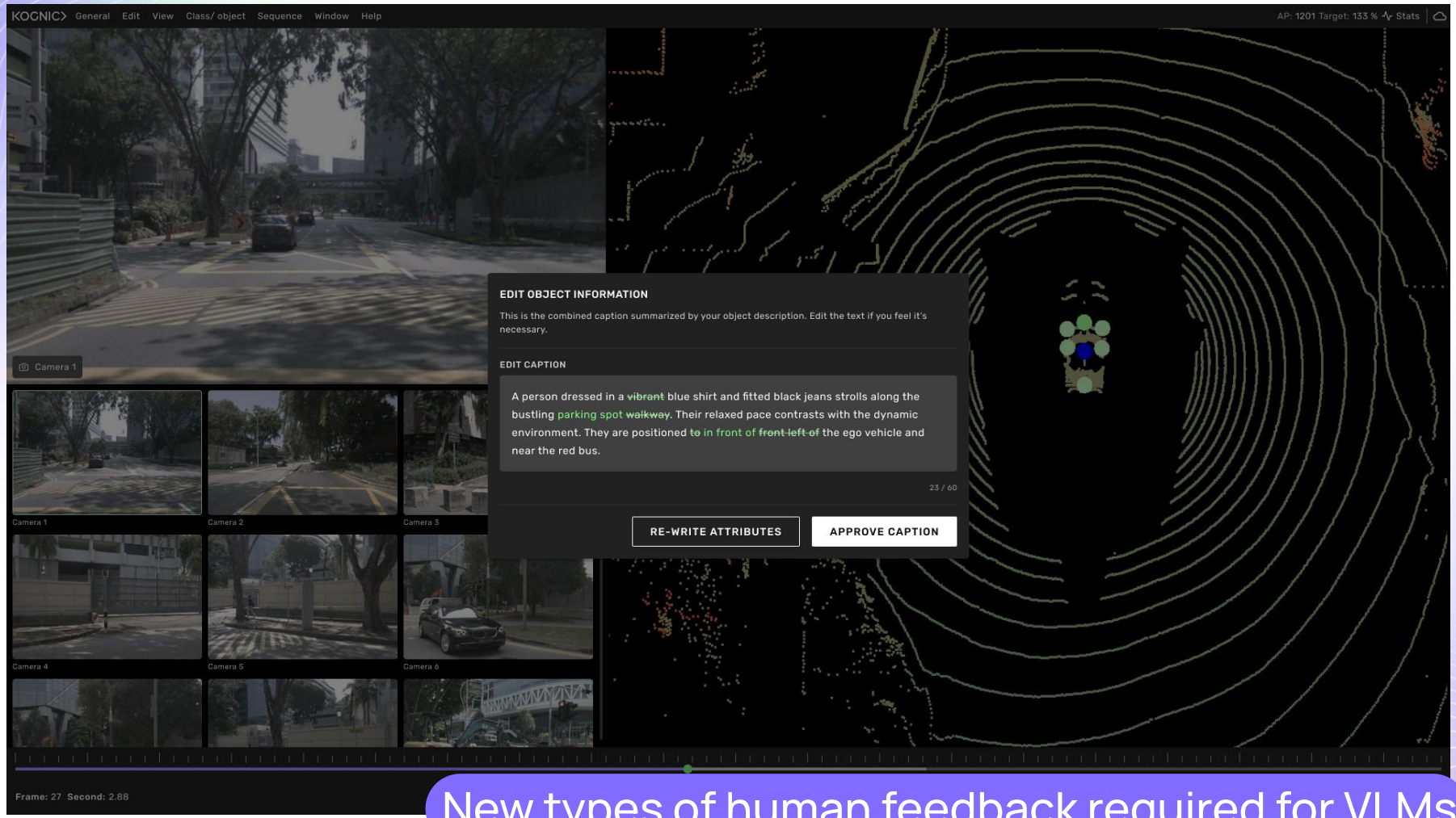
"Does a suggested action match local traffic moral?"

"Is a suggested maneuver acceptable for our brand?"

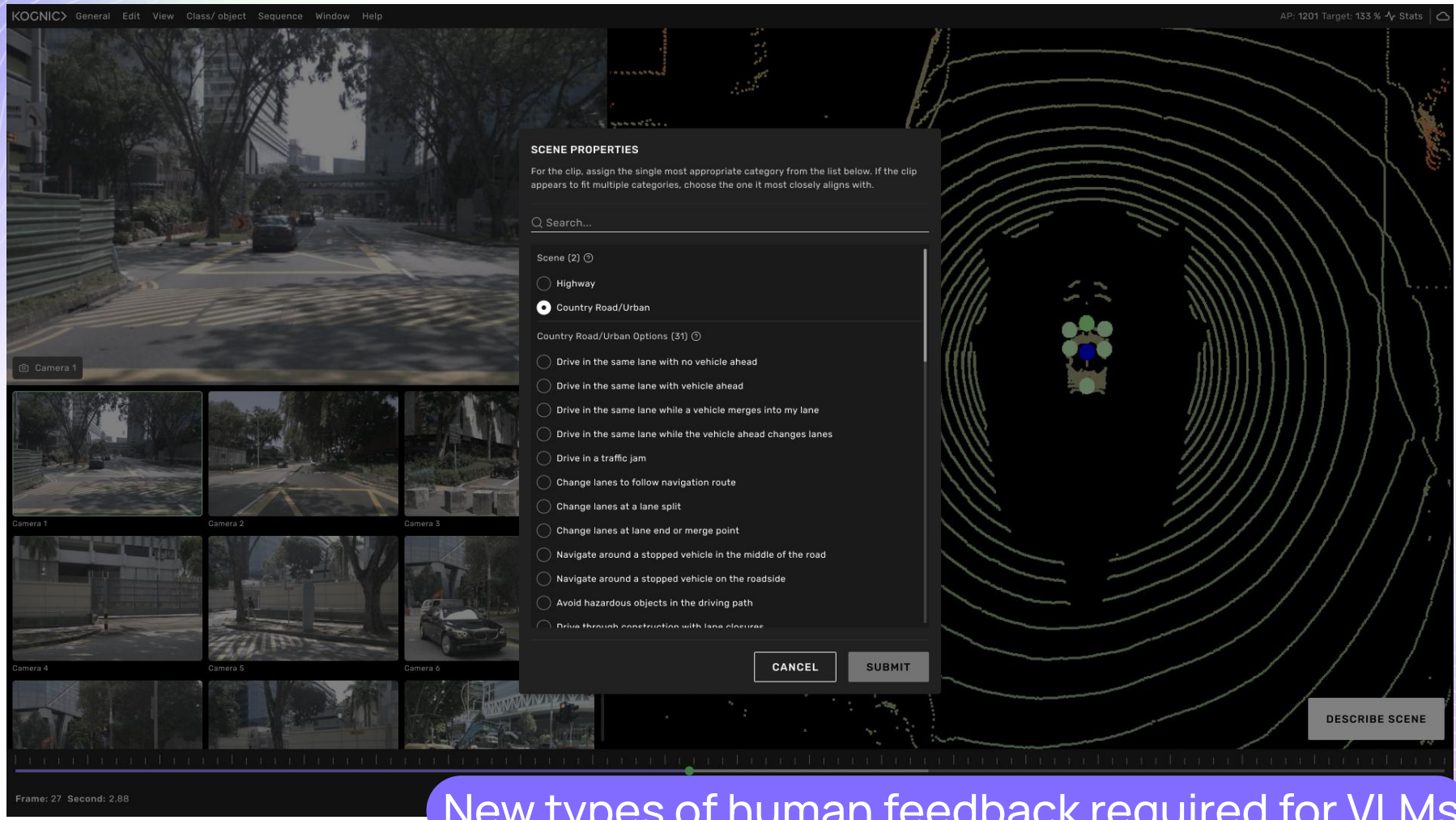
Figure 2: **An annotated sample of the SUP-AD dataset.**

2. **Scene Analysis** S: Including object-level analysis and scene-level summary S.
3. **Meta Actions** A: A sequence of actions representing task-level maneuvers.
4. **Decision Description** D: A detailed account of the driving decisions.
5. **Trajectory Waypoints** W: The waypoints outlining the planned trajectory of the ego vehicle.

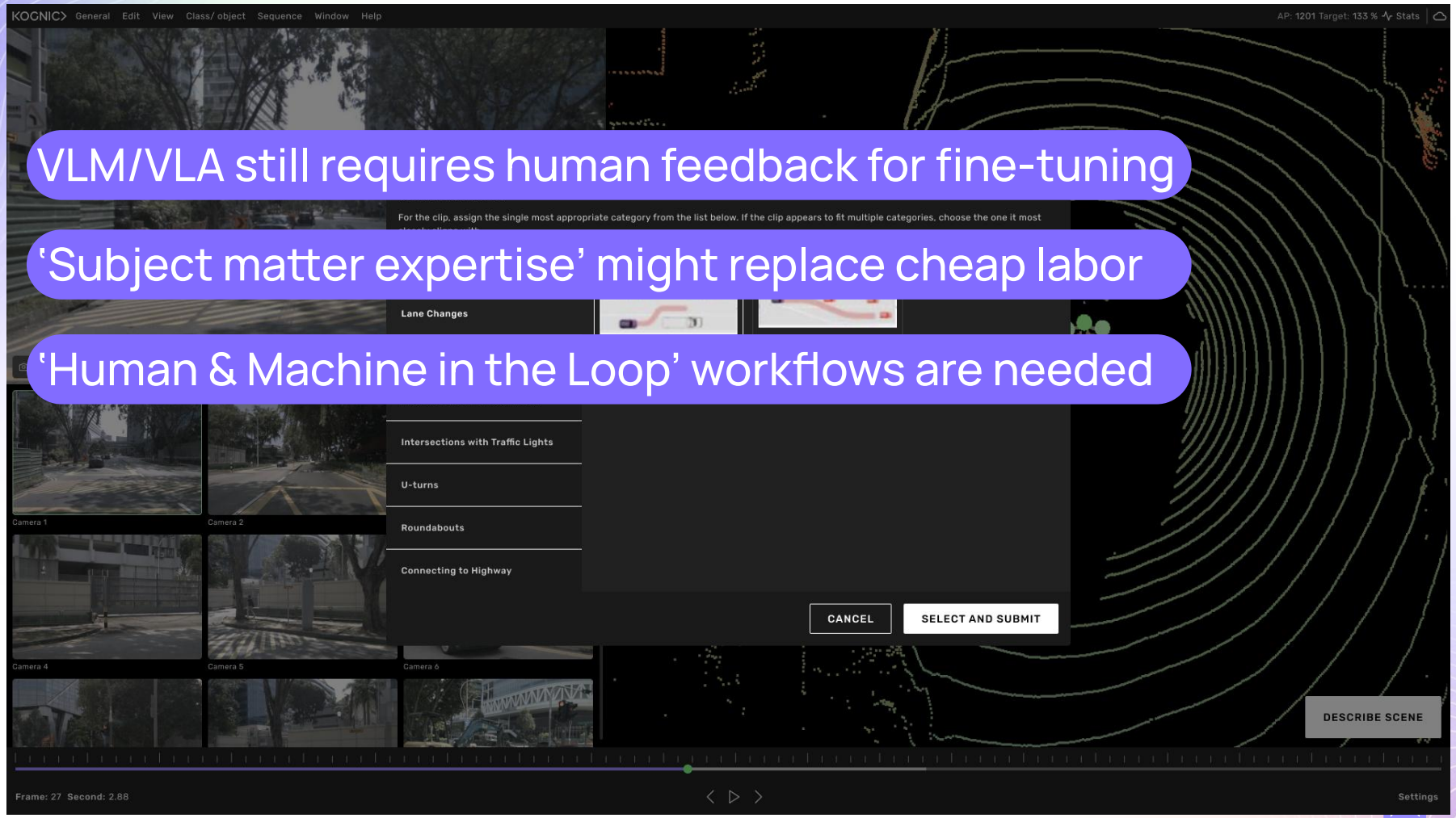
Source: DriveVLM, arXiv:2402.12289



New types of human feedback required for VLMs



New types of human feedback required for VLMs


KOGNIC> General Edit View Class/ object Sequence Window Help
AP: 1201 Target: 133 % Stats
VLM/VLA still requires human feedback for fine-tuning
‘Subject matter expertise’ might replace cheap labor
‘Human & Machine in the Loop’ workflows are needed
For the clip, assign the single most appropriate category from the list below. If the clip appears to fit multiple categories, choose the one it most
Lane Changes
Intersections with Traffic Lights
U-turns
Roundabouts
Connecting to Highway
CANCEL
SELECT AND SUBMIT
Camera 1
Camera 2
Camera 4
Camera 5
Camera 6
DESCRIBE SCENE
Frame: 27 Second: 2.88
Settings

“

Let’s go exploring.

Tom Dahlström
Account Executive

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+371 25636594