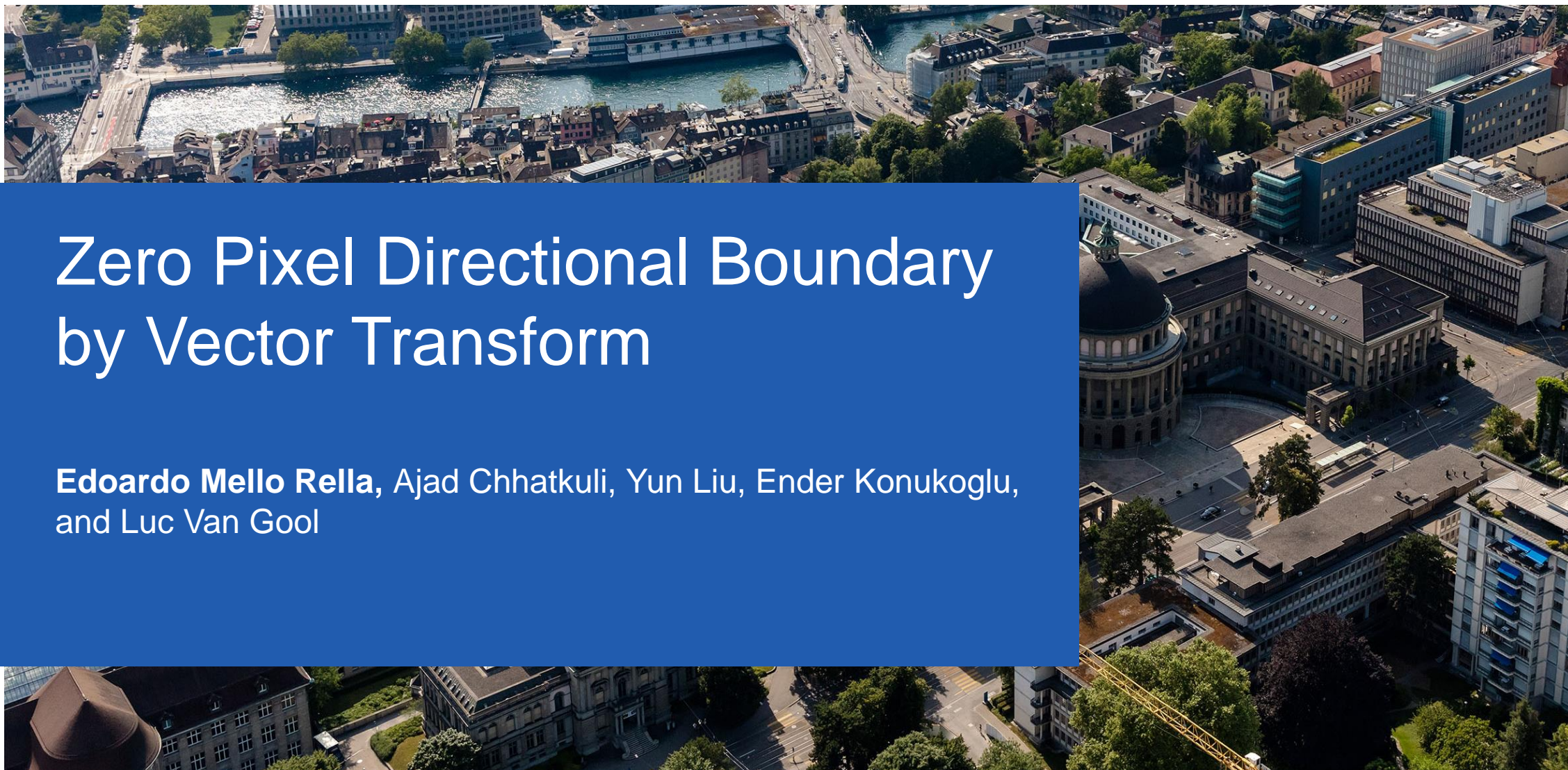


Zero Pixel Directional Boundary by Vector Transform

Edoardo Mello Rella, Ajad Chhatkuli, Yun Liu, Ender Konukoglu,
and Luc Van Gool



Boundary Detection and its Challenges

- Large class imbalance between boundary and non-boundary pixels.
- Prediction of thick boundaries.
- Low boundary localization.



Boundary Detection and its Challenges

- Large class imbalance between boundary and non-boundary pixels.
- Prediction of thick boundaries.
- Low boundary localization.



Boundary Detection and its Challenges

- Large class imbalance between boundary and non-boundary pixels.
- Prediction of thick boundaries.
- Low boundary localization.



From Binary to Vector Boundary Representation

- Change representation to solve the issues.



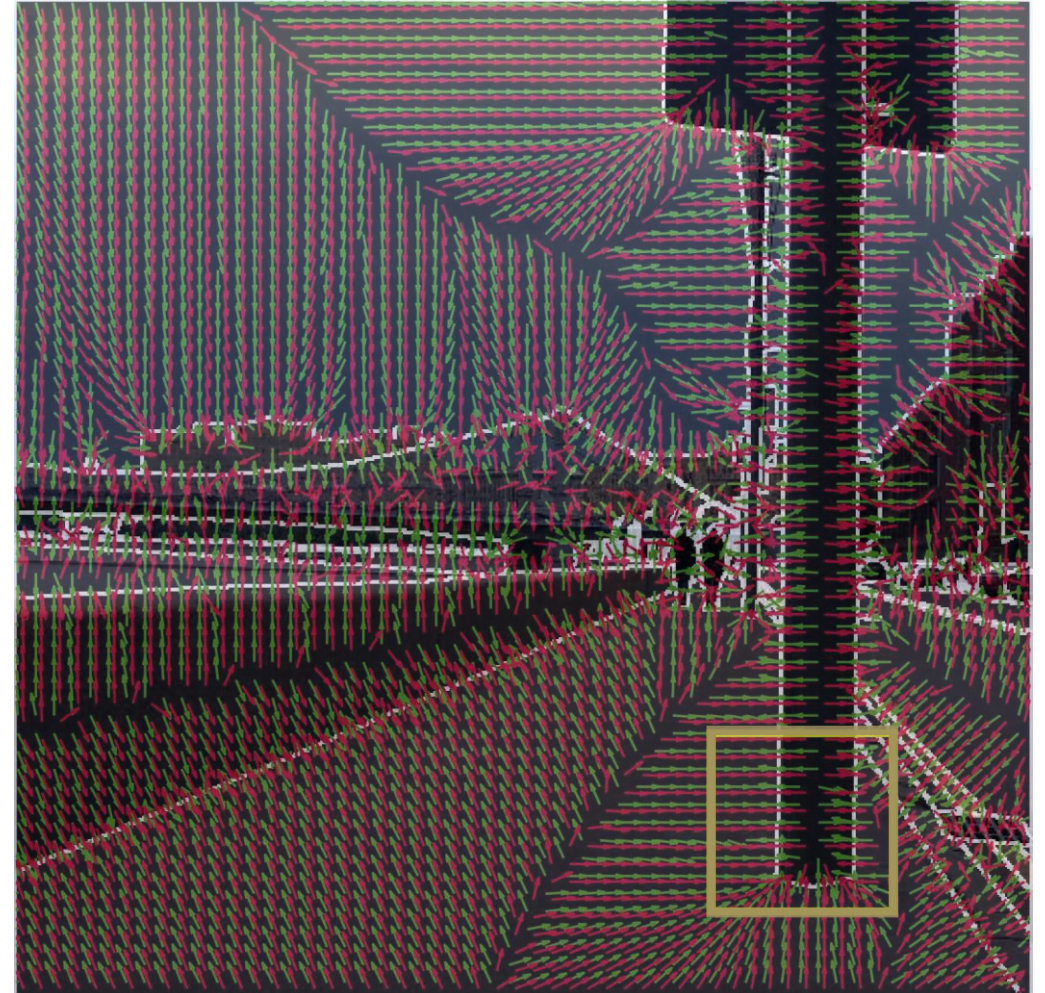
From Binary to Vector Boundary Representation

- Change representation to solve the issues.
- Map pixels to direction towards the closest boundary: **Vector Transform (VT)**.



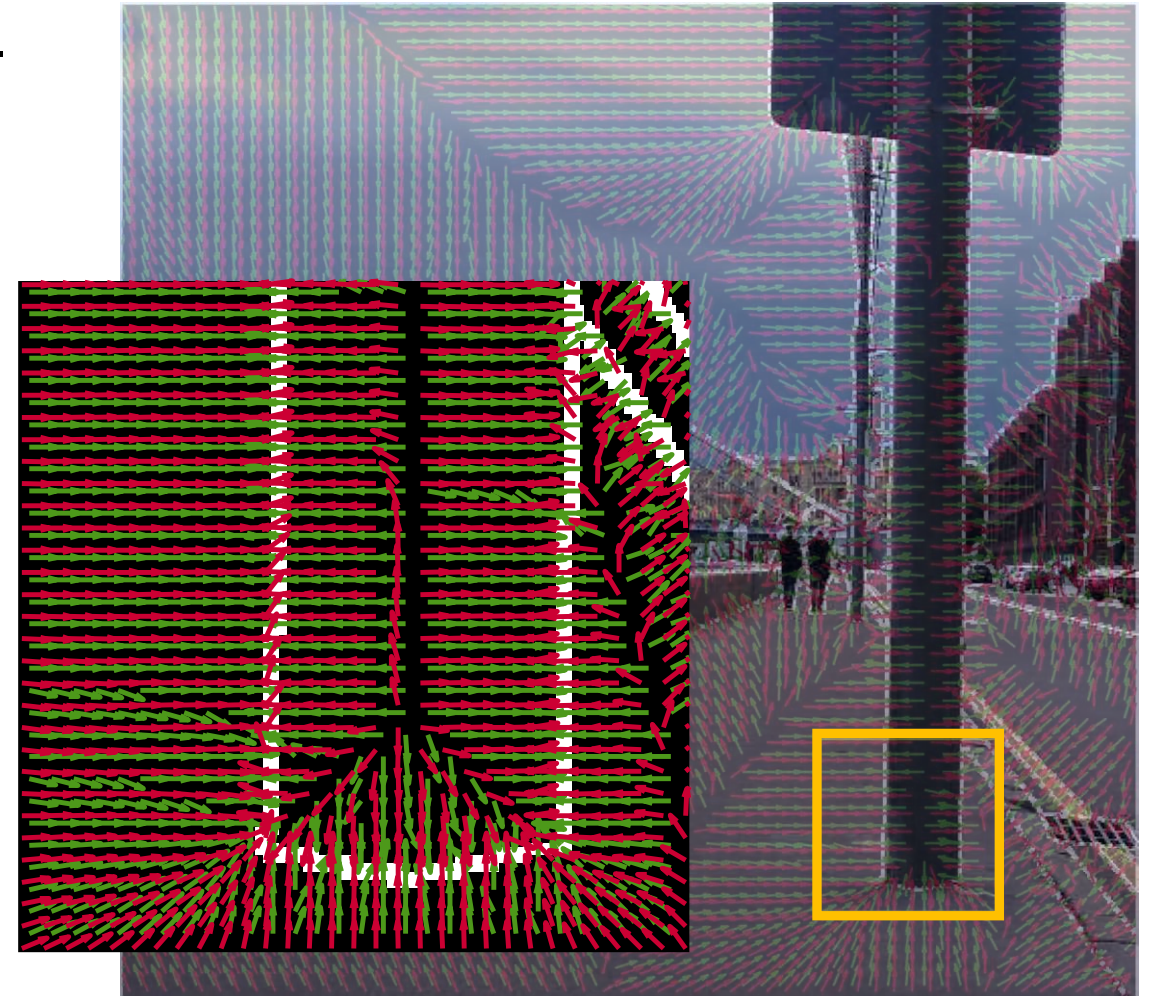
From Binary to Vector Boundary Representation

- Change representation to solve the issues.
- Map pixels to direction towards the closest boundary: **Vector Transform (VT)**.



From Binary to Vector Boundary Representation

- Change representation to solve the issues.
- Map pixels to direction towards the closest boundary: **Vector Transform (VT)**.
- Infer boundaries as points in the -2 level set of divergence on VT ($\nabla \cdot f$).



VT Improves Qualitative and Quantitative Results

Method	<i>assd</i>	ODS F	OIS F
DL	5.96	0.742	0.754



VT Improves Qualitative and Quantitative Results

Method	<i>assd</i>	ODS F	OIS F
DL	5.96	0.742	0.754
WCL	6.20	0.764	0.767



VT Improves Qualitative and Quantitative Results

Method	<i>assd</i>	ODS F	OIS F
DL	5.96	0.742	0.754
WCL	6.20	0.764	0.767
DCL	4.71	0.758	0.762



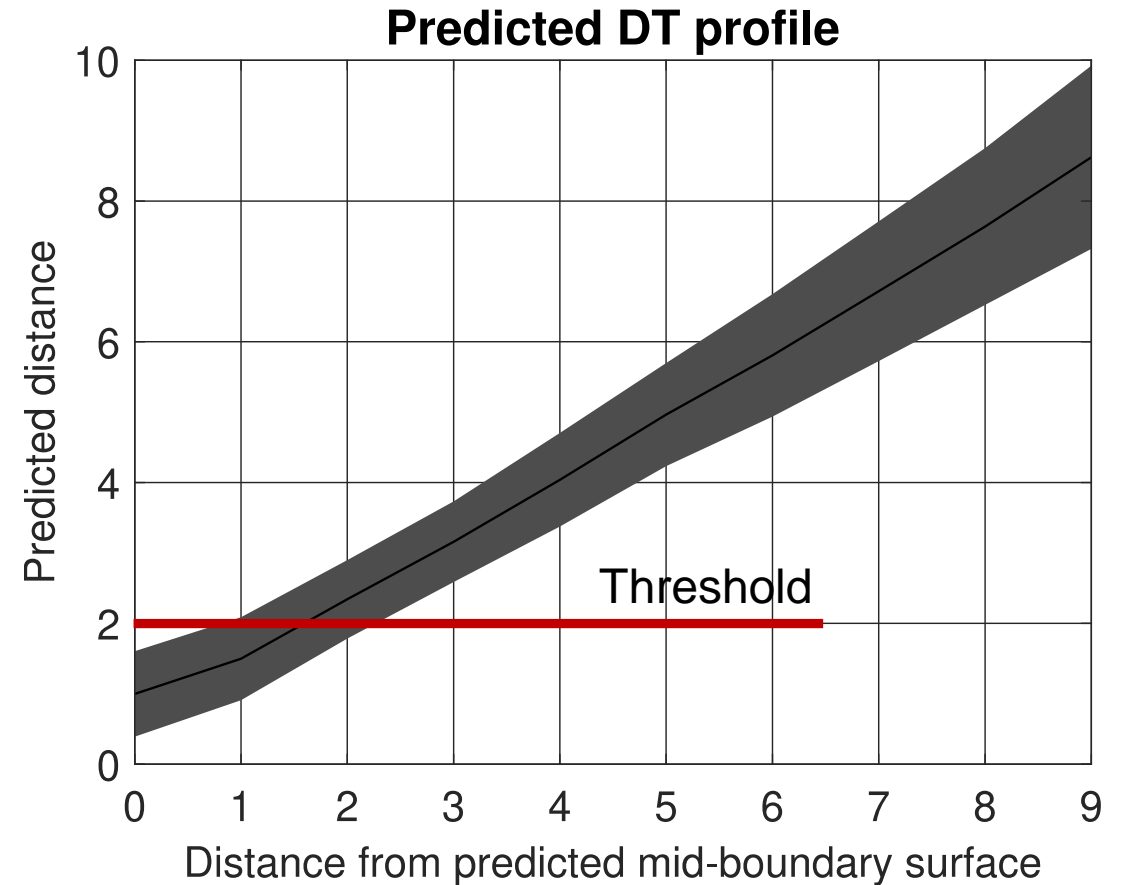
VT Improves Qualitative and Quantitative Results

Method	<i>assd</i>	ODS F	OIS F
DL	5.96	0.742	0.754
WCL	6.20	0.764	0.767
DCL	4.71	0.758	0.762
DT	5.63	0.616	0.668



VT Improves Qualitative and Quantitative Results

Method	<i>assd</i>	ODS F	OIS F
DL	5.96	0.742	0.754
WCL	6.20	0.764	0.767
DCL	4.71	0.758	0.762
DT	5.63	0.616	0.668



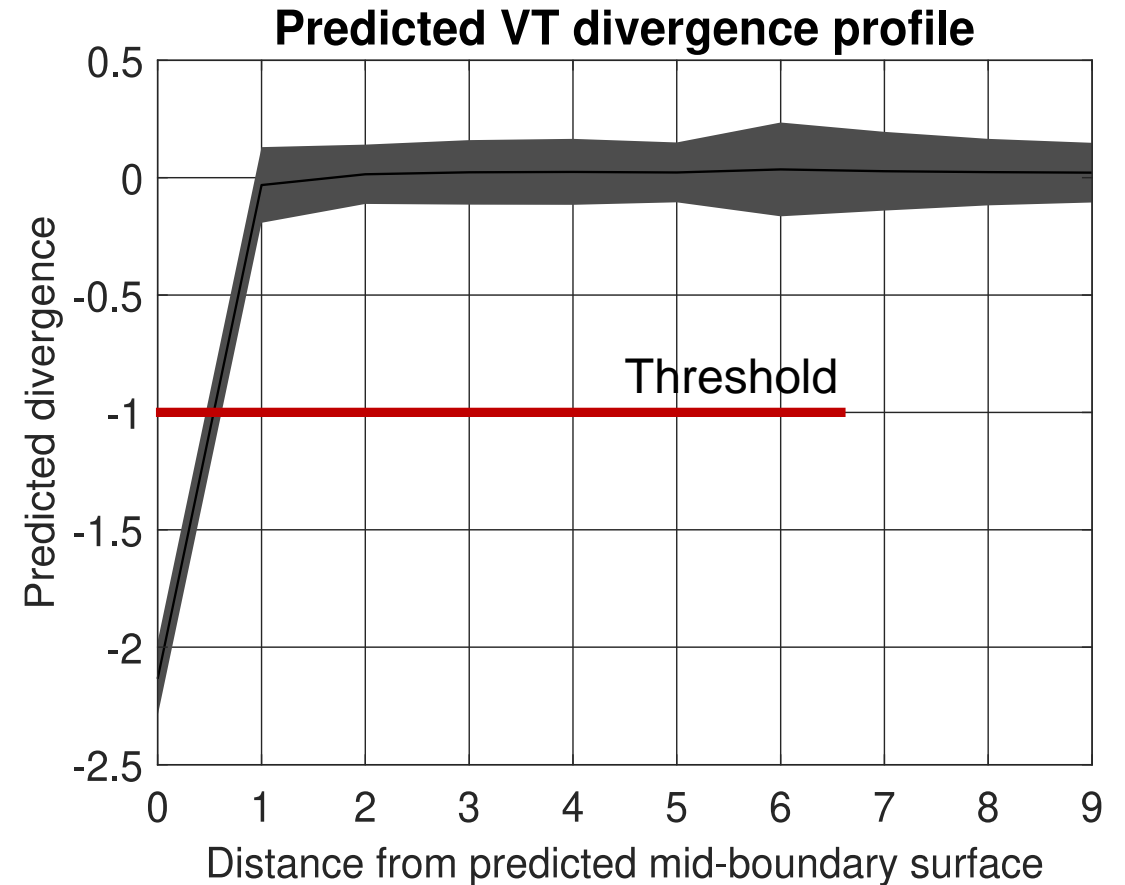
VT Improves Qualitative and Quantitative Results

Method	<i>assd</i>	ODS F	OIS F
DL	5.96	0.742	0.754
WCL	6.20	0.764	0.767
DCL	4.71	0.758	0.762
DT	5.63	0.616	0.668
VT	4.33	0.845	0.846



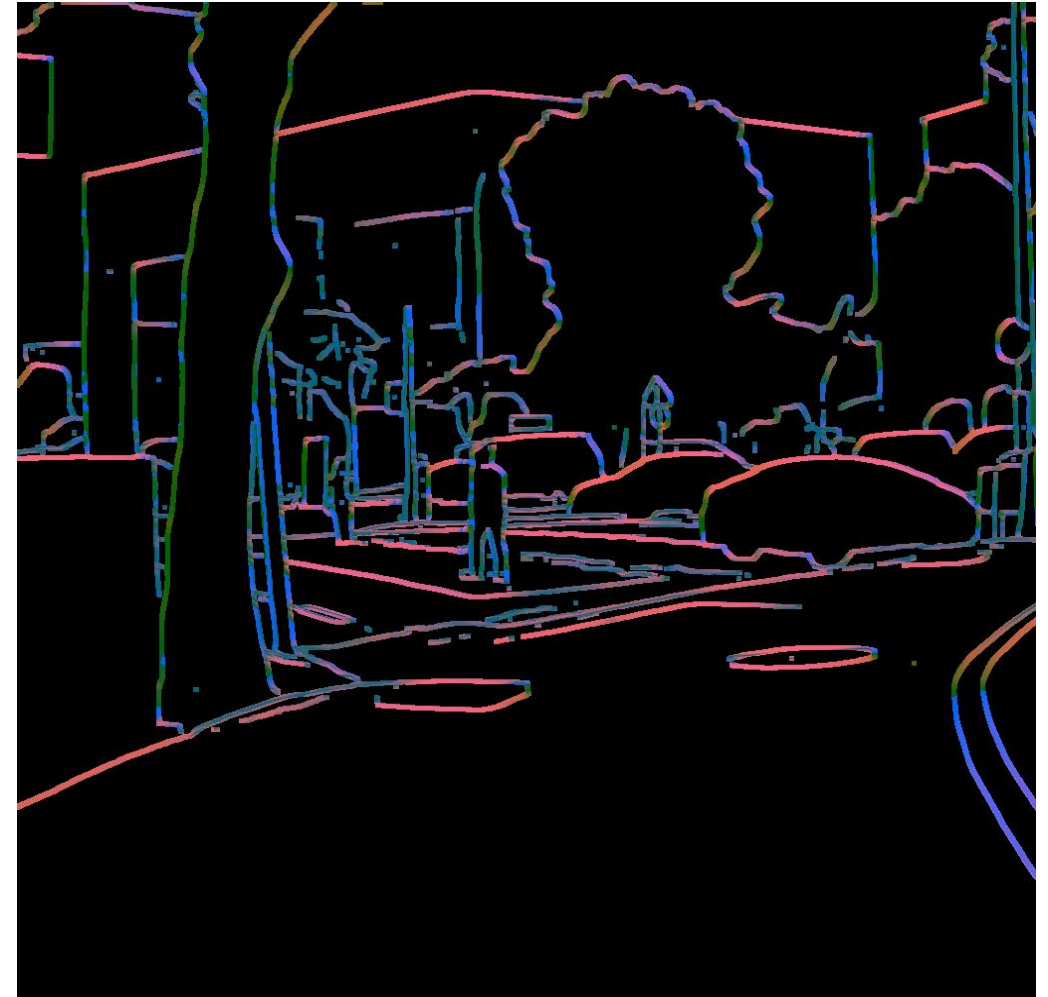
VT Improves Qualitative and Quantitative Results

Method	<i>assd</i>	ODS F	OIS F
DL	5.96	0.742	0.754
WCL	6.20	0.764	0.767
DCL	4.71	0.758	0.762
DT	5.63	0.616	0.668
VT	4.33	0.845	0.846



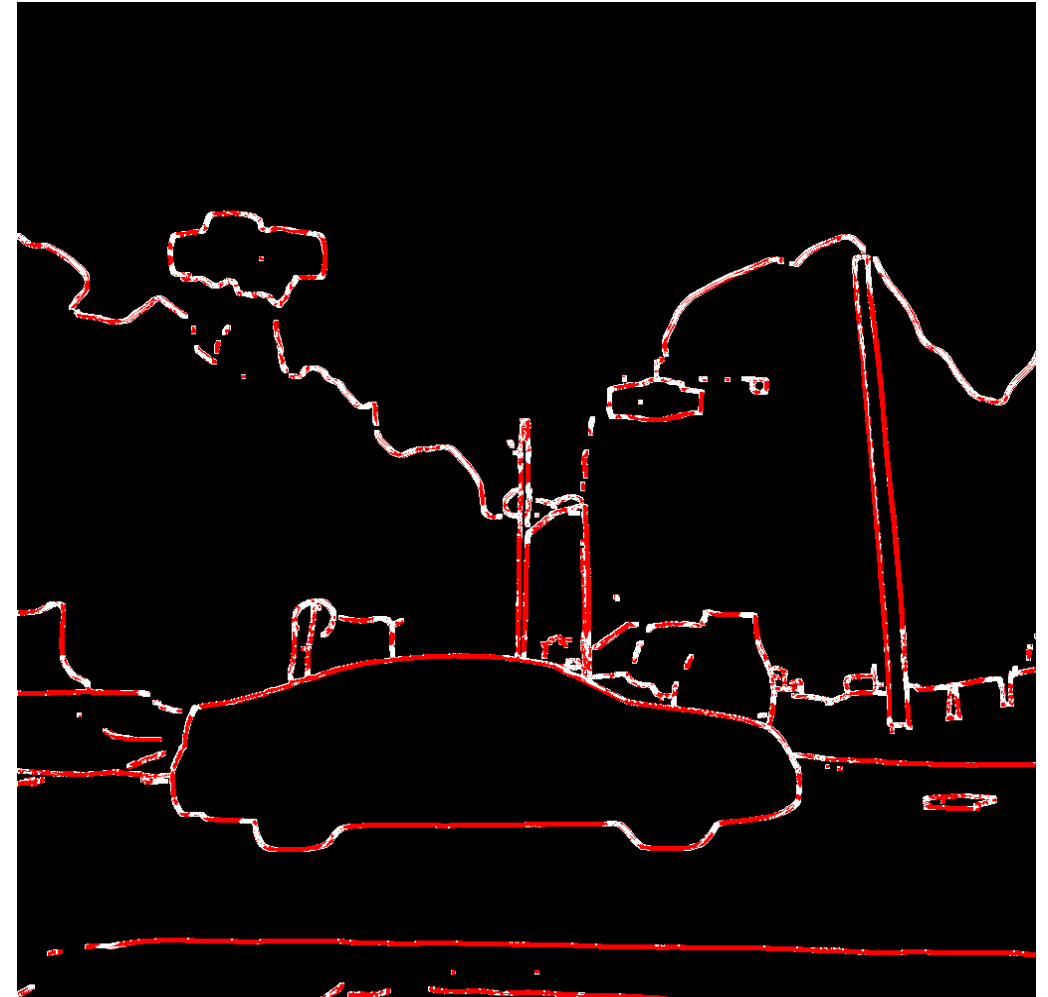
VT is Applicable in Multiple Tasks

- Boundary direction estimation.



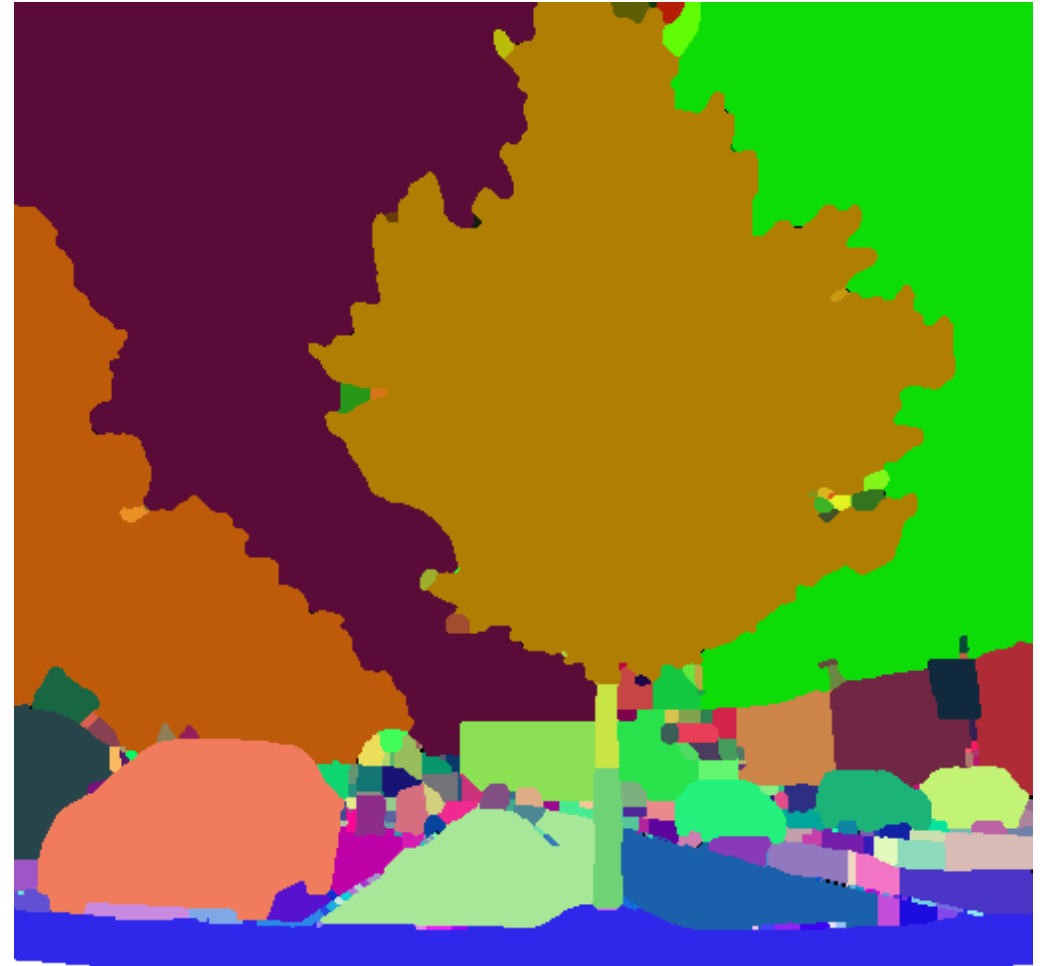
VT is Applicable in Multiple Tasks

- Boundary direction estimation.
- Straight line detection.



VT is Applicable in Multiple Tasks

- Boundary direction estimation.
- Straight line detection.
- Superpixels prediction.



Edoardo Mello Rella, Ajad Chhatkuli, Yun Liu, Ender Konukoglu, and Luc Van Gool

edoardo.mello-rella@vision.ee.ethz.ch

ETH Zurich
Computer Vision Lab CVL
Sternwartstrasse 7
8092 Zürich
Switzerland

<https://vision.ee.ethz.ch/>