AI for Image Processing and Synthesis

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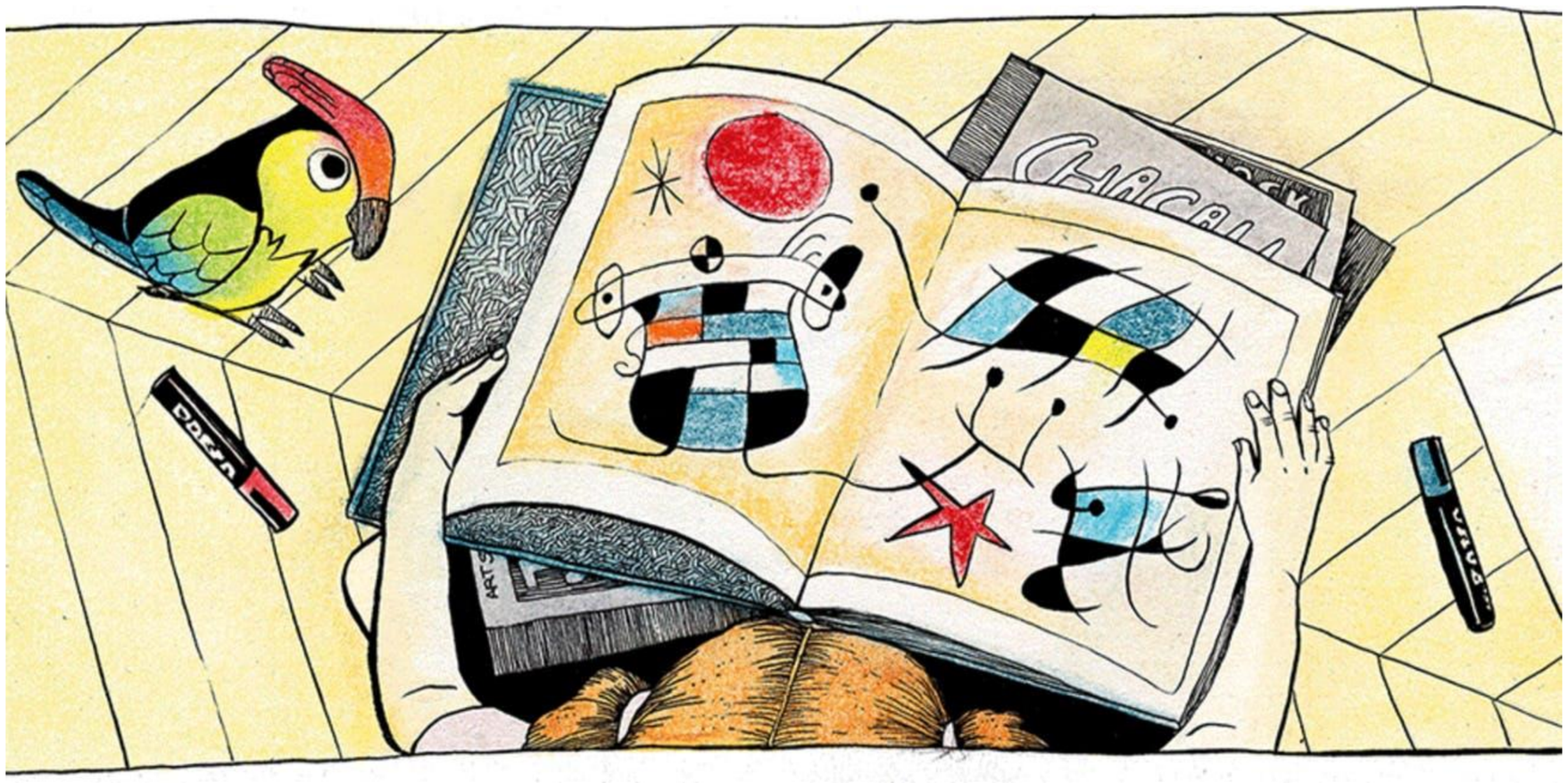
About Me

- Assistant Professor of CSE and ECE
  - PhD from Stanford, B.sc from HKUST
  - **Image processing and synthesis**
  - Autonomous driving

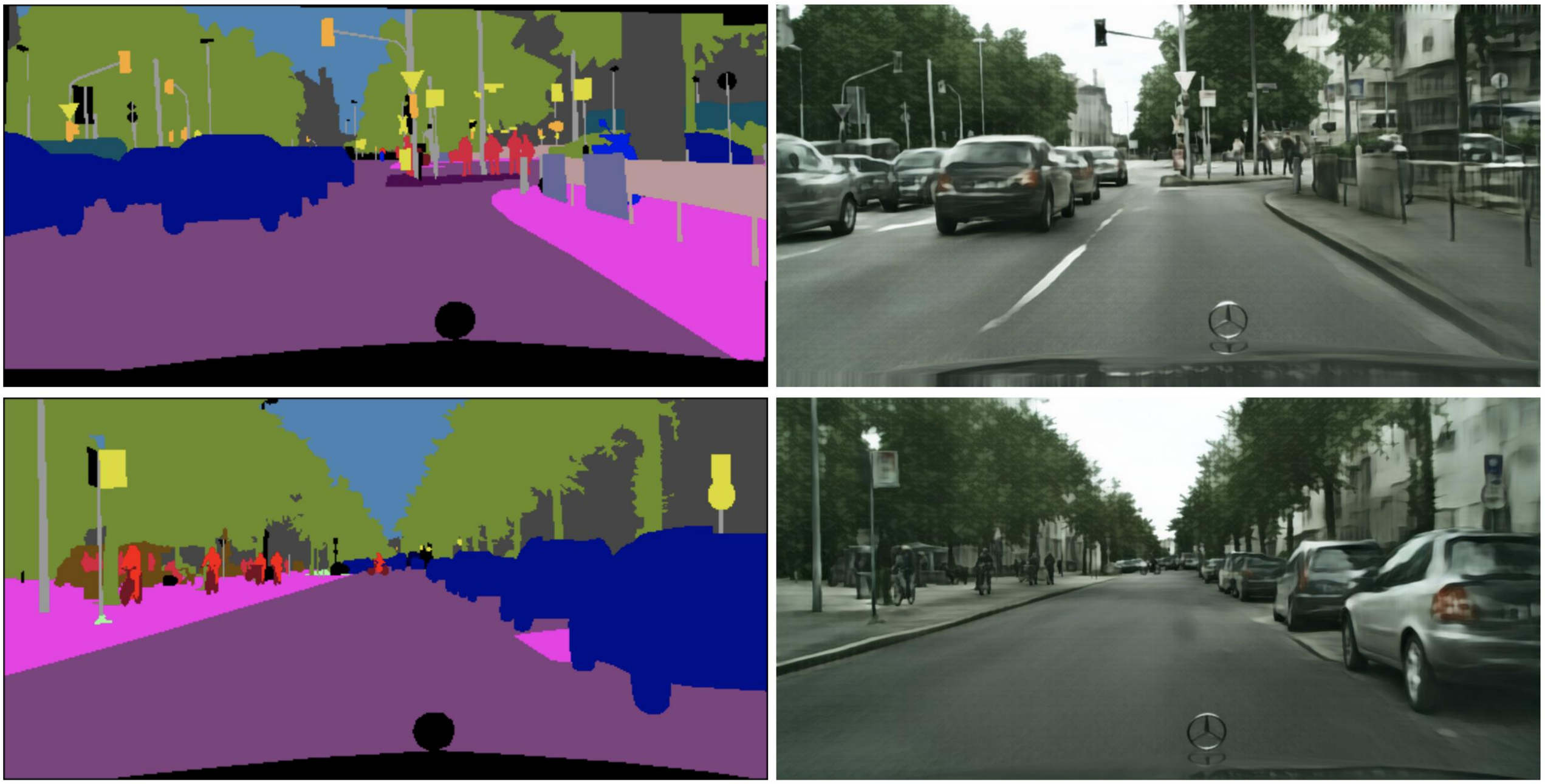
- Google Faculty Research Award
- 35 Innovators under 35 in China by MIT Review
- 2nd Worldwide in ACM-ICPC World Finals
- Co-founded Lino and DeepMirror

Art by Human Creation



Art by AI

Photographic image synthesis



Input semantic layouts

Synthesized images

Qifeng Chen and Vladlen Koltun. Photographic Image Synthesis with Cascaded Refinement Networks. ICCV 2017

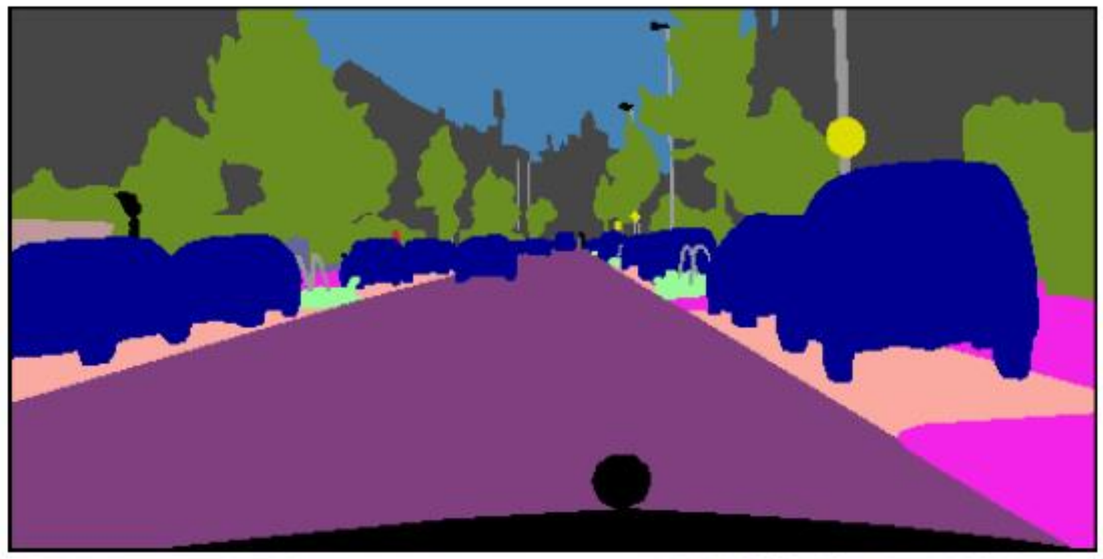
Motivation

- Computer graphics
  - Alternative route to photorealism
  - Capture photographic appearance
  - Fast image synthesis

CARLA
Dosovitskiy et al., CoRL 2017

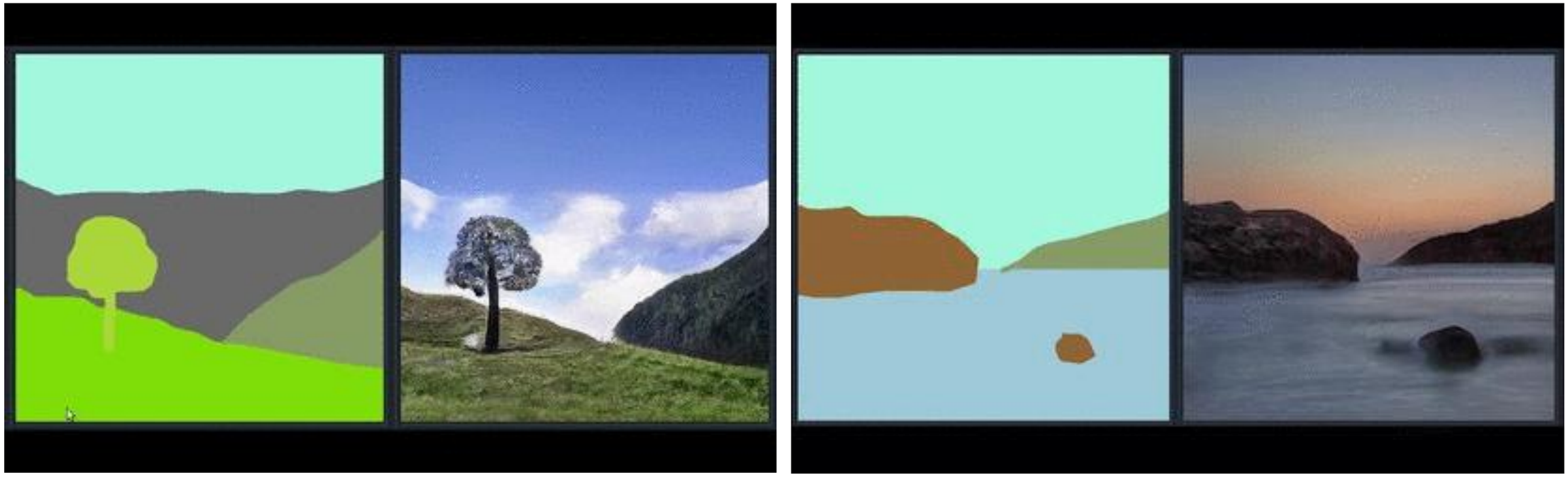
Motivation

- Artificial Intelligence
  - Visual Imagination



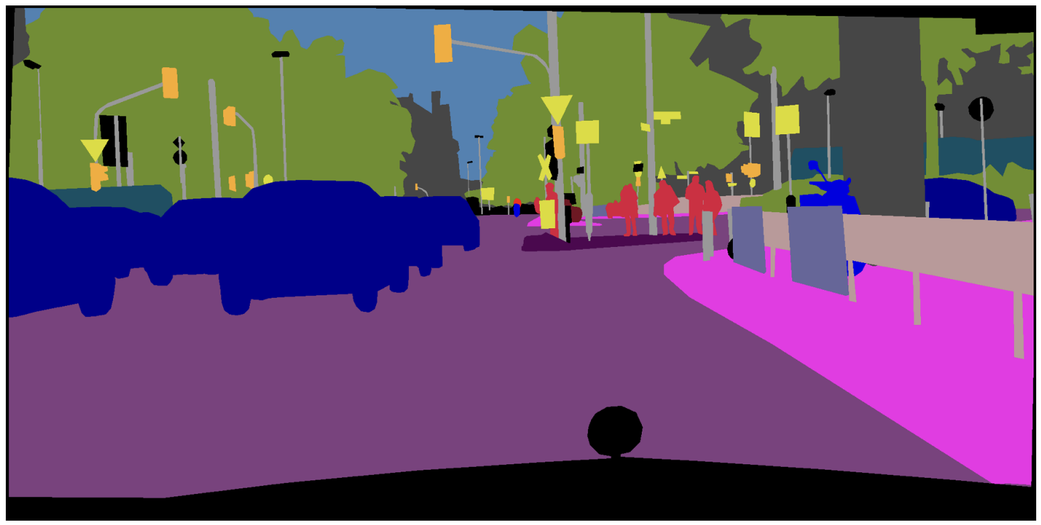
Application

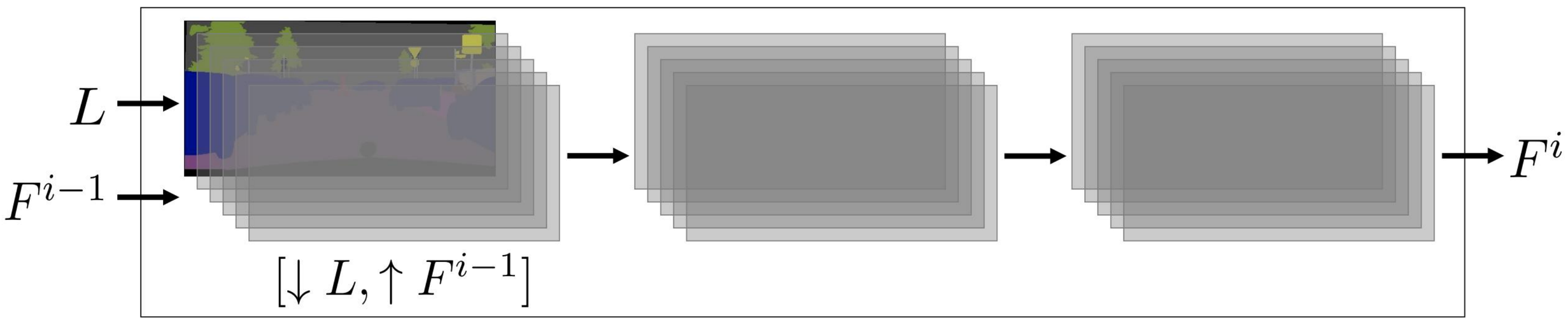
- An AI painting tool for general public



https://nvlabs.github.io/SPADE/

Cascaded refinement networks

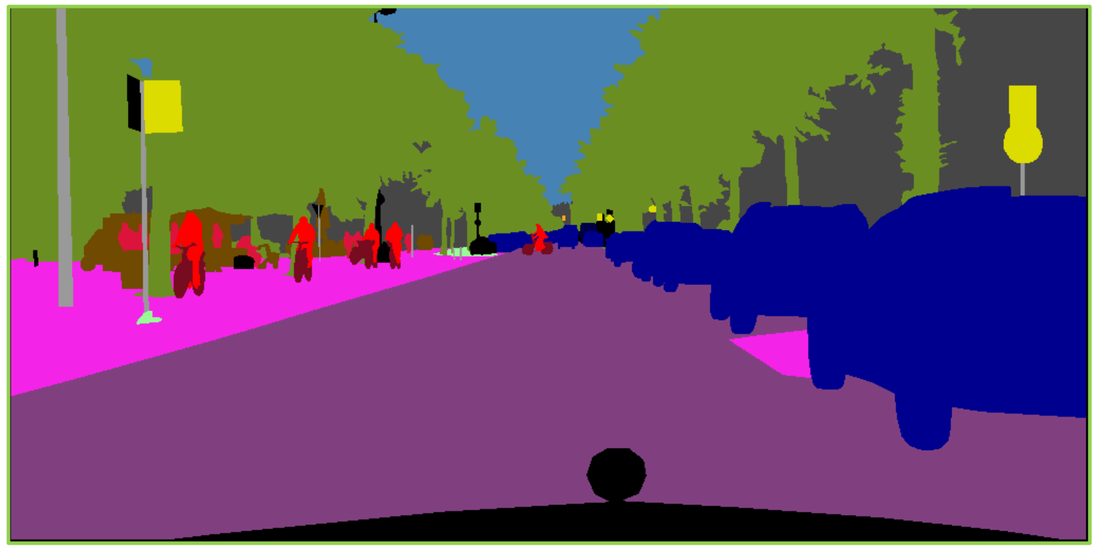




High Resolution

Semi-parametric Image Synthesis

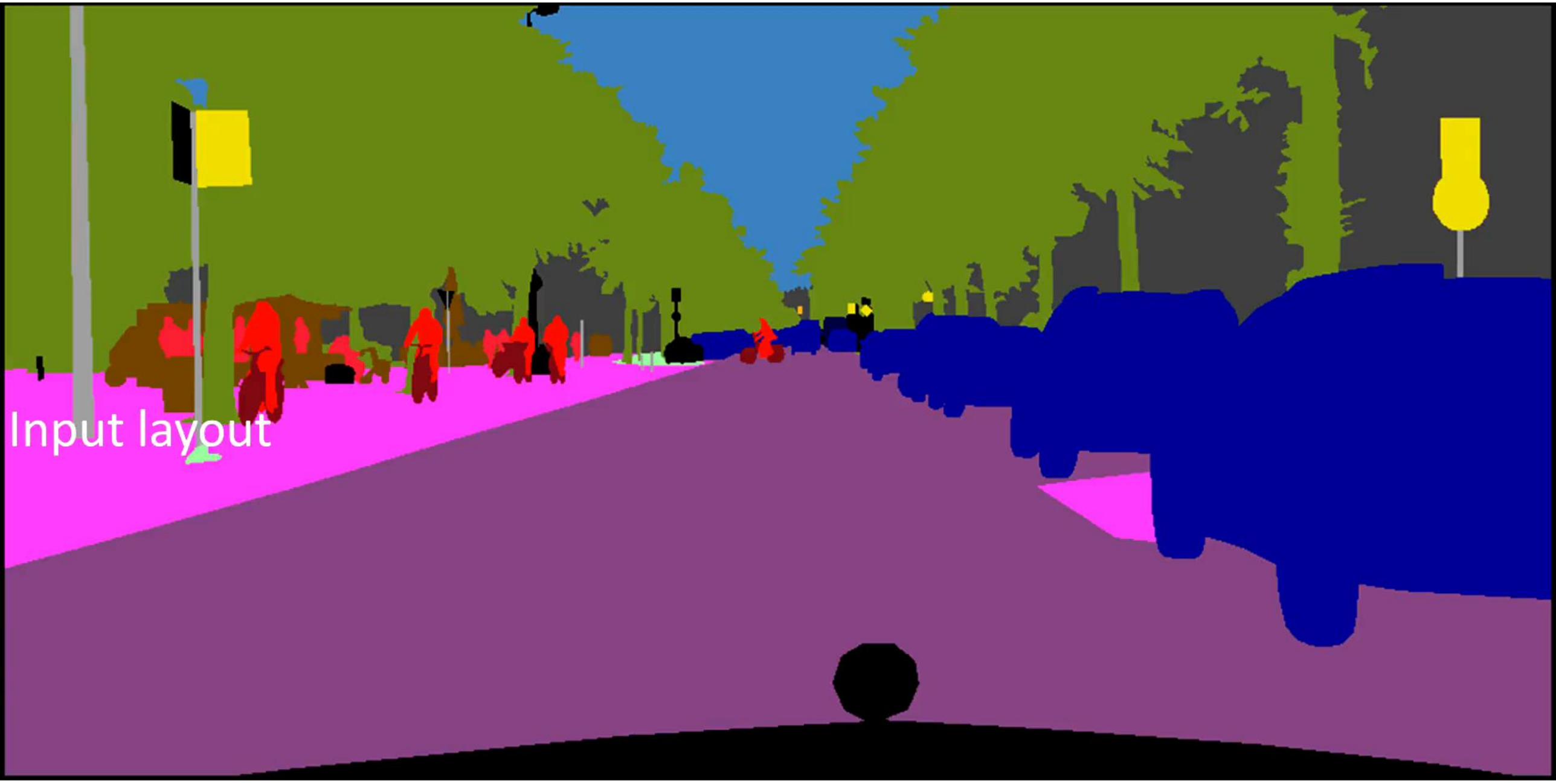
Semantic layouts



Our result

Xiaojuan Qi, Qifeng Chen, Jiaya Jia, and Vladlen Koltun Semi-parametric Image Synthesis. CVPR 2018

Results



Results

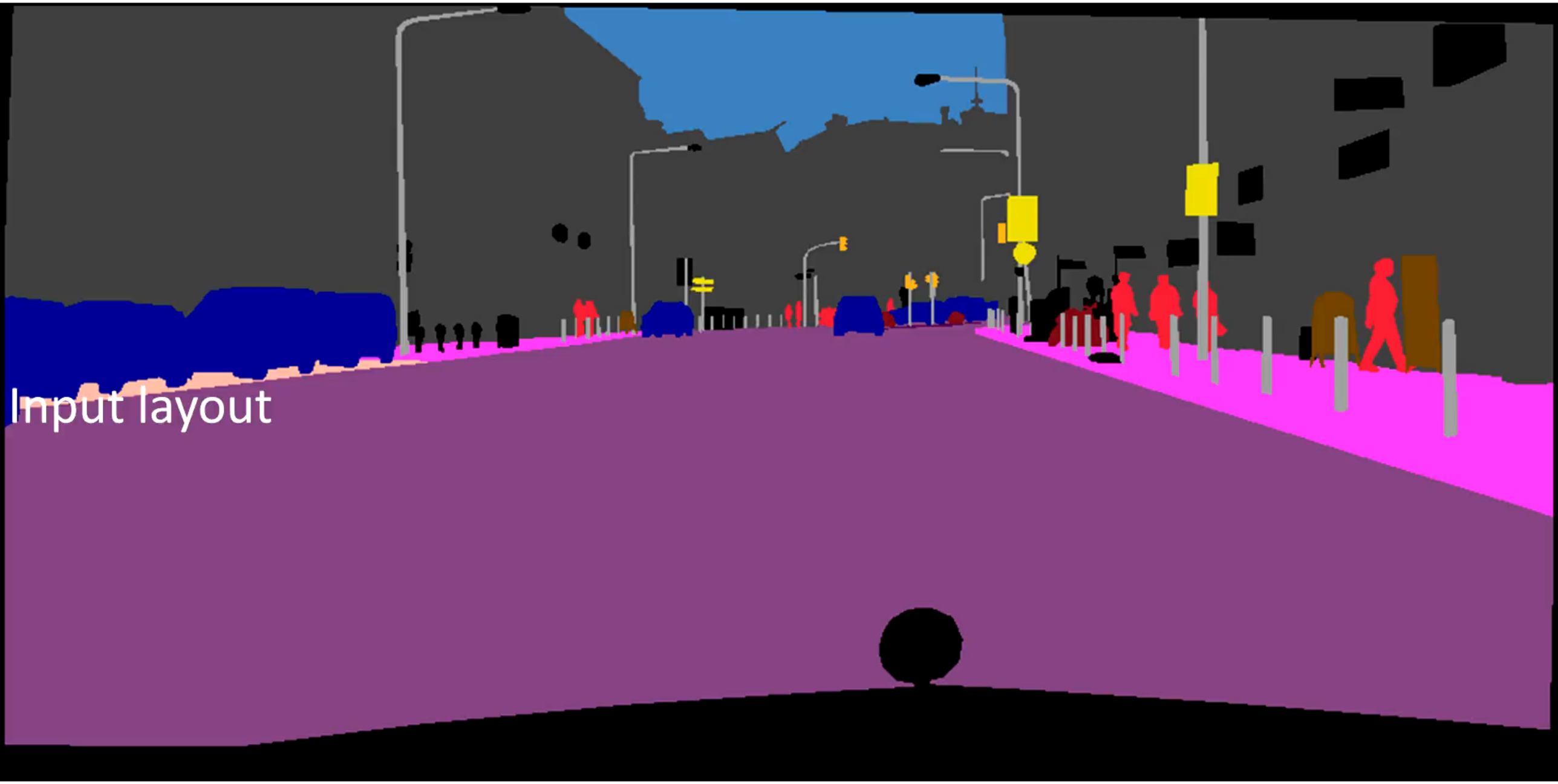
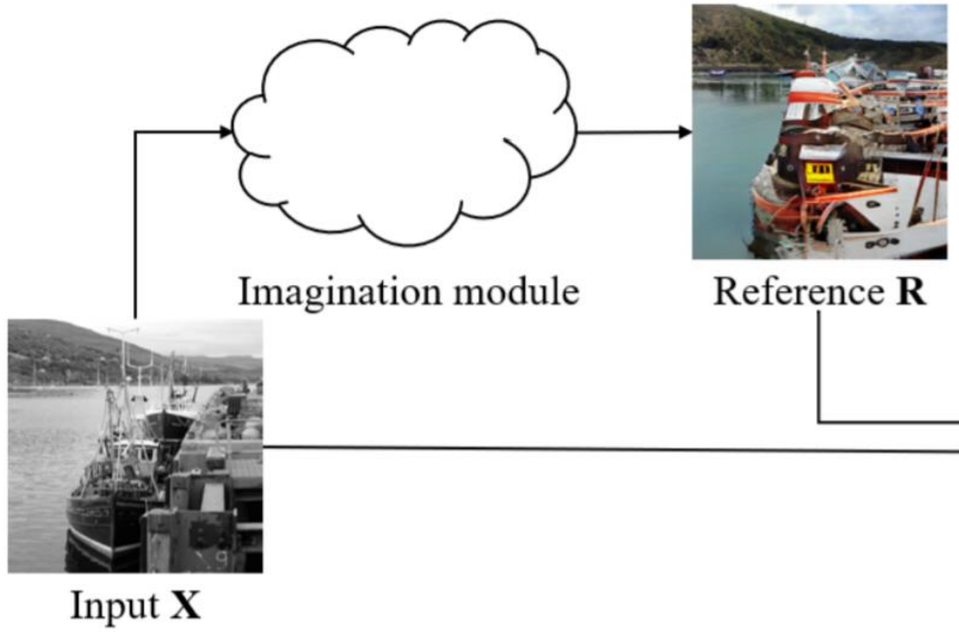


Image Colorization by Imagination



Video Inpainting

Input

Results

Tengfei Wang, Hao Ouyang, and Qifeng Chen, “Image Inpainting with External-internal Learning and Monochromic Bottleneck,” CVPR 2021
Hao Ouyang, Tengfei Wang, Qifeng Chen, “Internal Video Inpainting by Implicit Long-range Propagation,” ICCV 2021

Learning to Dance

Self-supervised Dance Video Synthesis Conditioned on Music

Xuanchi Ren, Haoran Li, Zijian Huang, Qifeng Chen

HKUST

Xuanchi Ren, Haoran Li, Zijian Huang, and Qifeng Chen, “Self-supervised Dance Video Synthesis Conditioned on Music,” ACM MM 2020

Multimodal Invertibility

Seeing Motion in the Dark

iPhone X video

Sony RX100 VI video

SID (Chen et al., CVPR18)

Ours

Conclusion

- AI empowers a new for visual content generation
  - Semantic Image Synthesis
  - Video Inpainting
  - Low-light imaging and videography
  - Dance Music Video Creation
  - Multimodal Invertibility

Thank You

https://cqf.io