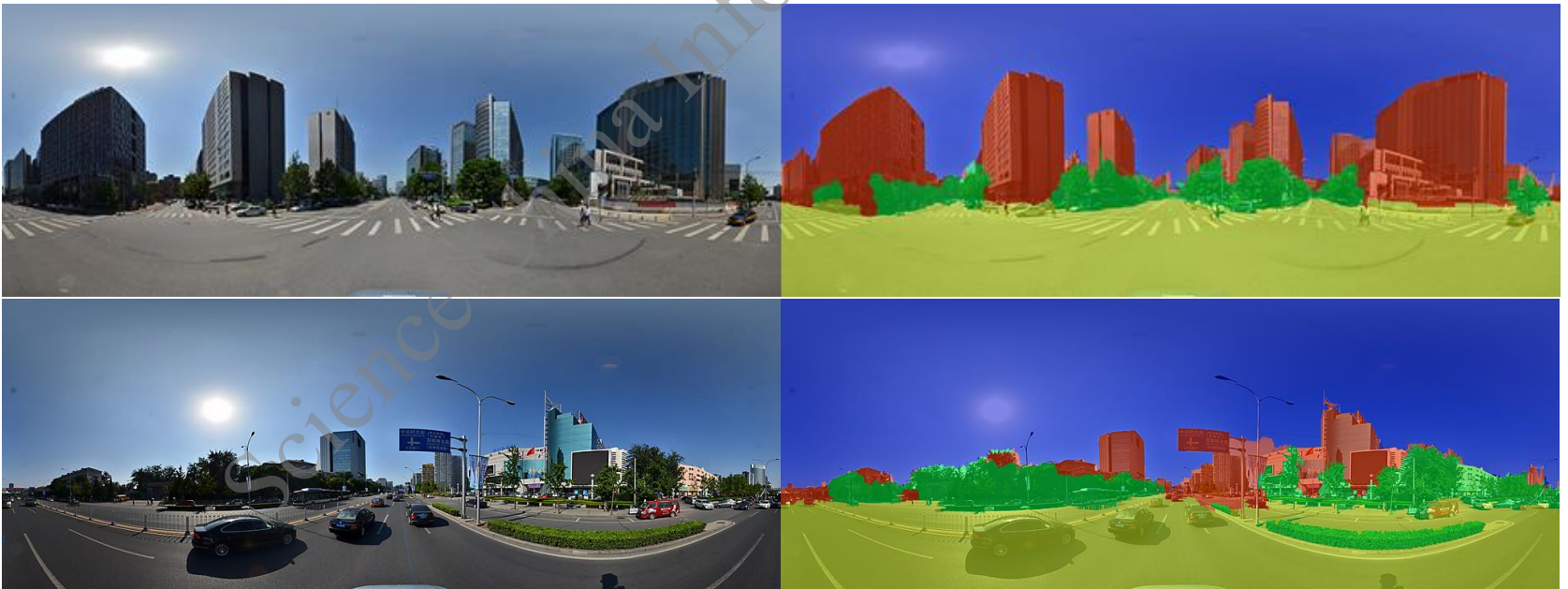# Semantic Segmentation of High-resolution Images

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Motivation

- Semantic segmentation provides pixel-wise classification result for input images
  - E.g. sky, road, building, etc.
- Important for image understanding

Related works

- Semantic segmentation has been studied for years and can achieve satisfactory results.

- Representative works:
  - Supervised learning based method [Carneiro et al. 2007]
  - Region based method [Gould et al. 2009]
  - Hierarchical features [Farabet et al. 2013]
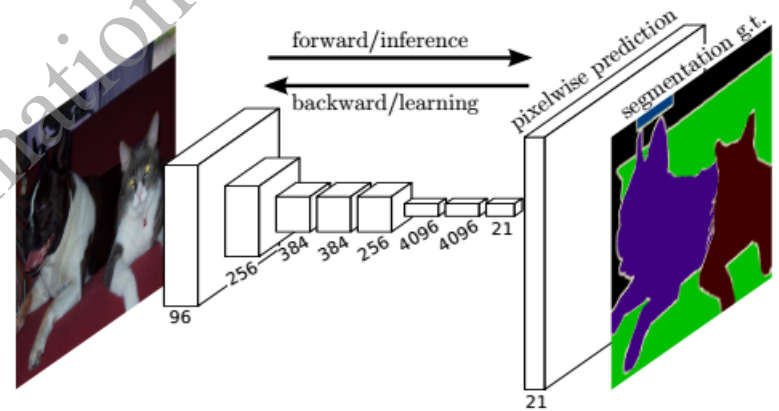 - Convolutional neural networks (CNNs) [Long et al. 2015]

Related works

- CNN-based method by Long et al.
 - Achieves ~70% pixel-level accuracy on public dataset
- Problem
  - Requires large video memory for training and testing
  - 4.9 GB for images with resolution 1600 * 900
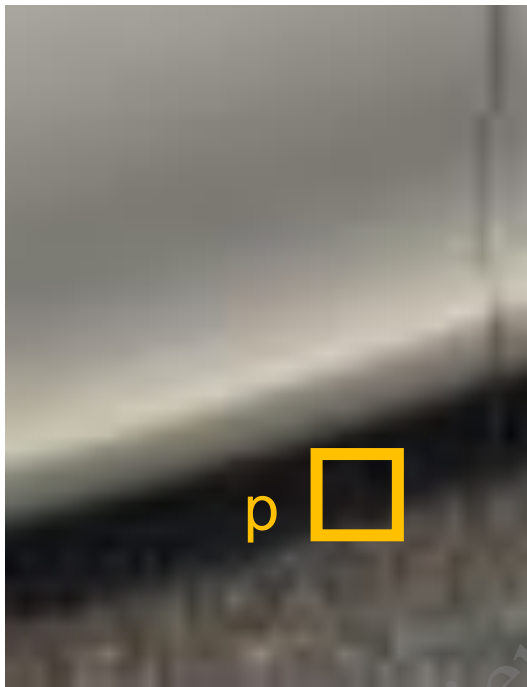 - Unable to handle high-resolution images

Our method

- Motivation
  - The first method for high-resolution images
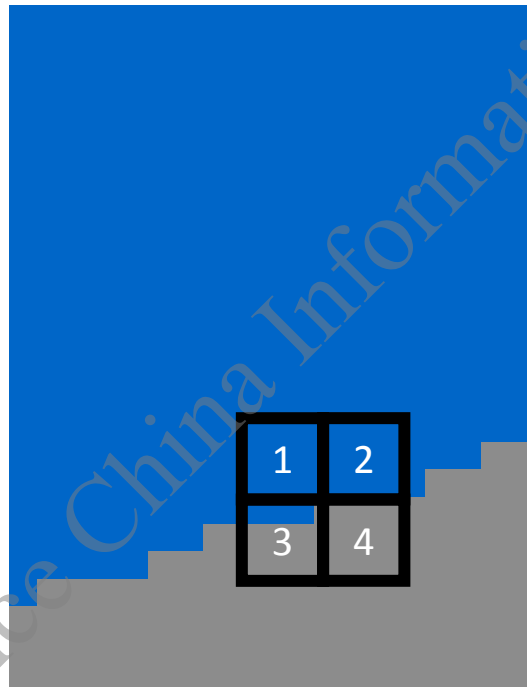- Pipeline

1. Downsampling

2. Generate low-resolution semantic segmentation image

3. Modified Joint bilateral upsampling
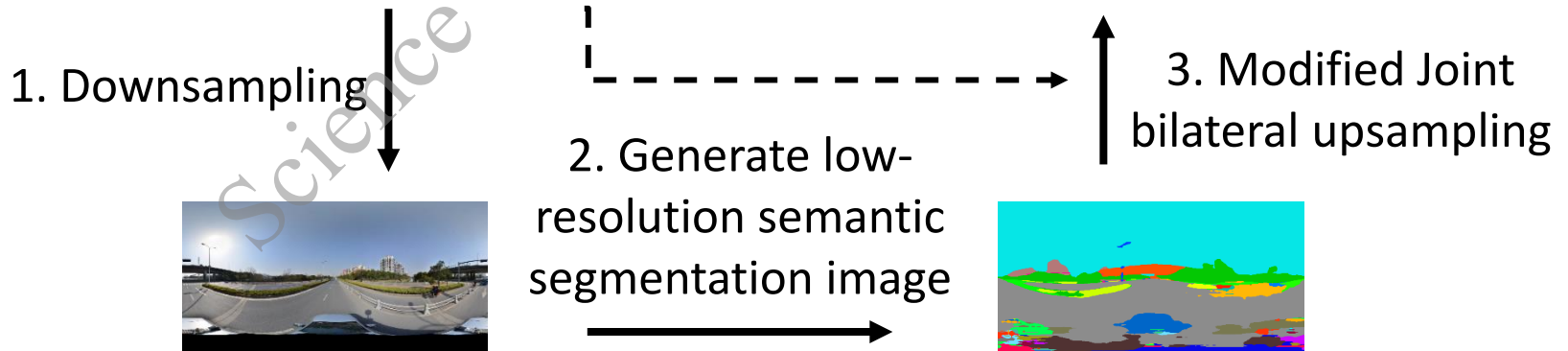
Modified joint bilateral upsampling

High-res input image

Low-res semantic seg.

Pixel	Joint Bilateral Filter Weight	Semantic Label
1	0.2	Sky
2	0.1	Sky
3	0.5	Road
4	0.7	Road

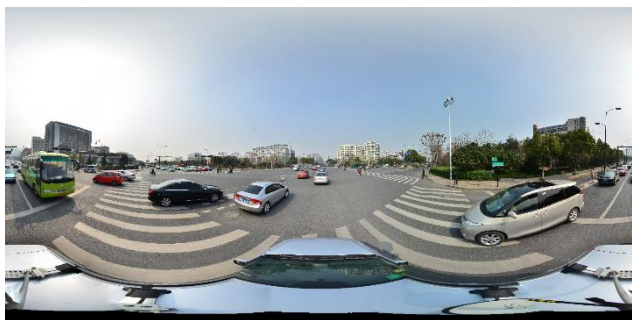| Semantic Label	Sum of Weights
Sky	0.3
Road	1.2

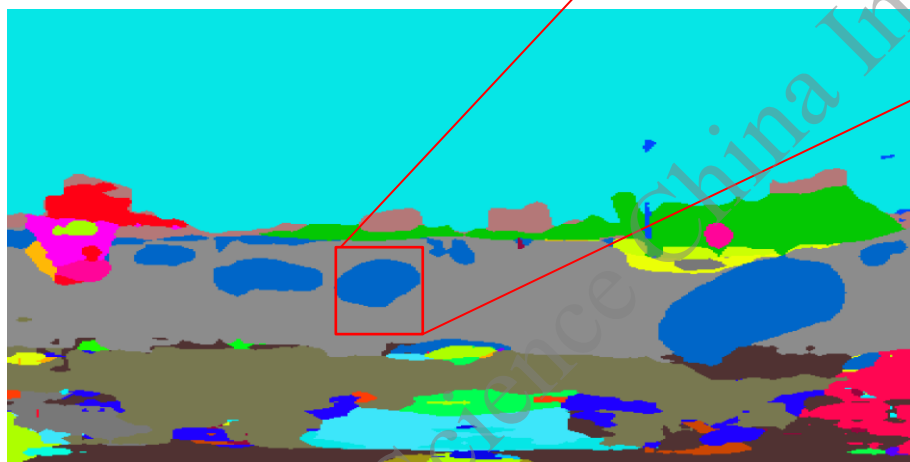# Results
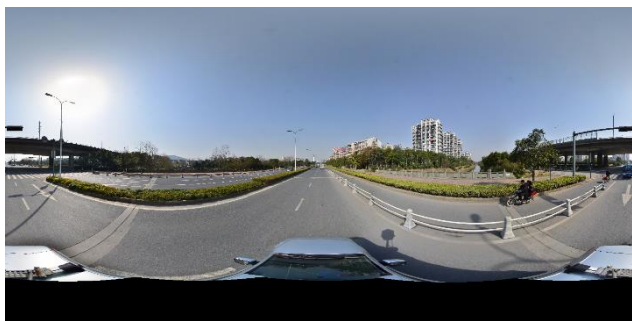
Input Image
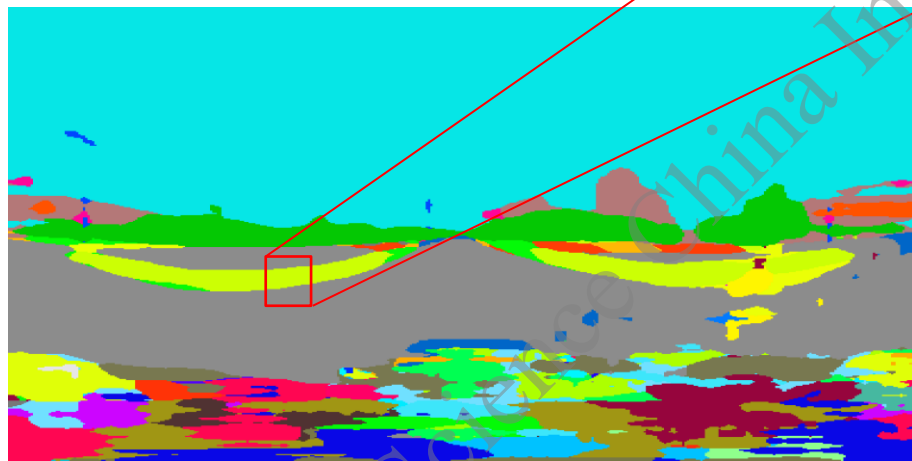
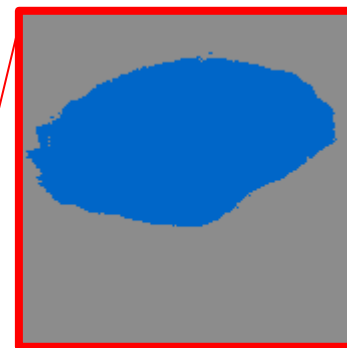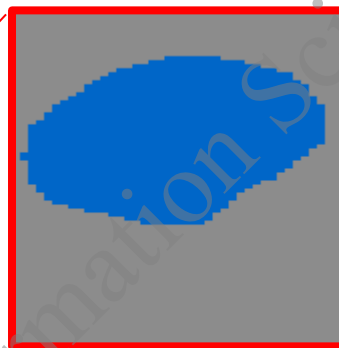Low-res result
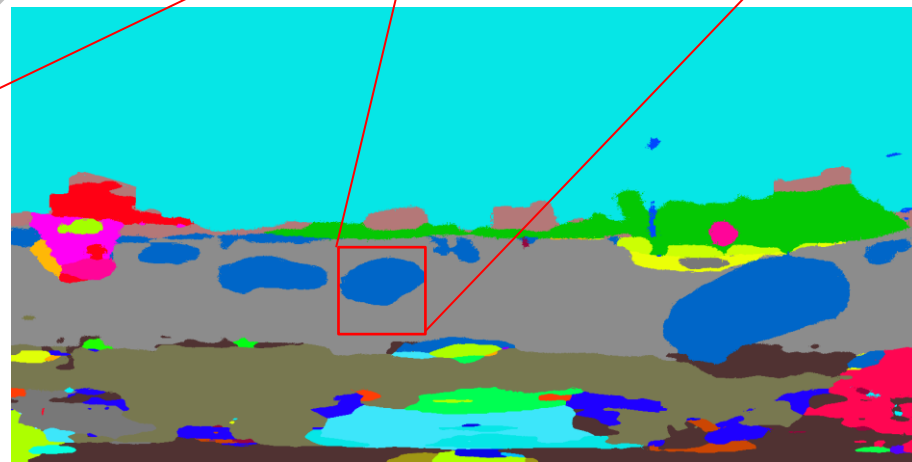by CNN based method

Our result

Results

Input Image

Low-res result
by CNN based method

Our result

Conclusion

- the first semantic segmentation method for high-resolution images

- a modified joint bilateral upsampling algorithm

- largely reduces memory consumption

Thank you!