New trends for coherent and integrated 3D scene understanding

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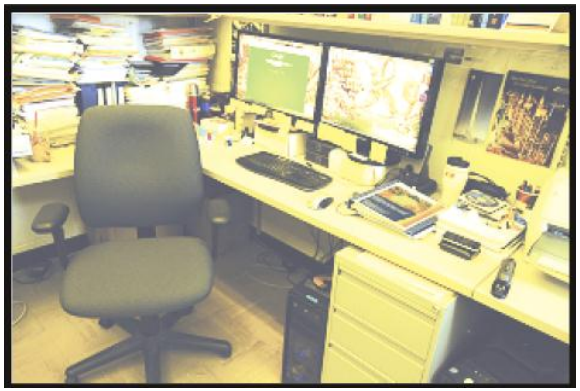
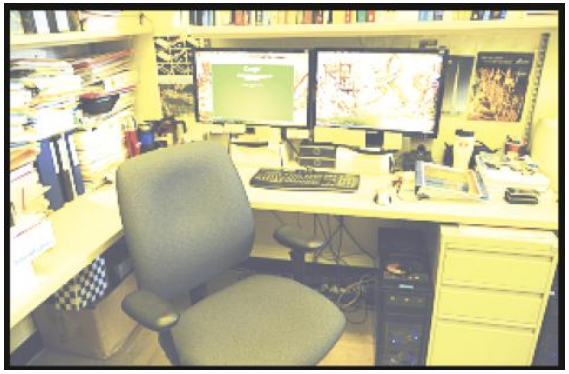
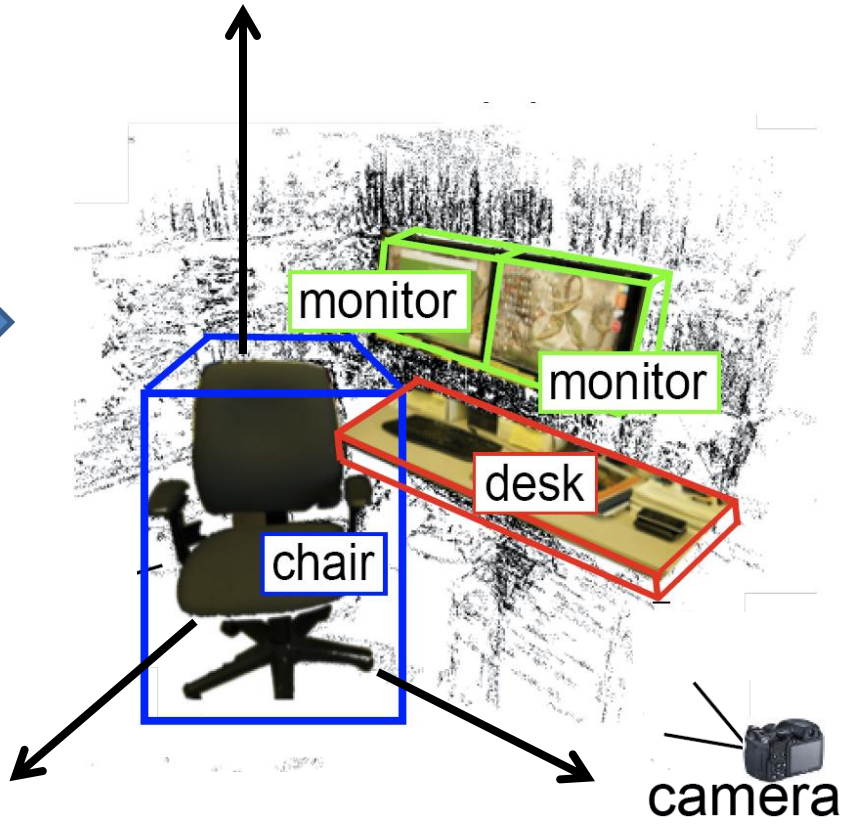
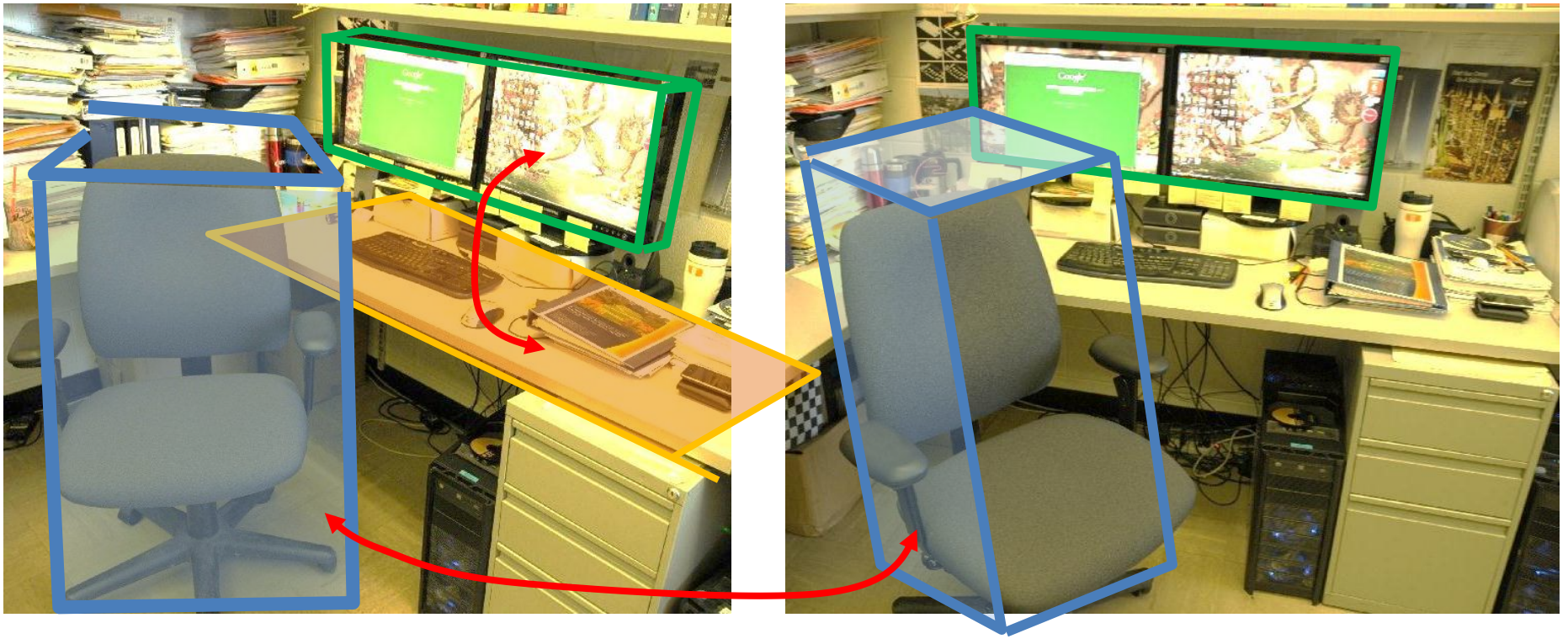
The problem: joint 3D scene reconstruction and recognition







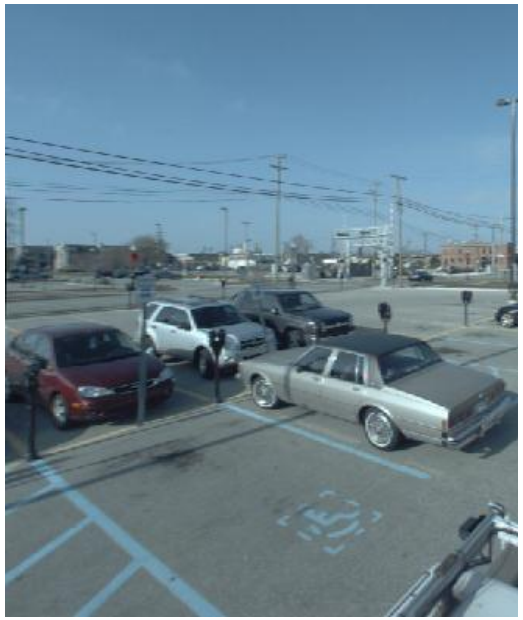
The intuition



- High level semantics help solving geometrical ambiguities
- Object **detections** and their **geometrical attributes** provide constraints for estimating the scene layout
  - Geometrical attributes: Pose -- Scale -- 3D shape

Savarese, Fei-Fei, ICCV 07
Savarese, Fei-Fei, ECCV 08
Su et al, ICCV 2009; Sun, et al, CVPR 2009
Sun et al, ECCV 2010

Joint 3D scene reconstruction and recognition from 1 or N image



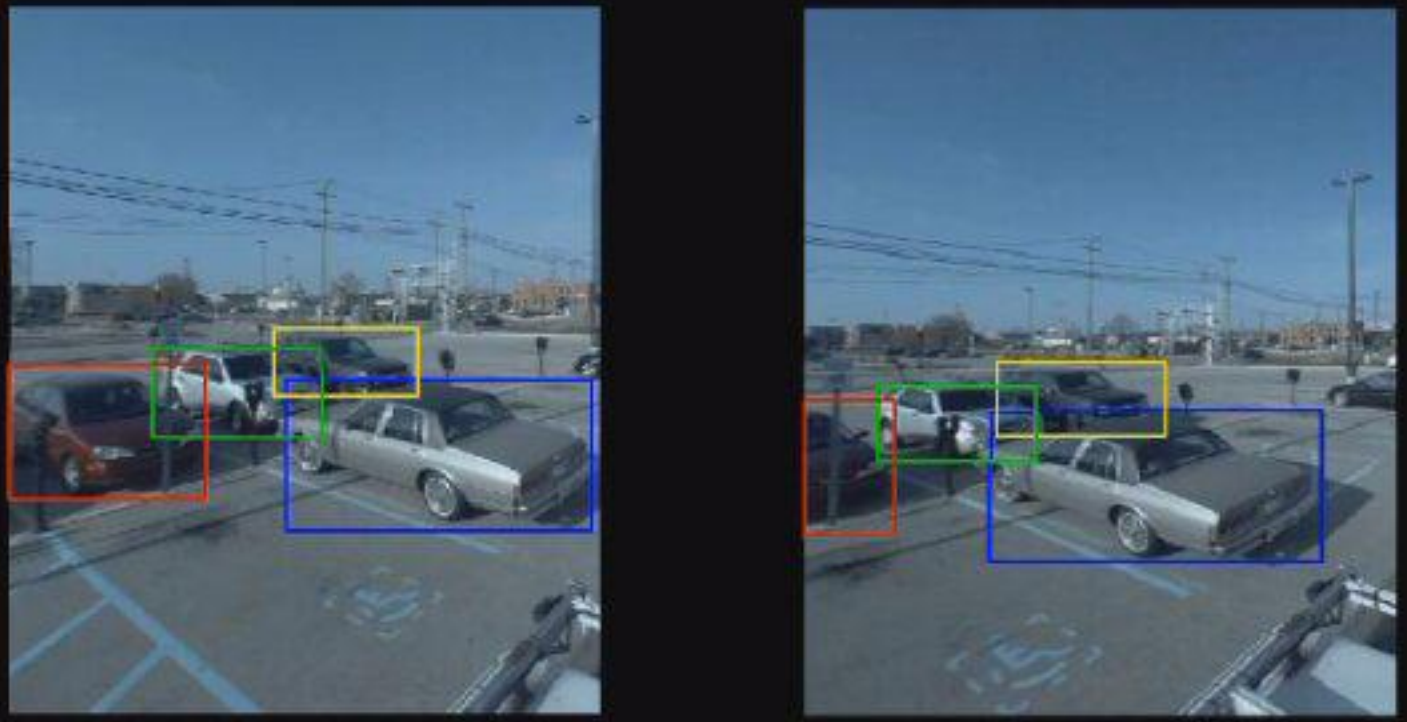
Bao, Sun, Savarese CVPR 2010
Sun, Bao, Savarese, BMVC 2010

Semantic Structure From Motion,
Bao, Sun, Savarese CVPR 2011

Applying SSFM

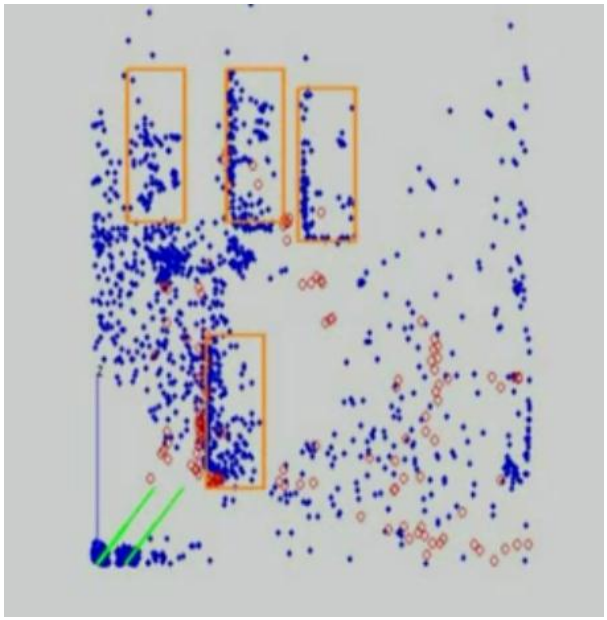
Detection results improved

Object correspondences are established across views



Each colored bounding box represents a unique Car

Joint 3D scene reconstruction and recognition from 1 or N image

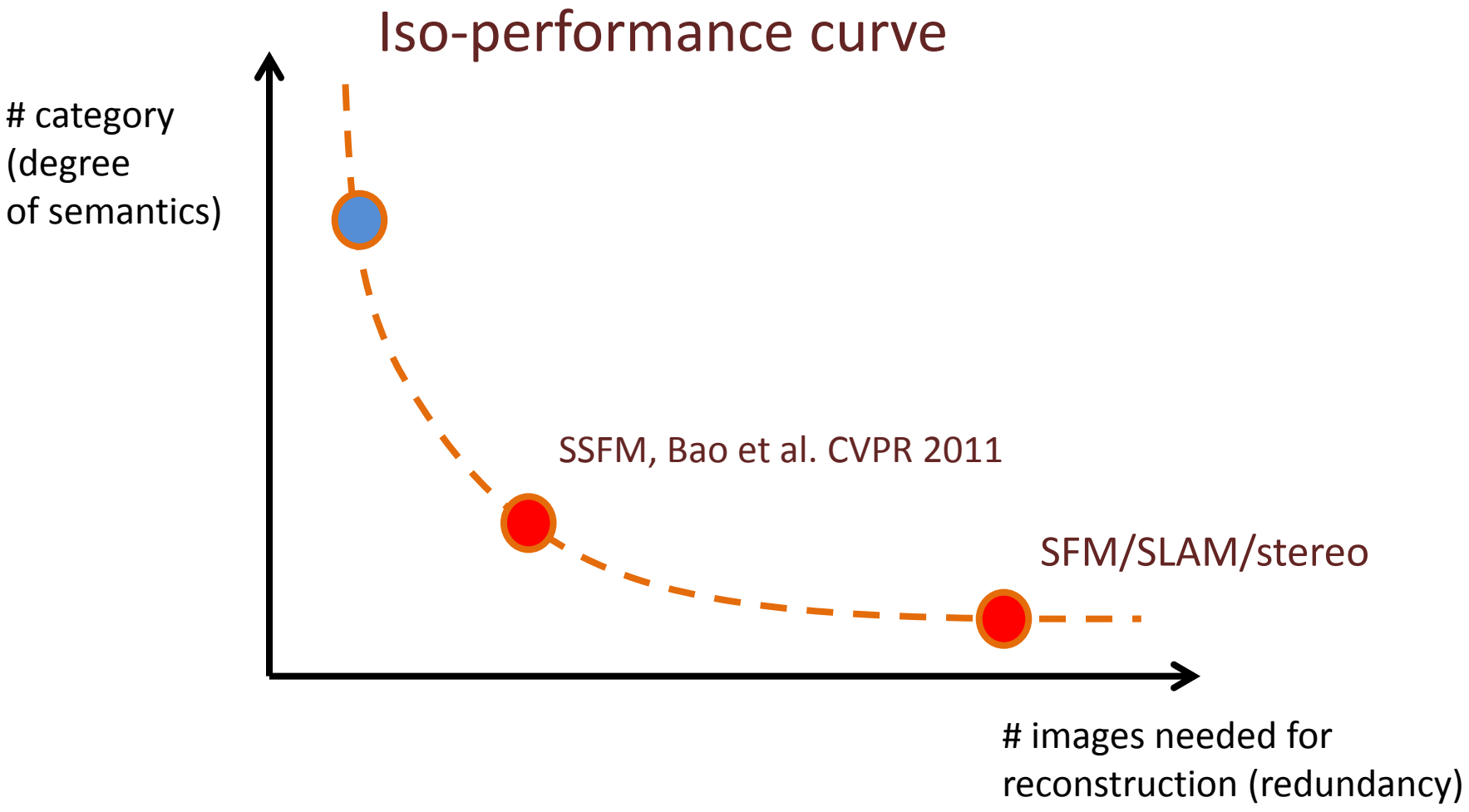


Bao, Sun, Savarese CVPR 2010
Sun, Bao, Savarese, BMVC 2010

Semantic Structure From Motion,
Bao, Sun, Savarese CVPR 2011

- By injecting semantics, few images are necessary to obtain accurate 3D reconstructions
- This has the potential to initiate a new trend in computer vision

Large scale object categorization meets 3D reconstruction



Thank you!