13-CVPR- Understanding Indoor Scenes using 3D Geometric Phrases

# Scene classifier

#### 05-CVPR- A Bayesian hierarchical model for learning natural scene categories

#### 06-CVPR- Beyond bags of features: Spatial pyramid matching for recognizing natural scene categories

#### 09-CVPR- Recognizing indoor scenes

#### 11-ICCV- Scene recognition and weakly supervised object localization with deformable part-based models

# Layout estimator

#### 09-ICCV- Recovering the spatial layout of cluttered room

#### 10-NIPS- Estimating spatial layout of rooms using volumetric reasoning about objects and surfaces

#### 10-ECCV- Discriminative learning with latent variables for cluttered indoor scene understanding

#### 10-CVPR- Toward coherent object detection and scene layout understanding

# Object detector

#### 04-ECCV- Combined object categorization and segmentation with an implicit shape model

#### 05-CVPR- Histograms of oriented gradients for human detection

#### 10-PAMI- Object detection with discriminatively trained part based models

#### 12-CVPR- Estimating the aspect layout of object categories

# Previous Method for co-occurrence

#### 11-IJCV- Discriminative models for multi-class object layout

#### 11-CVPR- Recognition using visual phrases

# Powerful feature representation

#### 04-IJCV- Distinctive image features from scale-invariant keypoints

#### 05-CVPR- Histograms of oriented gradients for human detection

# 2D spatial interactions via contextual features

#### 10-PAMI- Object detection with discriminatively trained part based models

#### 11-IJCV- Discriminative models for multi-class object layout

#### 11-CVPR- Recognition using visual phrases

#### 12-CVPR-Automatic discovery of groups of objects for scene understanding

# Geometric configuration of a scene

#### 11-NIPS- Joint 3d estimation of objects and scene layout

#### 10-ECCV-Blocks world revisited: Image understanding using qualitative geometry and mechanics

#### 10-CVPR-Toward coherent object detection and scene layout understanding

#### 11-CVPR-Semantic structure from motion

# Indoor layout estimation

#### 09-ICCV- Recovering the spatial layout of cluttered room (A cubic room representation)

#### 10-ECCV-Thinking inside the box: Using appearance models and context based on room geometry (to improve object detection)

#### 10-ECCV-Discriminative learning with latent variables for cluttered indoor scene understanding

#### 10-NIPS-Estimating spatial layout of rooms using volumetric reasoning about objects and surfaces (consistency between layout and objects)

#### 11-NIPS-Image parsing via stochastic scene grammar (consistency between layout and objects)

#### 12-CVPR-Bayesian geometric modeling of indoor scenes

#### 12-ECCV-Efficient exact inference for 3d indoor scene understanding

#### 12-BMVC-Data-driven scene understanding from 3d models

#### 12-ECCV-People watching: Human actions as a cue for single-view geometry (incorporate human pose into layout)

# Image scene categories

#### 05-CVPR- A Bayesian hierarchical model for learning natural scene categories

#### 11-ICCV-Scene recognition and weakly supervised object localization with deformable part-based models

#### 09-CVPR-Recognizing indoor scenes

#### 06-CVPR-Beyond bags of features: Spatial pyramid matching for recognizing natural scene categories

#### 10-NIPS-Object bank: A high level image representation for scene classification & semantic feature

#### 11-ICCV-Scene recognition and weakly supervised object localization with deformable part-based models

# Observation Features

#### 06-CVPR-Beyond bags of features: Spatial pyramid matching for recognizing natural scene categories (Spatial pyramid matching)

#### 09-ICCV-Recovering the spatial layout of cluttered room (Indoor layout estimator)

#### 10-PAMI- Object detection with discriminatively trained part based models

#### 11-IJCV-Discriminative models for multi-class object layout

# Geometric and Semantic Context Features

# Interaction Features

# 2D Spatial relationships

#### 11-CVPR-Recognition using visual phrases

#### 12-CVPR-Automatic discovery of groups of objects for scene understanding

#### 11-IJCV-Discriminative models for multi-class object layout

# Cuboid model [www.ikea.com](http://www.ikea.com)

#### 12-CVPR-Bayesian geometric modeling of indoor scenes

#### 10-ECCV-Thinking inside the box: Using appearance models and context based on room geometry

# Layout (using 5 orthogonal faces)

#### 09-ICCV-Recovering the spatial layout of cluttered room

#### 10-NIPS-Estimating spatial layout of rooms using volumetric reasoning about objects and surfaces

#### 10-ECCV-Discriminative learning with latent variables for cluttered indoor scene understanding

# Estimated use using three orthogonal vanishing points

#### 09-ICCV-Recovering the spatial layout of cluttered room

# 3D cuboid Detection

#### 98—Convergence properties of the nelder–mead simplex method in low dimensions (A simplex search method)

# The model

### Notation

##### 3DGPs:

##### Para :

##### Parse graph:

Scene properties:

Nodes set

### Description of each part

##### Scene label: SPM

##### Layout: …

##### Object detection: DPM