SketchyScene: Richly-Annotated Scene Sketches

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Motivation & Contribution

- Sketch understanding is important and has lots of applications in computer vision and graphics;
- Most existing sketch datasets and sketch tasks are at stroke- or object-level;
- Scene sketch understanding leads to a deeper and richer reasoning about sketched visual forms.
- **The first large-scale dataset of scene sketches, termed *SketchyScene*, is introduced.**

https://github.com/SketchyScene/SketchyScene

SketchyScene: Data Collection

Step1: Data Preparation

- Object sketches from 45 categories are collected.

Step2: Scene Sketch Synthesis

- 7,264 scene templates are synthesized by a customary, web-based application – *USketch* (Fig. 1).

Step3: Annotation and Data Augmentation

- More scene sketches are generated by replacing the object sketches with the rest components.

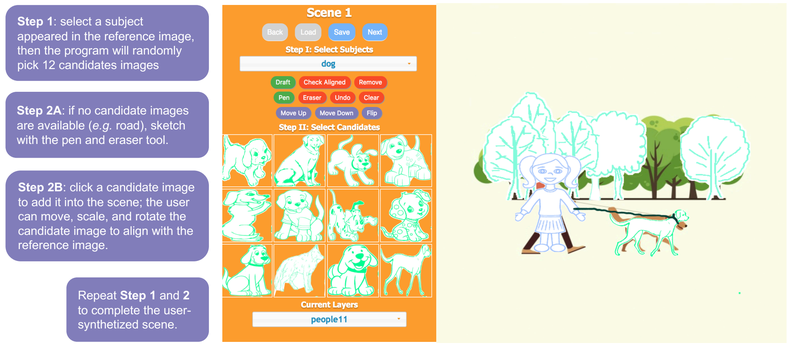
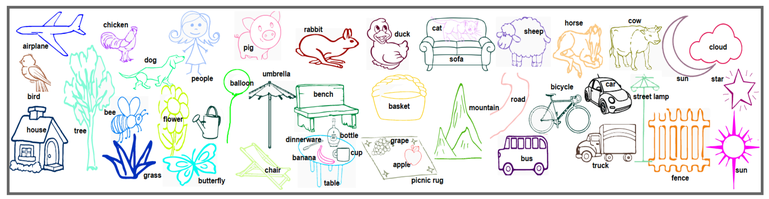


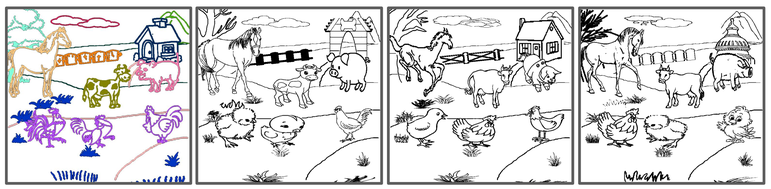
Figure 1: Interface and work flow of *USketch*.

SketchyScene: Dataset Statistics



A. Representative objet sketches of ***SketchyScene.***

B. From left to right: reference image, synthesized scene sketch, ground-truth of semantic and instance segmentation.



C. Examples of augmented scene sketches based on a scene sketch template (the 1st image).

Figure 2: Overview of dataset *SketchyScene*.

- **7,264** unique scene templates. Each contains at least **3** object instances;
- On average there are **16** instances, **6** object classes, and **7** occluded instances per template;
- **29,056** scene sketches after data augmentation;
- **11,316** object sketches spanning **44** categories;
- **4,730** unique reference cartoon style images;
- **100%** accurate semantic-level and instance-level segmentation annotations.

SketchyScene can be further augmented:
Object sketches can be replaced by sketches from other resources.

Sketch Scene Segmentation

Problem Definition
The problem of semantic segmentation in scene sketches is defined as predicting a class label for each pixel whose value is 0 since only black pixels convey semantic information.

Challenges

- Classes are imbalanced , i.e., large blank areas;
- Occluded objects are hard to segment due to lack of visual cues.

Key – ignore background class during modeling.

Quantitative results:

Figure 3: Visualizations of our segmentation results. Left: 3 examples with good segmentation results; right: one failure case.

Applications

- Scene-level image retrieval;
- Sketch captioning and editing;
- Dynamic scene synthesis.

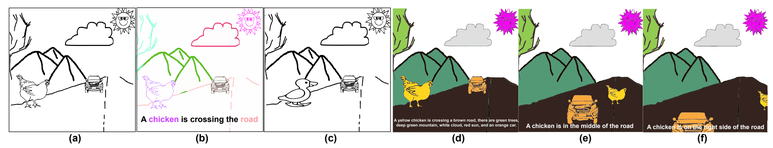


Figure 4: Examples of applications.