1/19/2019

① Add script notes to each slide.

② 20 minutes (#15-18 slides) Show

③ Use SHREC'18 track slides template

④ provide a highlighted / noted paper to Dr. Li for reference. to Important parts, sentences, words, and etc.

Sketch/Image-Based 3D Scene Retrieval: Benchmark, Algorithm, Evaluation

Hameed Abdul-Rashid[1], Juefei Yuan[1], Bo Li[1], Yijuan Lu[2]

Move down

1.
2.

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

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Outline

- Introduction — Related Work
- Benchmark
- ~~Evaluation~~ — this is part of benchmark.
- Method — only one proposed method.
- ~~Results~~ — Evaluation
- Conclusions and Future Work

Use the same name as the 2D Sene Sketch Query Dataset

Sort.

Insert outline slide before each section. Highlight the current one.

Introduction

- **2D Scene Sketch/Image-Based 3D Scene Retrieval (Scene_SBR_IBR)** focuses on retrieving relevant 3D scene models using scene sketches/image(s) as input
- **Motivation:**
  - Vast applications: 3D scene reconstruction, autonomous driving cars, 3D geometry video retrieval, and 3D AR/VR Entertainment
- **Challenges**
  - 2D sketches/images lack 3D scene information they are supposed to present
  - Semantic gap between 2D scene iconic sketches or realistic images and accurate 3D scene models
  - Brand new research topic in the field of sketch/image-based 3D object retrieval (Scene_SBR_IBR)
    - ✓ A query sketch/image contains several objects
    - ✓ Objects may overlap with each other
    - ✓ Relative context configurations among the objects
- To **promote** this challenging research direction, **we** built the most comprehensive and largest 2D scene sketch/image-based benchmark 3D scene retrieval benchmark, **Scene_SBR_IBR.**

Related work

[5] 3D Sene reconstruction

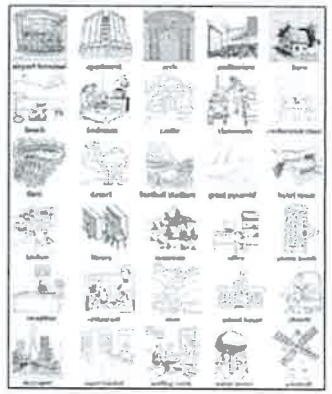
[52] 2D Sene datasets

? [1]

Scene_SBR_IBR Benchmark (1/3)

- 2D scene sketch dataset
  - SBR benchmark [21], augmented further with 500 sketches from Flickr and Google Images
  - 750 2D scene sketches
  - 30 classes (25 sketches per class)

[1]



[21] - J. Yuan and et al. SHREC'18 track: 2D scene sketch-based 3D scene retrieval. In 3DOR, pages 1–8, 2018

Fig. 1 Example 2D sketches (1 per class)

① Make each slide simple, not crowded.

② So, divide this slide into two separate ones.

Then benchmark { overview, motivation, building process (*), Benchmark details } One separate slide

Scene_SBR_IBR Benchmark (2/3)

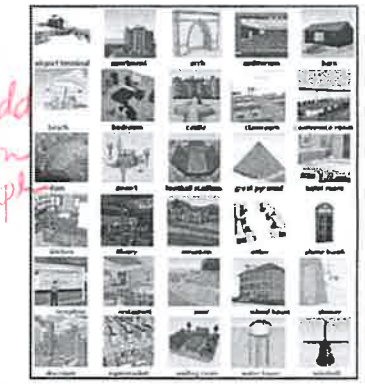
- 2D scene image dataset
  - Places88 [23]
  - 30,000 images
  - 30 classes (1,000 images per class)

[23] - B. Zhou and et al. Places: A 10 million image database for scene recognition. IEEE Trans. Pattern Anal. Mach. Intell., 40(6):1452–1464, 2018

Fig. 1 Example 2D scenes (1 per class)

Scene_SBR_IBR Benchmark (3/3)

- 3D scene model dataset
  - 3D Warehouse [1]
  - 3000 scene models
  - 30 classes (100 models per class)



[1] - 3D Warehouse. http://3dwarehouse.sketchup. com/?hl=en, 2018.

Fig. 1 Example 3D scenes (1 per class)

View and Majority Vote VMV-VGG

VMV-VGG

- Incorporates two different VGG-16 based models [10] (VGG1 and VGG2)
- M. Eitz and et al. How do humans sketch objects? ACM Trans. Graph., 31(4):44:1–44:10, 2012.
- (1) Scene view sampling
  - Automate sample through QMacro script
  - Uniformly sample 12 views along the equator of the sphere.
- (2) Data Augmentation
  - Perform random rotations, reflections and translations to augment each dataset's size by 500 times

[10] - K. Simonyan and A. Zisserman. Very deep convolutional networks for large-scale image recognition. CoRR, abs/1409.1556, 2014.

Move it to right after slide 7.

Ask Jiefei's comments during and after slides creation.

VMV-VGG contd.

- (3) Pre-Training on VGG1 and VGG2
  - For sketch-based retreival VGG1 is pretrained only on the TU-Berlin dataset [6] for 500 epochs
  - VGG2 is trained on the Places data set for just 100
  - #ASK We use Places to pretrain both VGG1 and VGG2 for the first 100 epochs
- (4) Fine-tuning
  - #ASK fine-tune the pre-trained VGG1/VGG2 models each 100/50 epochs

font.

font is different?

confirm with Jiefei

[6] M. Eitz and et al. How do humans sketch objects? ACM Trans. Graph., 31(4):44:1–44:10, 2012.

VMV-VGG contd.

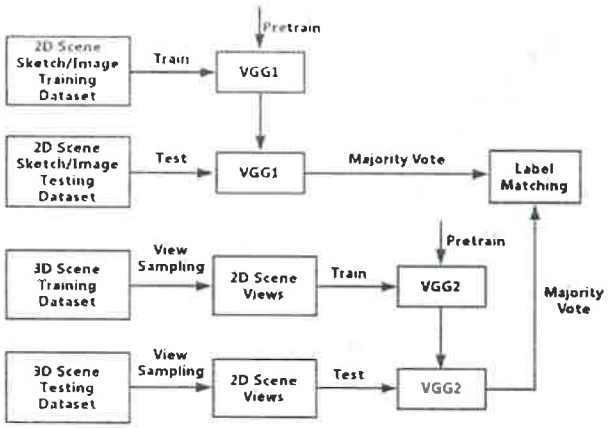
- (5) Sketch/Image/View Classification
  - We feed the well-trained model (VGG1/VGG2) alongside its corresponding testing query sketch/image or target scene view to obtain two classification vectors.
- (6) Majority vote-based label matching
  - We generate a rank list for each query by using a majority vote-based label matching method based on the query's classification vector and the target 3D scene's 13 classification vectors.

simplify.

Combine all the steps into one slide. Use short sentences to conclude each slide. Put complete presentations into corresponding script.

move up to after slide 6.

VMV-VGG Architecture



Evaluation

- **Seven** commonly adopted performance metrics in 3D model retrieval technique [2, 21]:
  - Precision-Recall plot (PR)
  - Nearest Neighbor (NN)
  - First Tier (FT)
  - Second Tier (ST)
  - E-Measures (E)
  - Discounted Cumulated Gain (DCG)
  - Average Precision (AP)
- We also have developed the code to compute them
  - http://orca.st.usm.edu/~bli/SceneIBR2018/data.html

Use [3] [4] or ignore them

[2] H. Abdul-Rashid and et al. SHREC'18 track: 2D scene image-based 3D scene retrieval. In 3DOR, pages 1–8, 2018.
[21] J. Yuan and et al. SHREC'18 track: 2D scene sketch-based 3D scene retrieval. In 3DOR, pages 1–8, 2018.

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Make sure you also add the meanings into scripts. In case there are questions from related attendees

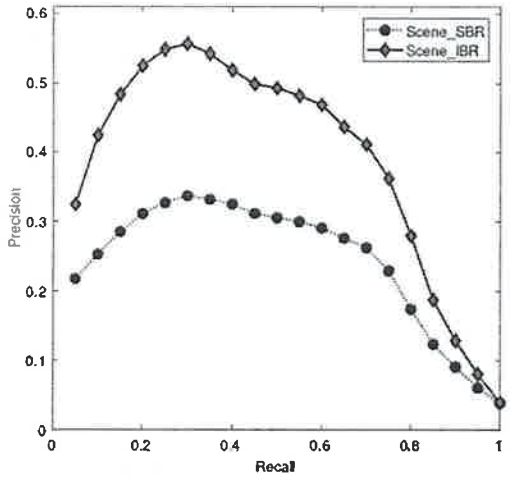

Figure 6. Precision-Recall diagram performance of our VMV-VGG on our Scene SBR IBR benchmark.

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Results: Performance Metrics

Benchmark	NN	FT	ST	E	DCG	AP
Scene_SBR	0.081	0.281	0.369	0.280	0.533	0.244
Scene_IBR	0.122	0.458	0.573	0.452	0.644	0.392

Performance metrics generated by running our VMV-VGG on our Scene SBR IBR benchmark.

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Conclusions

- **Objective:** To foster this challenging and interesting research direction: *Scene Sketch/Image-Based 3D Scene Retrieval*
- **Dataset:** Build ***the current largest*** 2D Scene sketch/image 3D scene retrieval benchmark
- **Method:** Baseline performance has been provided by VMV-VGG
- **Evaluation:** Performed a *comparative evaluation* on the accuracy
- **Impact:** Provided *the largest and most comprehensive common platform* for evaluating 2D scene sketch/image-based 3D scene retrieval

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Future Work

- Build a large-scale and/or multimodal 2D scene-based 3D scene retrieval benchmark
- Semantics-driven 2D scene image-based 3D scene retrieval

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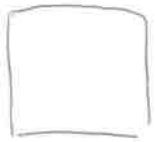
References slide



Thank you!

Q&A?

E-mail: bo.li@usm.edu

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