

Stereo Depth Estimation Network (SDE-Net)

Team members:

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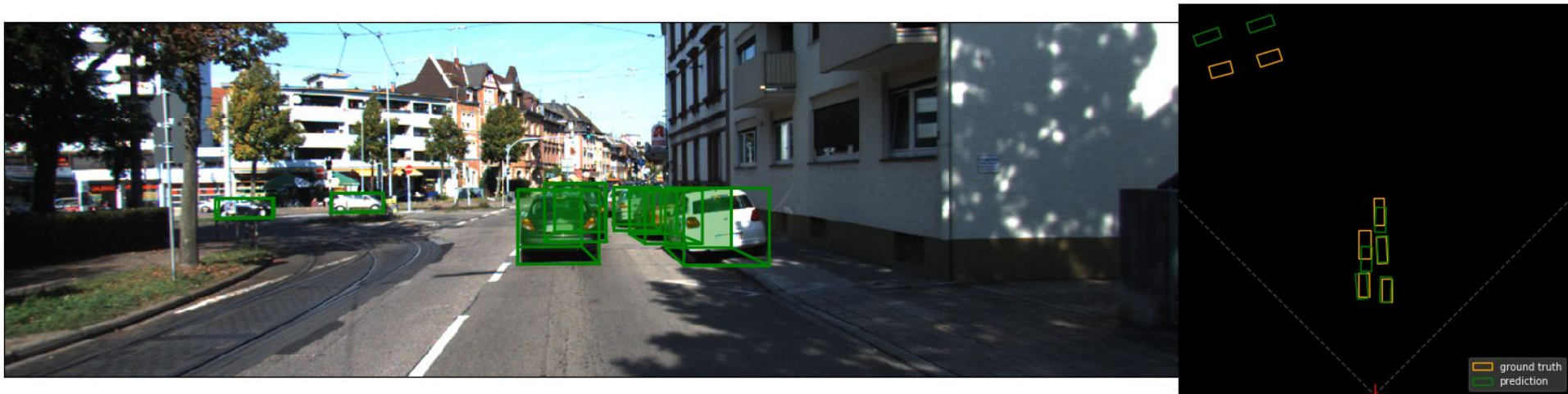
Bingkun Li

Robert Chang



Background

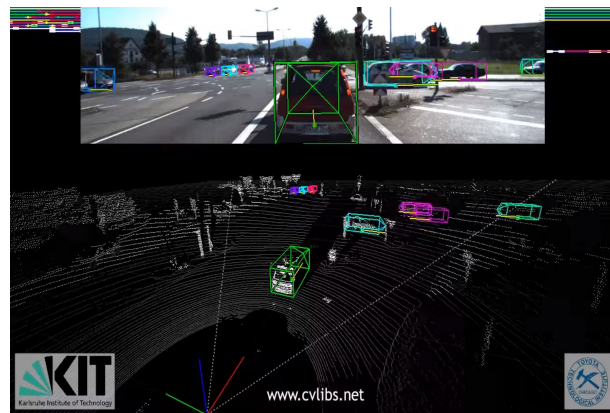
Depth estimation from stereo images is essential to computer vision applications, including autonomous driving for vehicles, 3D model reconstruction, and object detection and recognition



Datasets

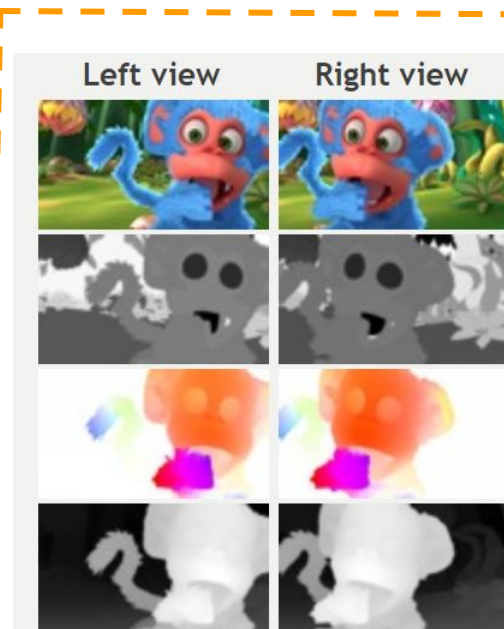
1. KITTI 2015:

- a **real-world** dataset with street views
- **200 training stereo image pairs** with sparse ground-truth disparities
- **200 testing image pairs** without ground-truth disparities
- Image size: $H = 376$ and $W = 1240$.



2. Scene Flow:

- a large scale **synthetic** dataset
- **35,454 training** and **4,370 testing** images
- Image size: $H = 540$ and $W = 960$.



Use Cases

1. Autonomous driving

Real-time images caught by stereo cameras

2. AI photography

Images captured by smartphones

3. AR application

Images of the environment

Depth Images

```
graph TD; A[1. Autonomous driving<br/>Real-time images caught by stereo cameras] --> D[Depth Images]; B[2. AI photography<br/>Images captured by smartphones] --> D; C[3. AR application<br/>Images of the environment] --> D; D --> E[Distance between actual items and car]; D --> F[Distance between background and objects]; D --> G[Distance between background and AR glasses]; E --> H[Design further actions.]; F --> I[Apply DOF effects for non-professional photograph devices.]; G --> J[Construct and display 3D objects.]
```

Distance between actual items and car

Design further actions.

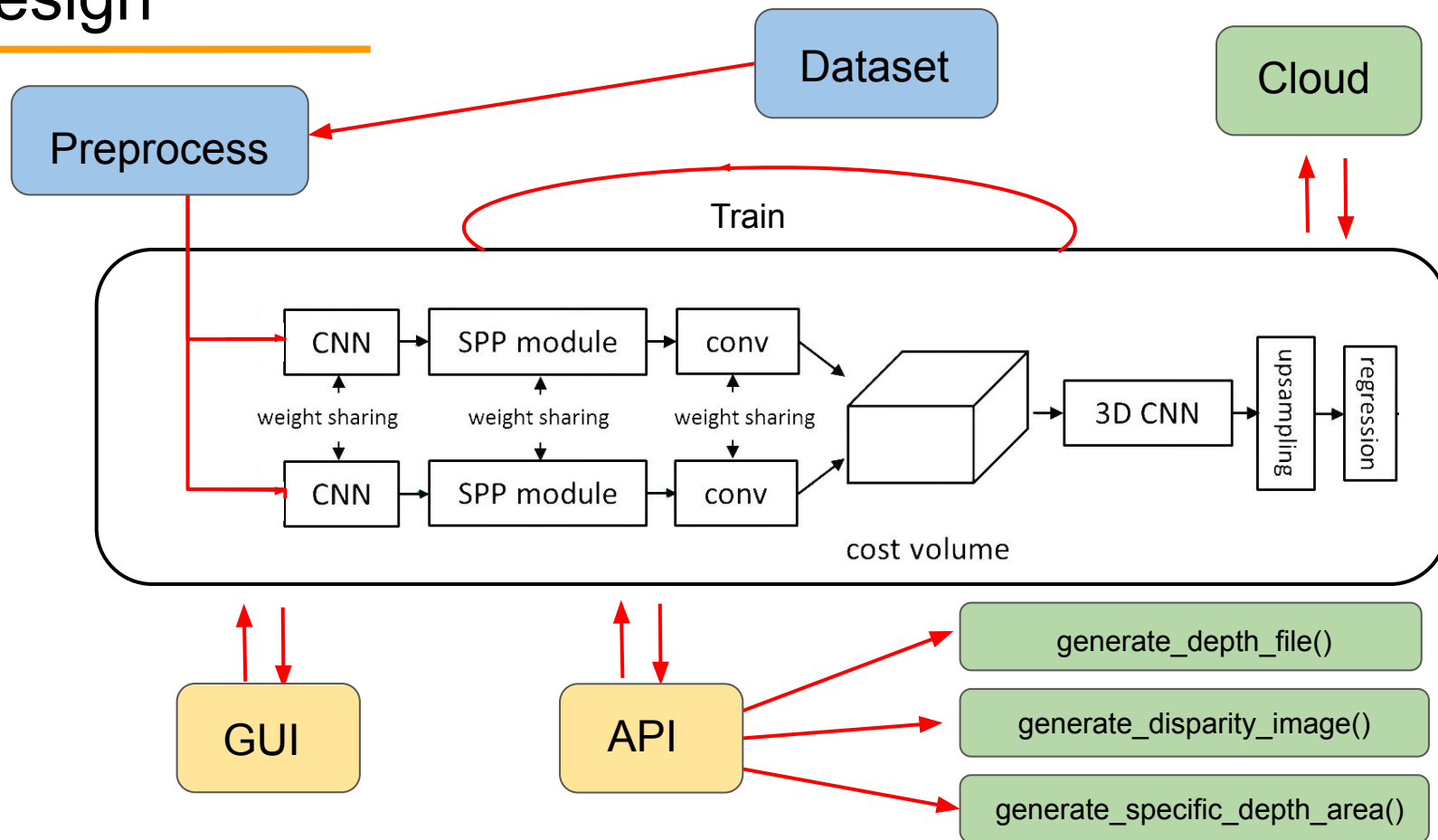
Distance between background and objects

Apply DOF effects for non-professional photograph devices.

Distance between background and AR glasses

Construct and display 3D objects.

Design



Demo

Project Structure

Stereo-Depth-Estimation-Network(final)

```
|--- SDENet/
|   |--- models/
|   |   |--- __init__.py
|   |   |--- basic.py
|   |   |--- stackhourglass.py
|   |   |--- submodule.py
|   |--- tests/
|   |   |--- test_generate_depth_file.py
|   |   |--- test_generate_disparity_image.py
|   |   |--- test_generate_specific_depth_area.py
|   |--- trained/
|   |   |--- KITTI2015.tar
|   |   |--- sceneflow.tar
|   |
```

```
|   |--- utils/
|   |   |--- SdenetDemo.py
|   |   |--- __init__.py
|   |   |--- config.py
|   |   |--- display_depth.py
|   |   |--- generate_depth_file.py
|   |   |--- generate_disparity_image.py
|   |   |--- generate_specific_depth_area.py
|   |   |--- inference.py
|   |   |--- preprocess.py
|--- doc/
|   |--- Component_Specification.md
|   |--- Functional_Specification.md
|--- .gitignore
|--- LICENSE.txt
|--- README.md
|--- requirements.txt
|--- setup.py
```

Future Work

- Deploy the model on the cloud platform
- Accelerate the prediction process
- Create more APIs such as let the users to finetune the model on their own dataset or let the users to load their own models

Thank You!

