FastCompletion: A Cascade Network with Multiscale Group-Fused Inputs for Real-Time Depth Completion

Yonggen Ling1
Wanchao Chi2
Zejian Yuan1
Shenghao Zhang2
Chong Zhang2
1Xi’an Jiaotong University, China
2Tencent Robotics X, China

Task

- Depth completion
  To estimate a dense depth map from sparse depth points in combination with an aligned high-resolution camera image.

Challenges

- To have a low computational complexity
  1. Dealing with multimodality data introduces extra computations.
  2. Capturing diverse structures requires large models.

Cascaded Networks with Multiscale Inputs

- 2 cascaded hourglass networks are employed as the backbone.
- The cascaded networks receive input maps at different resolutions.
- Each subnetwork is specialized for certain structures and has a lightweight architecture.

Grouped Fusion

- The sparse depth and the gray image are fed into convolutional layers with 2 filter groups.
- Low computational complexity
- High degree of parallelism

Ablation Study

- Grouped fusion saves inference time without losing accuracy
- Cascaded networks result in high accuracy & low runtime.
- The influence of the number of hourglasses.

Results

- Comparison with state-of-the-art methods on NVIDIA Jetson AGX Xavier.
- The proposed model runs at more than 39 frames per second (FPS).
- Example results

---