RGB-D Based Highly Reflective and Transparent Objects Semantic Segmentation

Highly reflective and transparent objects (namely **challenging object**, e.g., glasses and mirrors) are very common in our daily lives, yet their unique visual and optical properties severely degrade the performance of many computer vision algorithms when used in practice.

(a) (b) (c) (d)

Fig 1. Problems with challenging object in existing vision tasks.

As shown in Fig 1, segmentation algorithm wrongly segments the instances inside the mirror (Fig 1(a)), or segments the instances behind the glass but is not aware that they are actually behind the glass (Fig 1(b)). Many 3D computer vision tasks (e.g., depth estimation and 3D reconstruction) and 3D cameras also suffer from these challenge objects due to their optical properties (Figs 1(c-d)). These challenging objects limit the application of scene-understanding algorithms in the industry. Therefore, it is essential to detect and segment these challenging objects.

Recently, researchers have paid attention to challenging object segmentation and constructed some challenging object datasets. These works only focus on certain types of challenging objects (*e.g.,* mirrors or drinking glasses) rather than general highly reflective and transparent objects.

This proposal provides a unified challenging-object semantic-segmentation dataset, which contains both highly reflective and transparent objects (*e.g.*, mirrors, mirror-like objects, drinking glasses and transparent plastic), which is more general than other above-mentioned datasets of challenging objects. The proposed dataset allows researchers to make profound improvements for challenging object segmentation. It also can promote the progress of related research areas (robot grasping, 3D pose estimation and 3D reconstruction for challenging object).