

A hybrid Convolutional Neural Network for door and window detection in indoor environments using the multi-sensors datasets

Task

Develop a hybrid Convolutional Neural Network for localization and recognizing the type of door and window in indoor environments using the 3D colored point clouds and RGB images:

- Get to know the deep learning networks architectures.
- Get to know the methods of points and images annotation [2], [3].
- Get familiar with deep learning for Image and point cloud fusion [4].
- Test the implementation and evaluate efficiency on multi-sensors datasets of the TUM campus.

- [1]. Quintana Galera, Blanca & Prieto, Samuel & Adan, Antonio & Bosché, Frédéric. (2018). Door detection in 3D colored point clouds of indoor environments. *Automation in Construction*. 85. 146–166. 10.1016/j.autcon.2017.10.016. <http://dx.doi.org/10.1016/j.autcon.2017.10.016>
- [2]. O' Mahony, Niall & Campbell, Sean & Carvalho, Anderson & Krpalkova, Lenka & Riordan, Daniel & Walsh, Joseph. (2019). Point Cloud Annotation Methods for 3D Deep Learning. 1-6. 10.1109/ICST46873.2019.9047730. <http://doi.org/10.1109/ICST46873.2019.9047730>
- [3]. Khaing, Phyu & Yu, May. (2019). A Survey in Deep Learning Model for Image Annotation. *International Journal of Computer (IJC)*. 32. 54-63.
- [4]. Zhang, Rui & Li, Guangyun & Li, Minglei & Wang, Li. (2018). Fusion of images and point clouds for the semantic segmentation of large-scale 3D scenes based on deep learning. *ISPRS Journal of Photogrammetry and Remote Sensing*. 143. <http://dx.doi.org/10.1016/j.isprsjprs.2018.04.022>

Project Characteristics

Modeling:	<input type="checkbox"/>
Mathematics:	<input checked="" type="checkbox"/>
Programming:	<input checked="" type="checkbox"/>
Science:	<input checked="" type="checkbox"/>

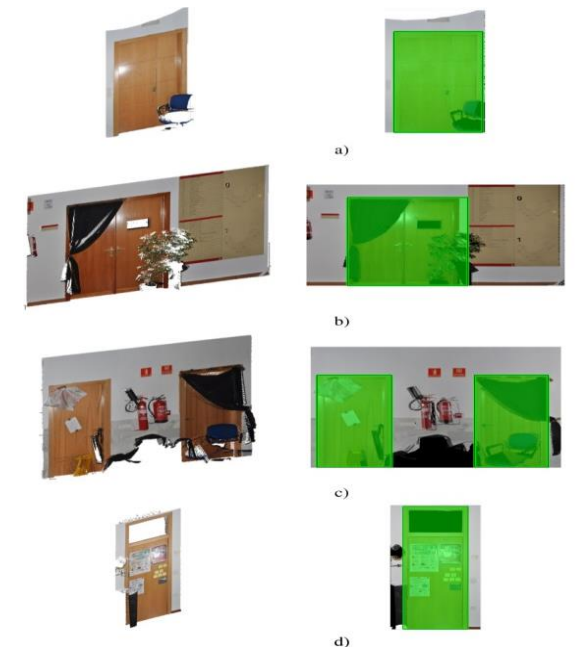


Figure 1: Door detection in indoor environments [1]