Objects Labelling

Description

Object labelling is the process of annotating objects such as doors and windows within images to provide machine-readable information about their presence, location, and characteristics. It involves identifying and delineating specific objects or regions of interest within the visual data and assigning descriptive labels or categories to them. This annotated data serves as training material for machine learning algorithms, enabling them to recognize and classify objects accurately in new, unseen data.

The process typically involves drawing bounding boxes, polygons, or masks around individual objects or areas of interest within the images. Each annotated object is assigned a label or class identifier corresponding to its semantic category, such as "left_door," "right_door," "slide_door," etc.

Object labelling is crucial for our computer vision tasks, particularly object detection in floor plans. It lays the foundation for building robust and accurate machine learning models that can automate object detection tasks in floor plans.

Overall, object labelling plays a pivotal role in bridging the semantic gap between raw floor plans and machine-understandable representations, facilitating the development of advanced computer vision systems capable of interpreting and understanding visual information with human-like accuracy and efficiency.

Requirements

The labelling process will commence with floor plans sourced from Signature Homes, requiring a minimum of 1,500 images. Each distinct object category within these images must contain no fewer than 1,000 instances.

Once the minimum image requirement is met, the model training phase will commence. Following this, the labelling process can extend to include floor plans from other companies. However, prior to this, Step 1 of the process outlined below must be completed and shared with Nick before implementation.

The quantity of images from other companies is expected to be comparable to those from Signature Homes. If the quantity falls short, consideration will be given to including them in the model based on their relevance. Furthermore, during this phase, depending on the disparity between object types in the images from other companies and those from Signature Homes, a decision will be made to either utilize existing labels or create new ones.

Concurrently, the labelling of Signature Homes' floor plans can continue in the background to enhance the model's accuracy with additional input images.

Process

The outlined process ensures efficient object labelling for machine learning tasks, beginning with the conversion of PDFs to PNG or JPG images and concluding with a meticulously annotated dataset, primed for model training and deployment.

1. *Define Labelling Schema: (Perform by expert from ID)*
   - Determine the classes or categories of objects to be labeled within the images. This might include objects like left_door, right_door, slide_door, ... etc.
   - Create a clear and comprehensive labelling schema that outlines the criteria for each class and any specific labelling guidelines or standards to be followed.

2. *Convert PDF to PNG or JPG: (Performed by student)*
   - Identify the PDF file(s) containing the images for labelling.
   - Choose a suitable tool to convert PDF to image format (JPG or PNG). This can be done using software like Adobe Acrobat or free online converters without losing image quality. Since a single floor plan PDF file may contain multiple pages, some of which may not be floor plans but text, ensure that all floor plans are batch converted to images. Verify that each page is saved as a separate image file, and that no text pages are inadvertently converted to images.

3. *Prepare Labelling Environment: (Performed by student)*
   - Set up a labelling tool or platform suited for object labelling tasks, and we will use open-source tool CVAT.
   - Ensure the labelling environment allows for the annotation of objects within images and supports the formats of the converted images (PNG or JPG).

4. *Load Images into Labelling Tool: (Performed by student)*
   - Import the converted PNG or JPG images into the labelling tool or platform.
   - Verify that all images are correctly loaded and displayed within the labelling environment.

5. *Perform Object Labelling: (Performed by student)*
   - Begin labelling each image by identifying and drawing bounding boxes or polygons around objects of interest according to the defined labelling schema.
   - Assign appropriate class labels to each annotated object based on the predefined categories.

6. *Quality Assurance: (Performed by expert from ID or student, but cross check prefered)*
   - Implement quality assurance measures to ensure accurate and consistent labelling across all images.
   - Review labeled images to check for any missed objects, mislabeled objects, or labelling errors. Becareful with labelling error especially when object has been given wrong label, which will lead to poor performance of marchine learning model
   - Make necessary corrections and adjustments as needed to maintain labelling accuracy.

7. *Save Labeled Data: (Performed by student)*
   - Save the annotated images along with their corresponding object labels in a structured format compatible with machine learning frameworks (e.g., Pascal VOC XML format, COCO JSON format).

   - Organise the labeled data into appropriate directories or datasets for easy access and future use.

8. *Documentation: (Performed by student)*
   - Document the labelling process, including any specific instructions, tools used, and decisions made during labelling, to ensure reproducibility and transparency.

Note: Step 1, defining the labelling schema, can be initiated by the ID expert. They will provide detailed instructions along with sample pictures for each type of object. This schema will serve as the manual for labelling purposes.