A Dataset and Machine Learning Approach to Classify and Augment Interface Elements of Household Appliances to Support People with Visual Impairment

Thank you for showing interest in our research.

Towards the goal of implementing an application that recognizes different interface elements of household appliances and visualizes them using an augmented reality headset. For this purpose, the outlines of the interface elements shall be highlighted and projected directly into the field of view of the headset wearer. The application is intended to help people with visual impairment to recognize and distinguish between operating elements more easily, thus facilitating the use of household appliances in their daily lives. For implementing such an application, I need a dataset.

We want to create such a database using images from all of you. We will use these images to annotate interface elements and train a neuronal network. To support other researchers, we will publish our dataset.

Short Instruction

1. Example video: <Link>
2. Pick as many household appliances with knobs, push buttons or sliders as you want (most important: washing machine, dishwasher, oven, kitchen range, microwave; Important: radio, stereo, CD player, irons; Others: blender, coffee maker, toaster, kettle, vacuum cleaner)
3. Do a landscape video circling around the devices interface **(try to avoid reflections of you or other humans)**. One video per device. You can add another video of the same device with different lighting (daylight vs. lightbulb).
4. Grant of rights of use: <Link>
   This document is also listed on the first page of the upload form (see point 5).
5. Upload videos: <Link>
   Each video can be uploaded on a new page, where you can specify the *type, lightning, manufacturer,* and *model*, for example: *dishwasher, daylight, Samsung* and *s7.* The maximum size of each upload is 1 GB. If some details are unknown leave them empty.

Detailed Instruction

1. An example of a shot is shown in the video at the following link: <Link>
   For a detailed textual description of how to record the video, see point 3.
2. For the data set, the most important **household appliances** are washing machine, dishwashers, ovens, kitchen ranges and microwaves. Also important are radios, stereos, CD players and irons. Other possible household appliances are blenders, coffee makers, toaster, kettles and vacuum cleaners. Select as many household appliances as you want.

The interface elements of the appliances must not only be touch displays, but have to include **knobs, push buttons or sliders**.

3. Any camera can be used to record the interface elements (including cell phone cameras). If possible, use **mp4/MPEG-4** as video format, otherwise use formats such as MOV, HEVC, MPEG or AVI.
   Please record a **separate video per device**.
   If the devices' location allows for it, please take multiple videos of the same device under **different lightning conditions** (broad daylight, room light, dusk without light, etc. …).
   During recording, the operating elements must be visible continuously in the camera frame. Record the video in **landscape format**. Start the recording frontally to the interface elements so that they are in the center of the screen. Now move the running camera around the controls once in a circle. **Change the angle** of the camera so that every perspective is covered. The control elements should not remain in the center of each frame. Try to **avoid reflections** of you or other humans as well as extensive shadows.
   If you are worried that the video quality is too low to extract still images, please make a series of at least 20 images per device following the same path as a video would (in JPEG or PNG format). There is also an example of such an approach in the linked video above.
4. The grant of rights of use can be find at the following link: <Link>
   This document is also listed on the first page of the upload form (see point 5). On the form, **enter your name** in the column provided and **click on the two respective items** (found under **"Agreement"**) to **agree to the terms**.
5. **Upload** your recordings to the following link: <Link>
   If you have trouble with accessing the Upload form, please contact us for alternative solutions under <Contact>.
   For each individual video, use a new page named "Data Collection". Fill in the type of the household device you recorded (**"Type"**) and upload the corresponding video (**"Upload"**). The maximum size of each upload is 1 GB. Add information about the lightning (**"Lightning"**), e.g., *daylight*, the manufacturer (**"Manufacturer"**), e.g., *samsung*, and the model (**"Model"**), e.g., *s7*. If details are unknown leave them empty. For **uploading more videos**, select at the end of a page "I have another video". After uploading all videos, you recorded, select "I uploaded all videos". For uploading photos, merge them into a zip file and upload the file.

If you have any questions about the use of the dataset or how the data collection is conducted, please feel free to contact us at any time. You can reach us under <Contact>.

Thank you in advance for your time and support!