

ICONATE: Automatic Compound Icon Generation and Ideation

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APPENDIX

MORE DETAILS ABOUT ICONVOC152

The International Picture Naming Project (IPNP) [Szekely et al. 2004], run in seven different languages, asked international participants to name 520 black-and-white drawings of common objects. A later study combined the concepts in the IPNP and the McRae corpus [McRae et al. 2005] (a corpus of 541 nouns for which a thorough set of attributes or "feature norms" was collected), resulting in a subset of 288 common concepts that were used to compare picture and word recognition performances [Taikh et al. 2015].

Our final icon vocabulary contains 152 concepts. Of these, 104 can be found in the original IPNP corpus, 80 can be found in the UCal corpus, 136 have matching concepts among PowerPoint's icons (verified visually, as those icons do not have tags/names), and 136 have corresponding Emoji symbols (80 had exact word matches, the rest of the matches were visually verified, e.g., tag = label, corn = ear of corn, garbage can = wastebasket).

Icon categories: Using the categories in the PowerPoint icon lists and Emoji taxonomy as inspiration, we divided our 152 icon concepts into 18 categories, each containing 3–23 concepts. We did not reuse an existing categorization because the PowerPoint categorization was too fine-grained for our concepts (yielding 31 categories with ten single-concept categories) and the Emoji categorization grouped all objects into a single category which covered almost 40% of our concepts. Instead, we manually merged icon concepts together to avoid single-concept categories and categories covering more than 20% of our concepts (our largest category, "animals and insects" covers just over 15% of our concepts).

ICON ANNOTATION TOOL

The interface of our annotation tool for segmenting icons is shown in Figure 1. We developed the interface to work

around the challenging problem of automatically parsing and segmenting an SVG file into constituent icons (e.g., hand) beyond simple graphical primitives (e.g., circle, path). The interface provides an intuitive interaction where a user can simply drag an SVG file onto the canvas and click a constituent icon to select it. The user can then assign a text label to each segmented icon. Often, multiple constituent icons are intertwined together in a compound path. In this case, the user has to use the masking function (Erasers in Figure 1C) to separate one from another. The final output file consists of the segmented constituent icons in pixel format, along with their labels.

RESULTS OF USER STUDY WITH PROFESSIONALS

Figure 2 shows some results generated by professionals using our tool. We show the screenshots from recorded interview videos. In Figure 2a, one designer worked around the automatically suggested layouts, scaling and shifting the constituent icons until he was happy with the final result. "This is a beautiful icon", he commented. In Figure 2b, a designer selected the second option in the ranked list of suggestions, and made a minor layout tweak to achieve better visual balance. In Figure 2c, another designer excitedly experimented with the style variations of the constituent icons.

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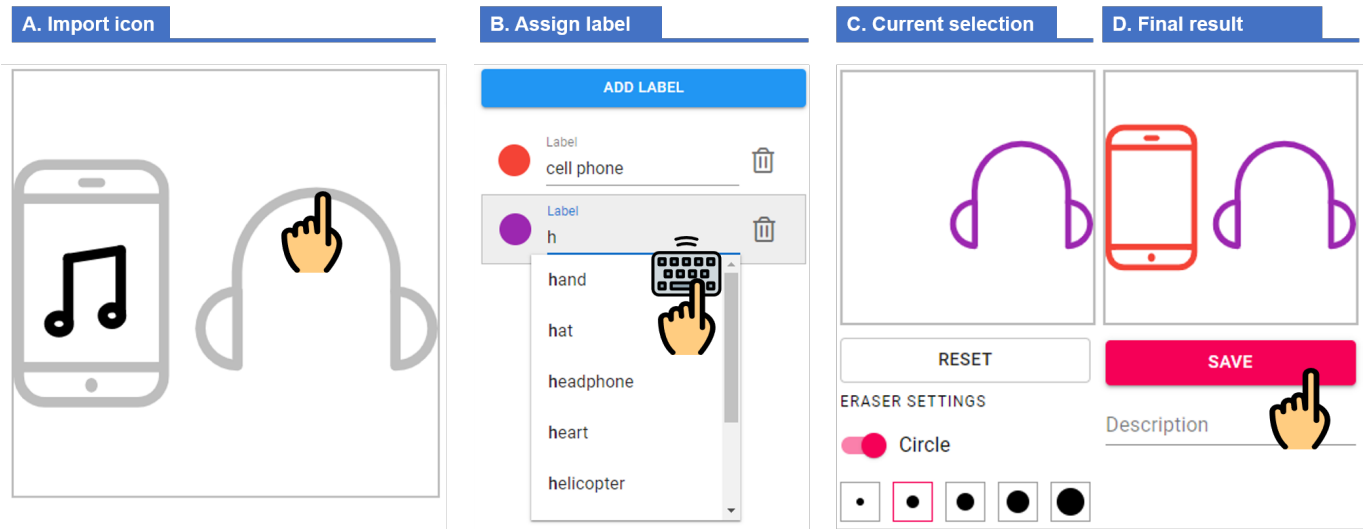


Figure 1. Our icon annotation interface. Annotators drag an icon in SVG format onto the canvas (A). They instantiate labels and assign the labels to constituent icons by clicking on corresponding regions in the canvas. Auto-complete suggestions (B) guide annotators to select words from our *IconVoc152* basic vocabulary. Another canvas (C) shows the current selection for the given label, which can be adjusted using the eraser tool if necessary. A final canvas (D) shows all the annotated constituent icons together, which can be exported as a CSV by clicking on the "save" button.

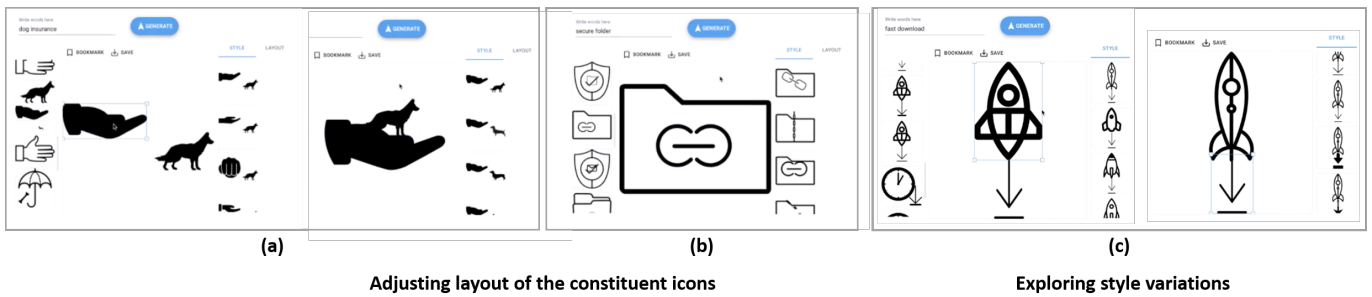


Figure 2. Screenshots of how professionals create compound icons using our tool.