Crowdsourcing Part Annotations for Visual Verification
B.H.L. Vredebregt

Abstract

Many maintenance and repair tasks involve first verifying the condition of parts of an object e.g. bicycle maker checking for other defects before starting to repair defects. It involves first detecting the object, followed by locating each of the parts and finally judging the state of each part. We call this process Visual Verification. Many popular datasets already contain object annotations, datasets containing part annotations are rare and there is no dataset that provides part state judgments. As a result state-of-the-art object detection algorithms are only evaluated on detecting relatively large objects and not on the often much smaller parts. Thus there is a need for a new dataset. In this thesis we created an unique crowdsourced dataset consisting of 10.000 images of bicycles in various settings to fill this gap. For each bicycle 22 parts were annotated using the crowdsourcing platform CrowdFlower. Resulting in a total of 220.000 bounding box annotations with median relative area size of 60.10% to 0.40% covering a wide range of object sizes where PASCAL VOC is limited to median relative area sizes of 46.15% to 1.8%. Additionally each part in the dataset also was judged to determine its state (intact, broken, occluded or absent) allowing future research into Visual Verification. For this purpose 220.000 state judgments are made available in addition to the bounding boxes. In our experiments we show that, unlike most crowd sourcing campaign, only a single judgment is sufficient to create annotations of sufficient quality. We show under which condition this is a reasonable trade-off between cost and quality. We apply three state-of-the-art detectors to show the relationship between relative part size and performance, which shows part detection and therefor Visual Verification are yet to be solved.