EasyMark: Semiautomatic Image Annotation Tool

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Abstract. *Image annotation tools are indispensable in this era of rapid Artificial Intelligence (AI) development, where image inference systems can be applied in most fields to aid professionals in several tasks. However, the current solutions are found to be lacking in multiple areas, including access, availability, security, and trust. For these reasons, this project aims to develop EasyMark, an image annotation tool designed to address these pressing issues, aiming for the safety and privacy of its users. At its current state, EasyMark is capable of manually and automatically annotating image folders, while remaining fully offline and open-source.*

1. Introduction

Development of Artificial Intelligence (AI) systems is currently at its all-time high, with new methods and functionalities proposed and launched every day, and among its various applications, detecting [Aleid et al. 2023], recognizing [Chintalapati et al. 2025], categorizing [Sainsbury-Martinez et al. 2023], and tracking [Jiménez-Bravo et al. 2022] objects in images and videos are of vital importance. Capable of being applied in most fields that require visual queues for proper decision-making, including areas from traffic assessment [Jiménez-Bravo et al. 2022], to detection of tumors in patients [Aleid et al. 2023], the development of image inference systems is imperative to increase safety and efficiency. Most of these systems, however, are completely dependent on data gathering and annotation, a pivotal step in the manufacturing of an AI system [Dutta and Zisserman 2019], as without plentiful or accurate data, the system is unable to produce precise results.

Therefore, tools for image annotation are critical when manufacturing or fine-tuning any visual, AI-based inference system, due to their reliability and efficiency at organizing data. Unfortunately, most of the current existing tools [Barlow 2018, Wang 2016, Kawamura 2017, Dwyer and Nelson 2020, Sharma et al. 2018, Rizzoli and Edwardsson 2018, Tzutalin 2015, Russell et al. 2008, Manovich 2018] are found to be lacking in multiple areas, like public access, service availability, data security, and trust with its users.

In this project, we develop EasyMark, an image annotation tool that addresses the present issues found. Initially, we analyzed popular tools currently available to identify gaps in their services, and based on those findings, we built EasyMark. Aiming for security and privacy of its users, EasyMark works completely offline and, to remain transparent, it is fully available open-source over on GitHub. Furthermore, to increase efficiency, EasyMark comes with both automatic and semi-automatic features bundled in its toolkit.

Table 1. Annotations tools, their availability, privacy and transparency

Tool	Value	Automation	Open-Source	Privacy	Platform
Roboflow	Free*	Yes*	No	Collects data	Online
V7 Darwin	Pay	Yes	No	Collects data	Online
Labelbox	Free*	Yes*	No	Collects data	Online
CVAT	Free*	Yes*	Yes	Collects data	Online
Scale AI	Free*	Yes	No	Microsoft Terms	Onboard
RectLabel	Free*	Yes	No	Apple Terms	Onboard*
Labelme	Pay	Yes	Yes	Full privacy	Onboard
VOTT	Free	Yes	Yes	Microsoft Terms	Onboard
LabelImg	Free	No	Yes	Full privacy	Onboard
Proposed	Free	Yes	Yes	Full privacy	Onboard

*Appears when there are caveats or conditions, such as demo accounts or extremely limited testing.

2. Methodology

Initially, we conducted an exploratory review to identify missing features and policies on several well-known image annotation tools. The study consisted of examining each tool's terms of privacy, searching for what, why and to what use is client data being stored and which security measures are put to protect this data; transparency about its inner-workings, highlighting open-source software with a public code base; and pay-walled functionalities, encompassing limited or otherwise blocked utilities.

Table 1 summarizes the most popular tools found in our exploratory review. This analysis included Roboflow [Dwyer and Nelson 2020], V7 Darwin [Rizzoli and Edwardsson 2018], Labelbox [Sharma et al. 2018], CVAT (Computer Vision Annotation Tool) [Manovich 2018], Scale AI [Wang 2016], RectLabel [Kawamura 2017], Labelme [Russell et al. 2008], VOTT (Visual Object Tagging Tool) [Barlow 2018], and LabelImg [Tzutalin 2015], of which most come with strengths and limitations.

In cases like Roboflow, LabelBox, and CVAT, free plans are offered to the user with significant limitations, reducing project size and quantity, restricting team size in shared projects, blocking features, and even limiting security measures. Likewise, most of the tools collect user data, which not only infringes on user privacy but additionally poses great risks to private and confidential projects.

Based on these findings, EasyMark was built utilizing the Python programming language and the Tkinter library, due to its wide support and reliability. Moreover, its semi-automatic and automatic features are based on the Ultralytics YOLOv8 and FastSAM models of image inference, chosen due to being an open-source library and for its ability to segment any object from a pre-defined seed, feature explained below.

3. Results

In its current state, EasyMark is already capable of providing the basic functions needed for image annotation. The software allows the user to load a folder containing images, create a list of categories of interest, and choose between two annotation methods, manual or semi-automatic, as shown in Figure 1, plus a fully automatic annotation feature.

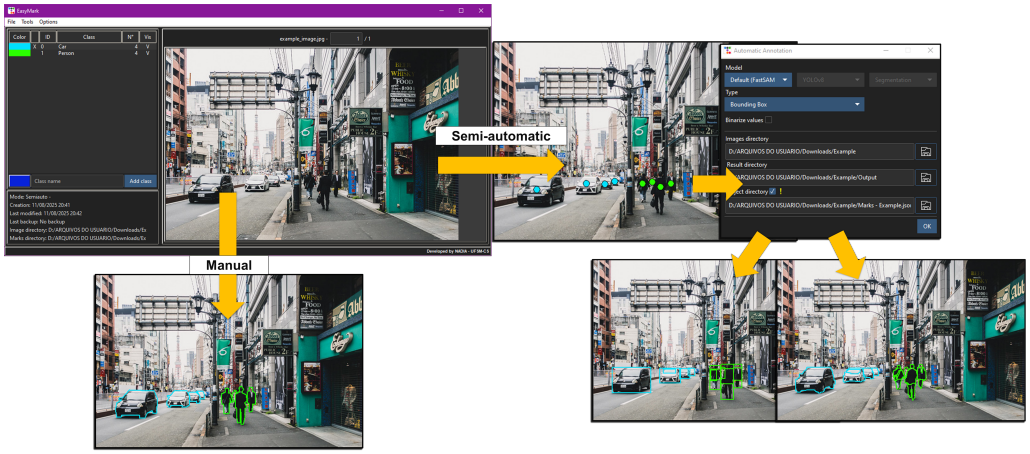

Figure 1. Diagram visualizing the manual and semi-automatic annotation processes in EasyMark

Manual mode allows users to draw a bounding box or polygon—created point by point—to make an object in the image stand out from the background. Semi-automatic accelerates the annotation pipeline of newer datasets. Consists of 'planting seeds' over the desired objects, which are fed to an AI, utilizing the FastSAM predictor system, to automatically infer and highlight the objects. Automatic annotation is highly useful to expand pre-existing datasets. Consists of utilizing a model already trained with the categories of interest to process a set of non-annotated images to infer the annotations, needing only manual fine-tuning of the output.

When finished, the annotations can then be exported, with custom settings for partition size and automatic stratification. By default, the exported files are in a viable dataset format for training YOLO family models, including a set of organized folders with images and corresponding labels, plus a configuration yaml file.

EasyMark runs offline, not requiring login or internet access for it to function properly with all its features. Thanks to this, both user and project data remain completely confidential . Moreover, the tool is completely open-source, publicly available on GitHub[1], and free of charge.

4. Conclusions and Future Works

In short, image annotation is imperative for building an accurate image inference system; however, the current tools available for the task are insecure towards user data and generally not transparent about their systems. For those reasons, we developed a software capable of tackling those issues, called EasyMark, an onboard offline open-source image annotation tool that aims for privacy and transparency, while providing extra features to aid in the creation and expansion of datasets.

For the future of EasyMark, we plan to rework or add many features: (*i*) wider support for AI model infrastructures (R-CNN, SSD, etc.) and dataset standards (ImageNet, COCO, Pascal); (*ii*) allow for fine-tuning the automatic and semi-automatic annotation outputs, with preset and custom-made commands and filters; (*iii*) modular implementation for user-made features and project-specific tools; (*iv*) add support for dynamic media

[1]Link to repository: `https://github.com/NADIA-UFSM/EasyMark`

annotation, primarily video, and related features; (*v*) develop support for spherical image annotation, tackling its main issues, circularity and projection-induced distortions. Alongside that, an evaluation will be made on its usability, collecting user feedback regarding ease of use, output quality, annotation speed, etc.

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